POST-GRADUATE WING OF SBRR MAHAJANA FIRST GRADE COLLEGE

(Autonomous)

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

K.R.S. Road, Metagalli, Mysuru-570016.

Affiliated to University of Mysore.

GENERAL REGULATIONS & STRUCTURE

OF

POST-GRADUATE PROGRAMMES

CONTENTS

Regulations for Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) for Post-Graduate Programmes with Effect from 2019-2020.

1. Title and Commencement

These Regulations shall be called the Regulations of Post-Graduate Programmes of SBRR Mahajana First Grade College for Choice Based Credit System **(CBCS)** and Continuous Assessment Grading Pattern (**CAGP**). These Regulations shall come into force from the academic year 2019- 2020.

2. Programmes offered:

Sl. No.	Programmes
1	Master of Commerce (M.Com.)
2	Master of Computer Application (M.C.A.)
3	Master of Business Administration (M.B.A.)
4	Master of Science in Biotechnology (M.Sc. Biotechnology)
5	Master of Science in Microbiology (M.Sc. Microbiology)
6	Master of Science in Biochemistry (M.Sc. Biochemistry)
7	Master of Science in Botany (M.Sc. Botany)
8	Master of Science in Chemistry (M.Sc. Chemistry)
9	Master of Social Work (MSW)
10	Master of Science in Computer Science (M.Sc. Computer Science)
11	Master of Arts in Economics (M.A. Economics)
12	Master of Tourism and Travel Management (MTTM)

3. Definitions

Course

Every course offered will have three components associated with the teaching-learning process of the course, namely

(i) Lecture – L (ii) Tutorial- T (iii) Practical - P, where

L stands Lecture session. **T** stands Tutorial session consisting participatory discussion / self study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands Practice session and it consists of Hands on experience / Laboratory Experiments / Field Studies / Case studies that equip students to acquire the much required skill component.

In terms of credits, every one hour session of L amounts to 1 credit per semester and a minimum of two hour session of T or P amounts to 1 credit per semester, over a period of one semester of 16 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components. That means a course may have only lecture component, or only practical component or combination of any two or all the three components.

The total credits earned by a student at the end of the semester upon successfully completing the course are L + T + P. The credit pattern of the course is indicated as

L: T: P.

If a course is of 4 credits then the different credit distribution patterns in L: T: P format could be

4 : 0 : 0,	1 : 2 : 1,	1 : 1 : 2,	1 : 0 : 3,	1 : 3 : 0,
2 : 1 : 1,	2 : 2 : 0,	2 : 0 : 2,	3 : 1 : 0,	3 : 0 : 1,
0 : 2 : 2,	0 : 4 : 0,	0 : 0 : 4,	0 : 1 : 3,	0 : 3 : 1,

The concerned BoS will choose the convenient credit pattern for every course based on the requirement.

Different courses of study are labelled and defined as follows:

Core Course

A course which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

A Core course may be a **Soft Core** if there is a choice or an option for the candidate to choose a course from a pool of courses from the main discipline /course of study or from a sister/related discipline / course which supports the main discipline / course. In contrast to the phrase Soft Core, a compulsory core course is called a **Hard Core** Course.

Elective Course

Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline / course of study or which provides an extended scope or which enables an exposure to some other discipline / course/domain or nurtures the candidate's proficiency/ skill is called an Elective Course. Elective courses may be offered by the main discipline/ course of study or by sister /

related discipline / course of study. A Soft Core course may also be considered as an elective.

An elective course chosen generally from an unrelated discipline / course, with an intention to seek exposure is called an **Open Elective**.

An elective course designed to acquire a special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher is called a **Self Study Elective.**

A core course offered in a discipline / course may be treated as an elective by other discipline / course and vice versa.

Project work/Dissertation work is a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A project work up to 4 credits is called Minor Project work. A project work of 6 to 8 credits is called Major Project Work. Dissertation work can be of 10-12 credits. A Project/Dissertation work may be a hard core or a soft core as decided by the concerned BoS.

Note: Courses of study for MBA and M.A in Economics Programmes - Refer: Annexure I.

4. Eligibility for Admission

Candidates possessing a degree of University of Mysore, or of any other University, equivalent there to and complying with the eligibility criteria shown in **Annexure – II**, are eligible for admission to post graduate degree programmes. Candidates seeking admission to post graduate programmes need to appear for the entrance examination.

A student who has obtained degree from any foreign university must obtain eligibility certificate for admission to PG programmes from University of Mysore.

5.0 Scheme of Instructions

5.1 A Masters Degree program is of 4/6 semesters-two/three year's duration for regular candidates. A regular candidate can avail a maximum of 8/12 semesters – 4/6 years (in one stretch) to complete Masters' Degree (including blank semesters, if any). Whenever, a candidate opts for blank semester(s)/DROP in a course or in courses or is compelled to DROP a course or courses as per the provision of the regulation, he/she has to study the prevailing courses offered by the department as per the prevailing scheme, when he/she continues his/her study.

5.2 A candidate has to earn a minimum of 76 credits, for successful completion of Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	Credits
Hard Core	A minimum of 42, but not exceeding 52
Soft Core	A minimum of 16
Open Elective	A minimum of 4

Every course including project work, practical work, field work, seminar, self-study elective should be entitled as hard core or soft core or open elective by the BoS concerned.

Note: Minimum credit requirement for the award of master's degree in specific programmes, refer Annexure III

5.3 A candidate can enrol for a maximum of 24 credits per semester with the approval of the concerned department.

5.4 Only such candidates who register for a minimum of 18 credits per semester in the first two semesters and complete successfully 76 credits in total of the 4 semesters shall be considered for declaration of ranks, medals and are eligible to apply for student fellowship, scholarship, free ships and hostel facilities.

5.5 In excess to the minimum of 76 credits for masters degree in the concerned discipline / course of study, a candidate can opt to complete a minimum of 18 extra credits to acquire **add on proficiency diploma** in that particular discipline /course along with the masters' degree. In such of the cases wherein, a candidate opts to earn at least 4 extra credits in different discipline / courses in addition to a minimum of 76 credits at masters level as said above then an **add on proficiency certification** will be issued to the candidate by listing the courses studied and grades earned.

5.6 A candidate admitted to Masters Program can exercise an option to exit with Bachelor Honors Degree / PG diploma after earning 40 credits successfully.

6.0. Continuous Assessment, Earning of Credits and Award of Grades

The evaluation of the candidate shall be based on continuous assessment. The Structure for evaluation is as follows:

6.1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified as C1, C2, and C3.

6.2 The performance of a candidate in a course (30:70 pattern) will be assessed for a maximum of 100 marks as explained below:

6.2.1 The first component (C1), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions, etc., During the first half of the

semester, the first 50% of the syllabus will be completed. This shall be consolidated during the 8th week of the semester. Beyond 8th week, making changes in C1 is not permitted.

6.2.2 The second component (C2), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions etc. The continuous assessment and scores of second half of the semester will be consolidated during the 16th week of the semester. During the second half of the semester the remaining units in the course will be completed.

6.2.2.1. The outline for continuous assessment activities for Component-I (C1) and Component-II (C2) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective Departmental Council. The students should be informed about the modalities well in advance. The evaluated courses/assignments during component I (C1) and component II (C2) of assessment are immediately returned to the candidates after obtaining acknowledgement in the register maintained by the concern teacher for this purpose.

6.2.3 During the 18th - 20th week of the semester, a semester-end examination of 3 hours duration shall be conducted for each course. This forms the third/final component of assessment (C3) and the maximum marks for the final component will be 70.

For the evaluation pattern 50:50 a semester-end examination of 2 hours duration shall be conducted for each course. This forms the third/final component of assessment (C3) and the maximum marks for the final component will be 50.

For evaluation pattern 10:40 a semester-end examination of 2 hours duration shall be conducted for each course. This forms the third/final component of assessment (C3) and the maximum marks for the final component will be 40.

Note: For Evaluation pattern of 50:50 - Refer Annexure IV

For Evaluation pattern of MTTM - Refer Annexure – V.

For department specific evaluation pattern refer to respective programme regulation.

Setting question papers and evaluation of answer scripts:

I. Question papers in two sets shall be set by the internal examiner and one set by external examiner for a course. Whenever there are no sufficient internal examiners, The Chairman, BoE shall get the question papers set by external examiners.

Whenever there are no external examiners, The Chairman, BoE shall get the question papers set by internal examiner.

II. The Board of Examiners shall scrutinize and approve the question papers and scheme of evaluation.

III. (i) There shall be single evaluation for all theory papers by internal examiner and 25% of the total scripts will be reviewed by an external examiner.

(ii) The average of first valuation and the review evaluation will be considered as the final marks of the candidate.

(iii) If there is difference of marks in maiden and reviewed evaluation is greater than 15 marks then the script will go for third evaluation by the external examiner and marks awarded in the third evaluation will be final.

(iv) The examination for Practical work/ Field work/ Project work will be conducted jointly by one internal and one external examiner.

(v) If a course is fully of (L=0): T: (P=0) type, then the examination for C3 Component will be as decided by the BOS concerned.

IV. Challenge Evaluation

A student who desires to apply for challenge evaluation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Controller of Examinations within 15 days after the announcement of the results. This challenge evaluation is only for C3 component.

The answer scripts, for which challenge evaluation is sought for, shall be sent to external examiner. The marks awarded in the challenge evaluation will be final.

6.2.4 In case of a course with only practical component a practical examination will be conducted with two examiners (one Internal and one external)

A candidate will be assessed on the basis of

a) Knowledge of relevant processes

b) Skills and operations involved

c) Results / products including calculation and reporting.

If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the Departmental council.

6.2.5 If **X** is the marks scored by the candidate out of 70 in C3 in theory examination, if **Y** is the marks scored by the candidate out of 70/50/40 in C3 in Practical examination, and if **Z** is the marks scored by the candidate out of 70/50/40 in C3

for a course of (L=0):T:(P=0) type that is entirely tutorial based course, then the final marks (M) in C3 is decided as per the following table.

L.T.P distribution	**Formula to compute Mark (M) in C3**
L:T:P	$\frac{[(L+T)*X]+[(T+P)*Y]}{L+2T+P}$
L:(T=0):P	$\frac{(L*X)+(P*Y)}{L+P}$
L:T:(P=0)	X
L:(T=0):(P=0)	X
(L=0):T :P	Y
(L=0): (T=0):P	Y
(L=0): T:(P=0)	Z

6.2.6 The details of continuous assessment (30:70 patterns) are summarized in the following table:

Component	**Syllabus in a Course**	**Weightage**	**Period of Continuous Assessment**
C1	First 50%	15%	First half of the semester To be consolidated by 8th week
C2	Remaining 50%	15%	Second half of the semester. To be consolidated by 16th week
C3	Semester-end examination (All units of the course)	70%	To be completed during 18th-20th Week.

6.2.7 A candidate's performance from all 3 components will be in terms of scores, and the sum of all three scores will be for a maximum of 100 marks (15 +15 + 70).

6.2.8 Finally, awarding the grades should be completed latest by 24th week of the semester.

6.3 **Minor/ Major Project Evaluation:**

Right from the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his/her progress in the form of seminars in addition to the regular discussion with the guide. Components of evaluation are as follows:

Component – I (C1): Periodic Progress and Progress Reports (15%)

Component – II (C2): Results of Work and Draft Report (15%)

Component– III (C3): Final Viva-voce and evaluation (70%).

The report evaluation is for 40% and Viva-voce examination is for 30%.

Note: For Evaluation pattern of 50:50 - Refer Annexure IV

For Evaluation pattern of MTTM - Refer Annexure – V.

For department specific evaluation pattern refer to respective programme regulation.

6.4 In case a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

In case a candidate's class attendance in a course is less than 75%, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

Teachers offering the courses will place the above details in the Department Council meeting during the last week of the semester, before the commencement of C3, and subsequently a notification pertaining to the above will be brought out by the Chairman of the Department before the commencement of C3 examination. A copy of this notification shall also be sent to the office of the Director & the Controller of Examinations.

6.5 In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUP option.

In case a candidate secures more than or equal to 30% in C3, but his/her grade (G) = 4, as per section 6.9 below, then he/she may be declared to have been conditionally successful in this course, provided such a benefit of conditional clearance based on G=4 shall not be availed for more than 8 credits for the entire program of Master's Degree of two years.

In case a candidate secures more than 30% in C3, he/she may choose DROP/MAKE-UP option.

The candidate has to exercise his/her option immediately within 10 days from the date of notification of results.

A MAKE UP examination for C3 shall be conducted in all the semesters. Candidates can register for the MAKE UP examination within 10 days from the date of notification of results. The MAKE UP examination will be conducted within one month of the notification of the results.

If a candidate is still unsuccessful, A MAKE UP Examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with next regular even semester examinations; however, not exceeding double the duration norm in one stretch from the date of joining the course.

6.6 A candidate has to re-register for the DROPPED course when the course is offered again by the department if it is a hard core course. The candidate may choose the same or an alternate core/elective in case the dropped course is soft core / elective course. A candidate who is said to have DROPPED project work has to re-register for the same subsequently within the stipulated period. **The details of any dropped course will not appear in the grade card.**

6.7 The tentative / provisional grade card will be issued by the Controller of Examinations at the end of every semester indicating the courses completed successfully. This statement will not contain the list of DROPPED courses.

6.8 Upon successful completion of Bachelors Honors/Master's Degree, a final grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Controller of Examinations.

6.9 The grade and the grade point earned by the candidate in the course will be as given below.

Marks(M)	**Grade**	**Grade Point (GP = V x G)**
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

Here, **P** is the Percentage of marks (P = [(C1+C2) + M] secured by a candidate in a course which is rounded to nearest integer. **V** is the credit value of course. **G** is the Grade and **GP** is the Grade Point.

6.10 A candidate can withdraw any course within ten days from the date of notification of final results. Whenever a candidate withdraws a paper, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is soft core/open elective.

A DROPPED course is automatically considered as a course withdrawn.

6.11 Overall Cumulative Grade Point Average (CGPA) of a candidate after successfully completing the required number of credits (76) is given by:

CGPA = ΣGP / Total Number of Credits

7. Classification of Results

The Final Grade Point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	Numerical Index	Qualitative Index
4<= CGPA <5	5	Second Class
5<= CGPA <6	6	
6<= CGPA <7	7	First Class
7<= CGPA <8	8	
8<= CGPA <9	9	Distinction
9<= CGPA <10	10	

Overall Percentage = 10* CGPA or is said to be 50% in case CGPA<5

8. Medium of Instruction

The medium of instruction shall be English. However, a candidate will be permitted to write the examinations either in English or Kannada. This rule is not applicable to languages.

9. Attendance and Conduct

Students SHALL NOT take up any employment/course, part time or full time during their study. Students found violating this rule shall be removed from the course. Minimum attendance of 75% of actual working hours in all the courses is required. A student who does not satisfy the requirements of attendance and conduct shall not be permitted to write examination.

In the case of a candidate who represents his institution/University/Karnataka State/Nation in Sports/NCC/NSS/Cultural or any official activities, shortage of attendance up to maximum of 15 days in a Semester per course may be condoned, based on the recommendation and prior permission of the Head of the Institution concerned.

The Head of the Department shall notify the list of all students who have less than 75% attendance in each course at the beginning of the 16th week of the semester. A copy of the same should be sent to the Controller of Examination of the college.

10. Transfer within University and from other Universities

- Transfer to a different institution within the University is permitted only at the beginning of the academic year.
- A Candidate seeking transfer to a different institution within University of Mysore

should have completed all the courses/papers of the previous semesters.

- A Candidate from any other university can join a program of this college only at the beginning of the academic year.
- A Candidate from other university seeking admission by transfer to the college should have completed all the courses of the previous semesters.

11. Provision for Appeal

If a candidate is not satisfied with the evaluation of C1 and C2 components, he / she can approach the grievance cell with the written submission together with all facts, the assignments, and test papers etc., which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty as prescribed by the college on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she found guilty. The decision taken by the grievance cell is final.

For every program there will be one grievance cell. The composition of the grievance cell is as follows.

1. The Controller of Examinations-ex-officio Chairman / Convener
2. One senior faculty member (other than those concerned with the evaluation of the course concerned) drawn from the department/discipline and/or from the sister departments/sister disciplines.
3. One senior faculty member / course expert drawn from outside the department.

12. Discipline

Every student is required to maintain discipline and decorum both inside and outside the campus in accordance with the instructions of the college and also as per the instructions issued by the University of Mysore/Government of Karnataka/UGC from time to time regarding Student Conduct Rules.

Any act of indiscipline of a student is first to be considered by the Disciplinary committee of the college for necessary action. If the issue demands more serious consideration, the act of indiscipline will be reported to the concerned authority who will initiate appropriate action.

Concerned authority may take necessary actions depending upon the prima facie evidence.

13. Any other issue not envisaged above, shall be resolved by the competent authority of the autonomous college, which shall be final and binding.

Any matter which is not covered under this regulation shall be resolved as per the Mysore University Regulations in this regard.

ANNEXURE –I

Definition of Course of Study ofM.B.A and M.A in Economics Programmes

1. **MASTER OF BUSINESS ADMINISTRATION (M.B.A.):**

Te Programme comprises of course of study, internship, project work and field work as prescribed.

a) Courses in the programme are of three types: **Core (C), Electives (E) and Project (P) :**

Core (C): Core Course is the course, which is to be compulsorily studied by a student as a core requirement to complete the programme. Business Familiarization Report (BFR) and Project Report are part of the core courses.

Foundation (F): Foundation (F) courses are the courses based upon the contents that lead to knowledge enhancement that are mandatory for all disciplines.

Elective (E): Elective Course is a course, which can be chosen from a group of papers.

b) **Internship and Business Familiarization Report (BFR):** In the beginning of the third semester, the students shall undertake team based internship in a business firm and prepare a Business Familiarization Report under the guidance of a faculty member. The report shall be submitted before the commencement of the third semester examinations.

i) Internship in a year cannot be for a continuous period of more than 4 weeks in a given academic year.

ii) Internship undergone during academic classes shall not be considered

iii) Each students shall maintain internship dairy

iv) Certificates (Color Photocopy) of each internship shall be submitted to the department along with the report

Details to mention on the Certificate:

i) Students name and registration number

ii) Name of the institution/organization and duration of internship with date

iii) Date, seal and signature of the authority.

c) **Project:** Each candidate shall carry out the project work independently as per Scheme of Teaching and Examinations under the guidance of one of the faculty members of the Department in the Institution of study.

The topic and title of the dissertation shall be chosen by the candidate in consultation with the guide. The subject and topic of the dissertation shall be from the major field of studies of the candidate. Modification of only the title but not the field of work

may be permitted at the time of final submission of dissertation report during IV semester. If dissertation has to be carried out in any industry/R&D labs/business organizations, outside the campus, permission shall be taken from the HoD to that effect.

2. MASTER OF ARTS IN ECONOMICS (M.A. ECONOMICS)

Hard Core Course:A Course which should be compulsorily studied as a Core requirement.[Requirement: Minimum 42 & Maximum 52 Credits]

Soft Core:A Course with a single choice the main discipline/subject of study or from sister/related discipline/subject which supports the main subject.[Requirement: Minimum 16 Credits]

Special Elective Course: Generally a course which may be very specific or specialized or advanced or supportive to the discipline/subject of study which provides an extended scope or which enables an exposure or nurtures the proficiency/skill. A Soft Core Course may also be considered as an elective.

Special Course: Project Work/Dissertation work involving application of knowledge in solving/ analyzing/exploring a real life situation/difficult problem. A project/dissertation work may be hard core or a soft core as decided by the concerned Board of Studies (BOS).

Open Elective: A Course chosen generally from an unrelated discipline/subject with an intention to seek exposure. It is given as an optional instead of a soft core in the second semester [Requirement: Minimum 4 Credits and Maximum 09 Credits]

ANNEXURE –II

ELIGIBILITY CRITERIA FOR ADMISSION TO POST GRADUATE PROGRAMMES

1. Eligibility for Admission to M.Com. Programme:

The candidate who has passed B.COM/BBM/BBA of University of Mysore or any other recognized university considered as equivalent there to, with a minimum of 45% aggregate marks in the qualifying examination. A relaxation of 5% is available for SC/ST and Cat I candidates.

2. Eligibility for Admission to M.C.A Programme:

Admission to MCA course shall be open for candidates who have passed the Bachelor degree examinations with not less than 50% of the marks in the aggregate of all the years of the Degree examinations, except BCA. However, in the case of candidates from Karnataka belonging to SC/ST and Category-I, the aggregate percentage of marks in the qualifying examinations shall not be less than 45%. Provided that for admission to MCA, the candidate shall have passed Bachelor Degree with not less than 50% of marks with Mathematics / Statistics / Computer Science / Computer Programming / Computer Application / Business Mathematics / Business Statistics as one of the optional or electives at degree level. Provided further that in respect of candidates who have studied and passed one of the subjects specified in the first proviso in the Pre-university course with 50% of marks in that subject shall also be considered for admission. However, in the case of candidates belonging to SC/ST and Category-I, 45% of marks in that subject shall also be considered for admission.

The BCA graduates with a minimum of 50% marks in aggregate (45% in case of SC/ST/Cat I candidates) are eligible to direct admission to 2nd year of MCA.

3. Eligibility for Admission to M.B.A Programme:

Any graduate or postgraduate in Arts, Science, Commerce, Business Management, Allied Sciences, Engineering and Technology, Medical Sciences of this University or from any other university considered equivalent thereto shall be eligible for admission to the Programme. Further the applicant shall have a minimum of 50% in the qualifying examination. A relaxation of 5% is available for SC/ST & Cat-I candidates. Selection of candidates to the Programme shall be done as per rules of the University and Government of Karnataka.

4. Eligibility for Admission to M.Sc. Biotechnology:

Candidates with Bachelor's degree in Science including Agricultural, Pharmacy, Chemical Engineering, Medicine, Veterinary, Dairy, Fisheries, Horticulture, Forestry from any University recognized by UGC/ICAR/AICTE/ Medical Council with an aggregate minimum of 55%(50% in case of SC/ST) or equivalent grade.

5. Eligibility for Admission to M.Sc. Microbiology:

B.Sc. with Microbiology as one of the Major/Optional subjects from the University of Mysore or any other University equivalent thereto; 45% for general category and 5% relaxation for SC/ST students.

6. Eligibility for Admission to M.Sc. Biochemistry:

Students of Bachelors of Science degree from any UGC recognized Universities in Life Science subjects with Chemistry or Biochemistry as major subjects are eligible. Minimum percentage of marks is as prescribed by the University of Mysore regulations for admission i.e., 45% for general category and 5% relaxation for SC/ST students.

7. Eligibility for Admission to M.Sc. Botany:

Candidates possessing a B.Sc. with Botany as a Major /Optional subject and degree from UGC recognized University. Candidates applying for admission to M.Sc. Botany must be a graduate and must have obtained a minimum of 45% (40% in case of SC/ ST and Category-I candidates).

8. Eligibility for Admission to M.Sc. Chemistry:

B.Sc. with Chemistry as one of the Major/ Optional subject, provided the candidate has studied Mathematics as one of the optional subject in the Two Year P.U.C. or equivalent

9. Eligibility for Admission to MSW:

Candidates who have passed BSW/ BA/ B.Sc. / B.Com. / BBA/BBM/ B.C.A / LLB of the University of Mysore or any other university recognized as equivalent there to, are eligible for admission to MSW course. Candidates will be selected for admission as per the general guidelines issued from the University of Mysore from time to time. The Department/University shall conduct entrance examination for admission to the course.

A minimum of 45% aggregate marks for GM and 40% aggregate marks for SC/ST in the qualifying examination is needed.

10. Eligibility for Admission to M.Sc. in Computer Science :

The candidates who have passed B.Sc. with Computer Science / Computer Applications / Vocational Computer Applications / Computer Maintenance / Computer Systems as an optional course / BCA with minimum 45% marks in Cognate subject are eligible (relaxed to 40% in case of SC, ST and Category I Candidates). The candidates should have also studied Mathematics as a major or a minor subject in their B.Sc. / BCA degree. The definition of the minimum percentage is as prescribed by the University of Mysore from time to time.

11. Eligibility for Admission to M.A. in Economics:

The candidates who have passed B.A. degree course (with Economics as one of the subjects) of Mysore University or any other University considered as equivalent to with a minimum of 45% in the qualifying examination. A relaxation of 5% is Available for SC/ST and Cat-I candidates.

12. Eligibility for Admission to MTTM:

Students who have passed any degree from a recognized University are eligible for admission to I semester MTTM.

ANNEXURE –III

Minimum Credit Requirement for the Award of Master's degree in Specific Programmes

1. **Credit Matrix of M.Com:**

A candidate has to earn a minimum of 80 credits, for successful completion of a Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	Credits
Hard Core	A minimum of 44, but not exceeding 52
Soft Core	A minimum of 32
Open Elective	A minimum of 4

2. **Credit Matrix of M.C.A.:**

A candidate has to earn a minimum of 112 credits, for successful completion of M.C.A. degree with a distribution of credits for different courses as given in the following table.

Course Type	Credits
Hard Core	60
Soft Core	A minimum of 40, but not exceeding 48
Open Elective	A minimum of 4, but not exceeding 12

Lateral entry students must earn a minimum of 76 credits, for successful completion of a Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	Credits
Hard Core	40
Soft Core	A minimum of 28, but not exceeding 32
Open Elective	A minimum of 4, but not exceeding 8

3. **Credit Matrix of M.B.A.:**

A candidate has to earn a minimum of 89 credits, for successful completion of a Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	Credits
Core	62
Foundation	6
Elective	21
Total	**89**

4. Credit Matrix of M.A. in Economics:

A candidate has to earn a minimum of 80 credits, for successful completion of a Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	Credits
Hard Core	50
Soft Core	12
Special Elective	11
Special Course	03
Open Elective	04
Total Credits	80

5. Credit Matrix of MTTM:

A candidate has to earn a minimum of 76 credits, for successful completion of a Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	Credits
Hard Core	44
Soft Core	24
Open Elective	08
Total	**76**

ANNEXURE –IV

Regulations pertaining to Continuous Assessment of 50:50 patterns

The evaluation of the candidate shall be based on continuous assessment. The Structure for evaluation is as follows:

1) Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified as C1, C2, and C3.

2) The performance of a candidate in a course will be assessed for a maximum of 100 marks as explained below.

   The first component (C1), of assessment is for 25 marks. This will be based on test/ assignment/seminar/quiz/group discussions. During the first half of the semester, the first 50% of the syllabus will be completed. This shall be consolidated during the 8th week of the semester. Beyond 8^{th} week, making changes in C1 is not permitted.

   The second component (C2), of assessment is for 25 marks. This will be based on test/ assignment/seminar/quiz/group discussions. The continuous assessment and scores of second half of the semester will be consolidated during the 16^{th} week of the semester. During the second half of the semester the remaining units in the course will be completed.

3) The details of continuous assessment are summarized in the following Table.

Component	**Syllabus in a course**	**Weightage**	**Period of Continuous Assessment**
C1	First 50%	25%	First half of the semester To be consolidated by 8th week
C2	Remaining 50%	25%	Second half of the semester. To be consolidated by 16th week
C3	Semester-end examination (All units of the course)	50%	To be completed during 18th-20^{th} Week.
Final grades to be announced latest by 24th week			

4) **Minor/ Major Project Evaluation**

Right from the initial stage of defining the problem, the candidate has to submitthe progress reports periodically and also present his/her progress in the form of Seminars in addition to the regular discussion with the guide. Components ofevaluation are as follows.

Component – I(C1): Periodic Progress and Progress Reports (25%)

Component – II(C2): Results of Work and Draft Report (25%)

Component– III(C3): Final Viva-voce and evaluation (50%). The reportevaluation is for 30% and the Viva-voce examination is for 20%.

ANNEXURE -V

Regulations pertaining to Master of Tourism and Travel Management programme

Continuous Assessment, Earning of Credits and Award of Grades

The evaluation of the candidate shall be based on continuous assessment. The Structure for evaluation is as follows:

1) Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified asC1, C2, and C3.

2) The performance of a candidate in a course will be assessed for a maximum of 100/50 marks as explained:

   The first component (C1), of assessment is for 15/5 marks. This will be based on test/ assignment/seminar/quiz/group discussions. During the first half of the semester, the first 50% of the syllabus will be completed. This shall be consolidated during the 8th week of the semester. Beyond 8th week, making changes in C1 is not permitted.

   The second component (C2), of assessment is for 15/5 marks. This will be based on test/ assignment/seminar/quiz/group discussions. The continuous assessment and scores of second half of the semester will be consolidated during the 16th week of the semester. During the second half of the semester the remaining modules in the course will be completed.

3) During the 18th -20th week of the semester, a semester-end examination of 3/2 hours duration as applicable shall be conducted for each course. This forms the third/final component of assessment (C3) and the maximum marks for the final component will be 70/40.

The details of continuous assessment are summarized in the following table:

Component	Syllabus in a course	Weightage	Period of Continuous assessment
C1	First 50% (2 units of total Units)	15%/10%	First half of the semester To be consolidated by 8th week
C2	Remaining 50% (Remaining units of the course)	15%/10%	Second half of the semester. To be consolidated by 16th week
C3	Semester-end examination (All units of the course)	70%/80%	To be completed during 18th-20th Week.
Final grades to be announced latest by 24th week			

Setting questions papers and evaluation of answer scripts.

Questions papers in two sets shall be set by the internal examiner and one set by external examiner for a course. Whenever there are no sufficient internal examiners, the BoE shall get the questions papers set by external examiners. Whenever there are no external examiners, The Chairman, BoE shall get the question papers set by internal examiner.

The Board of Examiners shall scrutinize and approve the question papers and scheme of valuation.

(i) There shall be single valuation for all theory papers by internal examiner. Then review will be done as per the common regulation.

(ii) The examination for Practical work/ Field work/Project work will be conducted jointly by one internal examiner and one external examiner.

(iii) If a course is fully of (L=0): T :(P=0) type, then the examination for C3 Component will be as decided by the BOS concerned.

4) Challenge Valuation

A student who desires to apply for challenge valuation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Controller of Examinations within 15 days after the announcement of the results. This challenge valuation is only for C3 component.

The answer scripts for which challenge valuation is sought for shall be sent to an external examiner. The marks awarded in the challenge valuation is final.

5) In case of a course with only practical component a practical examination will be conducted with two examiners of which one internal and one external.

A candidate will be assessed on the basis of

a) Knowledge of relevant processes

b) Skills and operations involved

c) Results / products including calculation and reporting.

If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the departmental council.

6) Finally, awarding the grades should be completed latest by 24th week of the semester.

7) Project Work:

A student in the fourth semester shall register for a Project Work which carries 3 credits. Continuous assessment criteria for the project work include:

Component-I (C1): Periodic Progress and Progress Reports –15 Marks

Component-II (C2): Results of Work and Draft Report–15 Marks.

Component-III (C3): Final Viva-voce and Project Report Evaluation-70Marks, out of which The Project Report evaluation is for 50Marks and the Viva–Voce examination is for20 Marks.

8) Industrial training

I. Each student must undergo on the job training in any Tourism/Hotel/Aviation industry

II. The practical training shall preferably be undertaken in the beginning of the semester only. The minimum period of training shall be 2 months.

III. The trainer has to assess the student and award 100 marks along with a training certificate.

IV. The students have to write a project report regarding their training which shall be valued for 50 marks. There shall be a training presentation & viva voce examination on the training for 50 marks.

9) Study Tour Evaluation

A student in the first three semesters should go for study tour and study the respective destination. A detailed study tour report should be prepared based on the observation.

Study tour project report should be evaluated for 30 marks and a viva-voce to be conducted for 20 marks. Thus study tour component carries 50 marks.

POST-GRADUATE WING OF SBRR MAHAJANA FIRST GRADE COLLEGE (Autonomous)

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

K.R.S. Road, Metagalli, Mysuru-570016.

Affiliated to University of Mysore.

DEPARTMENT OF STUDIES IN BIOCHEMISTRY

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

UPDATED REGULATIONS FOR CHOICE BASED CREDIT SYSTEM (CBCS) AND CONTINUOUS ASSESSMENT GRADING PATTERN (CAGP) FOR M.Sc., BIOCHEMISTRY PROGRAMME WITH EFFECT FROM 2019

PREAMBLE

The University Grants Commission (UGC) has stressed on speedy and substantive academic and administrative reforms in higher education for promotion of quality and excellence. The Action Plan proposed by UGC outlines the need to consider and adopt Semester System, Choice Based Credit System (CBCS), and Flexibility in Curriculum Development and Examination Reforms in terms of adopting Continuous Evaluation Pattern by reducing the weightage on the semester- end examination so that students enjoy a de-stressed learning environment. Further, UGC expects that institutions of higher learning draw a roadmap in time bound manner to accomplish the above.

ABOUT THE COURSE

The M.Sc., Biochemistry course of the University of Mysore is approved by the University Grants Commission. The syllabus is designed to provide a holistic insight into the subject by experts of the University and was adopted for teaching in the Centre. The Department is well furnished and provided with state-of-the-art laboratory facilities. The Department has highly qualified and experienced faculty for the students to learn and experiment, hands on, with techniques of great relevance to current day bio industries. Besides, the Centre also invites eminent Scholars, Scientists and Professors from UOM, CFTRI, DFRL and other institutions for special lectures to enlighten students on most recent developments in the subject. The students are also encouraged to take part in scientific seminars, group discussions and quiz competitions apart from the other extracurricular activities. Our students have won prizes in intercollegiate essay, debate and music competitions.

OBJECTIVE

The Department makes it their mission to provide socially and industrially relevant post-graduate education and training. The Department also undertakes basic and applied research in the area of Biochemistry as related to the sustainability of the Earth Ecosystem.

The Department endeavors to build and enhance the capabilities of the future generation by providing quality education that provides a deep insight into the subject that can be exploited to build sustainable bio-enterprises. The Department also strives to produce technically highly qualified and skilled scientists to help the bio-industries.

1. TITLE AND COMMENCEMENT

These Regulations shall be as per the University of Mysore regulations for Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) for M.Sc., Biochemistry program. These Regulations shall come into force from the academic year 2019.

2. PROGRAM OFFERED

(1) **M.Sc.,**: Biochemistry

3. ABOUT THE ASESSMENT AND CREDITS:

Credit Distribution: The Choice Based Credit System (CBCS) comprises Hard Core, Soft Core subjects for Biochemistry Students and Open Elective for students other than Biochemistry.

Following shall be the minimum and maximum subjects per semester:

The credit pattern is Lecture (L); Tutorial (T); Practical (P); (L: T: P) Pattern.

Course is of 4 credits, and the different credit distribution patterns in L: T: P format is:

4 : 0 : 0,	1 : 2 : 1,	1 : 1 : 2,	1 : 0 : 3,	1 : 3 : 0,
2 : 1 : 1,	2 : 2 : 0,	2 : 0 : 2,	3 : 1 : 0,	3 : 0 : 1,
0 : 2 : 2,	0 : 4 : 0,	0 : 0 : 4,	0 : 1 : 3,	0 : 3 : 1,

The concerned BoS will choose the convenient credit pattern for every course based on the requirement.

One semester period is 16 weeks of teaching and learning.

Duration of semester is 20 weeks that includes semester end examinations.

Credit Pattern:

Hard Core: 3 – 6 Credits **Soft Core:** 2 – 4 Credits **Open elective:** 4 Credits

Project Work: 6 Credits

Course Type	Credits
Hard Core	Minimum Credits - 42 and Maximum Credits - 52
Soft Core	Minimum Credits – 16
Open Elective	Minimum Credits - 4

- A Candidate can enroll for **maximum of 24 Credits per semester** inclusive of Open Elective earned from the other Departments.
- A Candidate has to earn a minimum of **76 Credits** for successful completion of a Masters degree.

- A minimum 76 Credits and additional 18 Credits (76 + 18 = 94 Credits) shall acquire add on Proficiency Diploma.

Continuous Assessment Pattern:

Continuous Assessment	Time Duration	Marks		Minimum 30% and an aggregate of 40% to declare pass
		Max	Min	
C1	1 week to 8 weeks	15	4.5	
C2	9 week to 16 weeks	15	4.5	
C3	Complete 16 weeks	70	21	

Finally, awarding the grades should be completed latest by 24th week of the semester.

4. ELIGIBILITY FOR ADMISSION

Students of Bachelors of Science degree from any UGC recognized Universities in life science subjects with Chemistry or Biochemistry as major subjects are eligible. Students from Foreign National degree will apply through equivalence committee. Minimum percentage of marks is as prescribed by the University of Mysore regulations for admission ie., **45% for general category and 5% relaxation for SC/ST students**.

5. SETTING QUESTIONS PAPERS AND EVALUATION OF ANSWER SCRIPTS

1. Questions papers in three sets shall be set by the internal examiner for a course. Whenever there are no sufficient internal examiners, the chairman of BOE shall get the questions papers set by external examiners.

The Board of Examiners shall scrutinize and approve the question papers and scheme of valuation.

2. (i) There shall be single valuation for all theory papers by internal examiners. In case, the number of internal examiners falls short, external examiners may be invited.

(ii) The examination for Practical work/ Field work/Project work will be conducted jointly by two internal examiners. However the BOE on its discretion can also invite external examiners if required.

5.0 Scheme of Instructions

5.1 A Masters Degree program is of 4/6 semesters-two/three year's duration for regular candidates. A regular candidate can avail a maximum of 8/12 semesters – 4/6 years (in one stretch) to complete Masters' Degree (including blank semesters, if any). Whenever, a candidate opts for blank semester(s)/DROP in a course or in courses or is compelled to DROP a course or courses as per the provision of the regulation, he/she has to study the prevailing courses offered by the department as per the prevailing scheme, when he/she continues his/her study.

5.2 A candidate has to earn a minimum of 76 credits, for successful completion of Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	**Credits**
Hard Core	A minimum of 42, but not exceeding 52
Soft Core	A minimum of 16
Open Elective	A minimum of 4

Every course including project work, practical work, field work, seminar, self-study elective should be entitled as hard core or soft core or open elective by the BoS concerned.

Note: Minimum credit requirement for the award of master's degree in specific programmes, refer Annexure III

5.3 A candidate can enrol for a maximum of 24 credits per semester with the approval of the concerned department.

5.4 Only such candidates who register for a minimum of 18 credits per semester in the first two semesters and complete successfully 76 credits in total of the 4 semesters shall be considered for declaration of ranks, medals and are eligible to apply for student fellowship, scholarship, free ships and hostel facilities.

5.5 In excess to the minimum of 76 credits for masters degree in the concerned discipline / course of study, a candidate can opt to complete a minimum of 18 extra credits to acquire **add on proficiency diploma** in that particular discipline /course along with the masters' degree. In such of the cases wherein, a candidate opts to earn at least 4 extra credits in different discipline / courses in addition to a minimum of 76 credits at masters level as said above then an **add on proficiency certification** will be issued to the candidate by listing the courses studied and grades earned.

5.6 A candidate admitted to Masters Program can exercise an option to exit with Bachelor Honors Degree / PG diploma after earning 40 credits successfully.

6.0. Continuous Assessment, Earning of Credits and Award of Grades

The evaluation of the candidate shall be based on continuous assessment. The Structure for evaluation is as follows:

6.1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified as C1, C2, and C3.

6.2 The performance of a candidate in a course (30:70 pattern) will be assessed for a maximum of 100 marks as explained below:

6.2.1 The first component (C1), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions, etc., during the first half of the semester; the first 50% of the syllabus will be completed. This shall be consolidated during the 8th week of the semester. Beyond 8th week, making changes in C1 is not permitted.

6.2.2 The second component (C2), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions etc. The continuous assessment and scores of second half of the semester will be consolidated during the 16th week of the semester. During the second half of the semester the remaining units in the course will be completed.

6.2.2.1. The outline for continuous assessment activities for Component-I (C1) and Component-II (C2) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective Departmental Council. The students should be informed about the modalities well in advance. The evaluated courses/assignments during component I (C1) and component II (C2) of assessment are immediately returned to the candidates after obtaining acknowledgement in the register maintained by the concern teacher for this purpose.

6.2.3 Setting question papers and evaluation of answer scripts:

V. Question papers in two sets shall be set by the internal examiner and one set by external examiner for a course. Whenever there are no sufficient internal examiners, The Chairman, BoE shall get the question papers set by external examiners.

Whenever there are no external examiners, The Chairman, BoE shall get the question papers set by internal examiner.

VI. The Board of Examiners shall scrutinize and approve the question papers and scheme of evaluation.

VII. (i) There shall be single evaluation for all theory papers by internal examiner and 25% of the total scripts will be reviewed by an external examiner.

(ii) The average of first valuation and the review evaluation will be considered as the final marks of the candidate.

(iii) If there is difference of marks in maiden and reviewed evaluation is greater than 15 marks then the script will go for third evaluation by the external examiner and marks awarded in the third evaluation will be final.

(iv) The examination for Practical work/ Field work/ Project work will be conducted

jointly by one internal and one external examiner.

(v) If a course is fully of (L=0): T: (P=0) type, then the examination for C3 Component will be as decided by the BOS concerned.

VIII. Challenge Evaluation

A student who desires to apply for challenge evaluation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Controller of Examinations within 15 days after the announcement of the results. This challenge evaluation is only for C3 component.

The answer scripts, for which challenge evaluation is sought for, shall be sent to external examiner. The marks awarded in the challenge evaluation will be final.

6.2.4 In case of a course with only practical component a practical examination will be conducted with two examiners (one Internal and one external)

A candidate will be assessed on the basis of

a) Knowledge of relevant processes

b) Skills and operations involved

c) Results / products including calculation and reporting.

If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the Departmental council.

6.2.5 If **X** is the marks scored by the candidate out of 70 in C3 in theory examination, if **Y** is the marks scored by the candidate out of 70/50/40 in C3 in Practical examination, and if **Z** is the marks scored by the candidate out of 70/50/40 in C3 for a course of (L=0):T:(P=0) type that is entirely tutorial based course, then the final marks (M) in C3 is decided as per the following table.

L.T.P distribution	Formula to compute Mark (M) in C3
L:T:P	$\frac{[(L+T)*X]+[(T+P)*Y]}{L+2T+P}$
L:(T=0):P	$\frac{(L*X)+(P*Y)}{L+P}$
L:T:(P=0)	X
L:(T=0):(P=0)	X
(L=0):T :P	Y
(L=0): (T=0):P	Y
(L=0): T:(P=0)	Z

6.2.6 The details of continuous assessment (30:70 patterns) are summarized in the following table:

Component	Syllabus in a Course	Weightage	Period of Continuous Assessment
C1	First 50%	15%	First half of the semester To be consolidated by 8th week
C2	Remaining 50%	15%	Second half of the semester. To be consolidated by 16th week
C3	Semester-end examination (All units of the course)	70%	To be completed during 18th-20th Week.

6.2.7 A candidate's performance from all 3 components will be in terms of scores, and the sum of all three scores will be for a maximum of 100 marks (15 +15 + 70).

6.2.8 Finally, awarding the grades should be completed latest by 24th week of the semester.

6.3 **Minor/ Major Project Evaluation:**

Right from the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his/her progress in the form of seminars in addition to the regular discussion with the guide. Components of evaluation are as follows:

Component – I (C1): Periodic Progress and Progress Reports (15%)

Component – II (C2): Results of Work and Draft Report (15%)

Component– III (C3): Final Viva-voce and evaluation (70%).

The report evaluation is for 40% and Viva-voce examination is for 30%.

6.4 In case a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

In case a candidate's class attendance in a course is less than 75%, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

Teachers offering the courses will place the above details in the Department Council meeting during the last week of the semester, before the commencement of C3, and subsequently a notification pertaining to the above will be brought out by the Chairman of the Department before the commencement of C3 examination. A copy of this notification shall also be sent to the office of the Director & the Controller of Examinations.

6.5 In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUP option.

In case a candidate secures more than or equal to 30% in C3, but his/her grade (G) = 4, as per section 6.9 below, then he/she may be declared to have been conditionally successful in this course, provided such a benefit of conditional clearance based on G=4 shall not be availed for more than 8 credits for the entire program of Master's Degree of two years.

In case a candidate secures more than 30% in C3, he/she may choose DROP/MAKE-UP option.

The candidate has to exercise his/her option immediately within 10 days from the date of notification of results.

A MAKE UP examination for C3 shall be conducted in all the semesters. Candidates can register for the MAKE UP examination within 10 days from the date of notification of results. The MAKE UP examination will be conducted within one month of the notification of the results.

If a candidate is still unsuccessful, A MAKE UP Examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with next regular even semester examinations; however, not exceeding double the duration norm in one stretch from the date of joining the course.

6.6 A candidate has to re-register for the DROPPED course when the course is offered again by the department if it is a hard core course. The candidate may choose the same or an alternate core/elective in case the dropped course is soft core / elective course. A candidate who is said to have DROPPED project work has to re-register for the same subsequently within the stipulated period. **The details of any dropped course will not appear in the grade card.**

6.7 The tentative / provisional grade card will be issued by the Controller of Examinations at the end of every semester indicating the courses completed successfully. This statement will not contain the list of DROPPED courses.

6.8 Upon successful completion of Bachelors Honors/Master's Degree, a final grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Controller of Examinations.

6.9 The grade and the grade point earned by the candidate in the course will be as given below.

Marks(M)	**Grade**	**Grade Point (GP = V x G)**
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

Here, **P** is the Percentage of marks (P = [(C1+C2) + M] secured by a candidate in a course which is rounded to nearest integer. **V** is the credit value of course. **G** is the Grade and **GP** is the Grade Point.

6.10 A candidate can withdraw any course within ten days from the date of notification of final results. Whenever a candidate withdraws a paper, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is soft core/open elective.

A DROPPED course is automatically considered as a course withdrawn.

6.11 Overall Cumulative Grade Point Average (CGPA) of a candidate after successfully completing the required number of credits (76) is given by:

CGPA = ΣGP / Total Number of Credits

7. Classification of Results

The Final Grade Point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	Numerical Index	Qualitative Index
4<= CGPA <5	5	Second Class
5<= CGPA <6	6	
6<= CGPA <7	7	First Class
7<= CGPA <8	8	
8<= CGPA <9	9	Distinction
9<= CGPA <10	10	

Overall Percentage = 10* CGPA or is said to be 50% in case CGPA<5

8. Medium of Instruction

The medium of instruction shall be English. However, a candidate will be permitted to write the examinations either in English or Kannada. This rule is not applicable to languages.

9. Attendance and Conduct

Students SHALL NOT take up any employment/course, part time or full time during their study. Students found violating this rule shall be removed from the course. Minimum attendance of 75% of actual working hours in all the courses is required. A student who does not satisfy the requirements of attendance and conduct shall not be permitted to write examination.

In the case of a candidate who represents his institution/University/Karnataka State/Nation in Sports/NCC/NSS/Cultural or any official activities, shortage of attendance up to maximum of 15 days in a Semester per course may be condoned, based on the recommendation and prior permission of the Head of the Institution concerned.

The Head of the Department shall notify the list of all students who have less than 75% attendance in each course at the beginning of the 16^{th} week of the semester. A copy of the same should be sent to the Controller of Examination of the college.

10. Transfer within University and from other Universities

a) Transfer to a different institution within the University is permitted only at the beginning of the academic year.

b) A Candidate seeking transfer to a different institution within University of

Mysore should have completed all the courses/papers of the previous semesters.

c) A Candidate from any other university can join a program of this college only at the beginning of the academic year.

d) A Candidate from other university seeking admission by transfer to the college should have completed all the courses of the previous semesters.

11. Provision for Appeal

If a candidate is not satisfied with the evaluation of C1 and C2 components, he / she can approach the grievance cell with the written submission together with all facts, the assignments, and test papers etc., which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty as prescribed by the college on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she found guilty. The decision taken by the grievance cell is final.

For every program there will be one grievance cell. The composition of the grievance cell is as follows.

1. The Controller of Examinations-ex-officio Chairman / Convener
2. One senior faculty member (other than those concerned with the evaluation of the course concerned) drawn from the department/discipline and/or from the sister departments/sister disciplines.
3. One senior faculty member / course expert drawn from outside the department.

11. Discipline

1) Every student is required to maintain discipline and decorum both inside and outside the campus in accordance with the instructions of the college and also as per the instructions issued by the University of Mysore/Government of Karnataka/UGC from time to time regarding Student Conduct Rules.

2) Any act of indiscipline of a student is first to be considered by the Disciplinary committee of the college for necessary action. If the issue demands more serious consideration, the act of indiscipline will be reported to the concerned authority who will initiate appropriate action.

3) Concerned authority may take necessary actions depending upon the prima facie evidence.

12. Any other issue not envisaged above, shall be resolved by the competent authority of the autonomous college, which shall be final and binding.

Any matter which is not covered under this regulation shall be resolved as per the Mysore University Regulations in this regard.

MINIMUM CREDITS TO BE REGISTERED BY A STUDENT IN A NORMAL PHASE TO SUCCESSFULLY COMPLETE M.Sc., DEGREE IN BIOCHEMISTRY FOR FOUR SEMESTERS

Semesters	Hard Core		Soft Core		Open Elective		Total	
	Numbers	Credits	Numbers	Credits	Numbers	Credits	Numbers	Credits
I semester	04	15	02	06	-	-	06	21
II semester	03	11	02	06	01	04	06	21
III semester	03	12	02	06	00	00	06	18
IV semester	02	13	01	03	-	-	03	16
Total	**12**	**51**	**07**	**21**	**01**	**04**	**21**	**76**

Course Type	Credits
Hard Core	A minimum of 42,
Soft Core	A minimum of 16
Open Elective	A minimum of 04

I Semester

Sl. No.	Code	Title of the Paper	Course Type	Credit pattern			Total Credits
				L	T	P	
1		Bioorganic and Bioinorganic Chemistry	HC	3	0	0	3
2		Biochemical Techniques	HC	3	0	0	3
3		Biophysical Techniques	HC	3	0	0	3
4		Practical-1: Biochemical Techniques, and seminar	HC	0	2	4	6
5		Biomolecules	SC	3	0	0	3
6		Membrane Biology	SC	3	0	0	3
7		Physiology and Nutrition	SC	3	0	0	3

II Semester

Sl. No.	Code	Title of the Paper	Course Type	Credit pattern			Total Credits
				L	T	P	
1		Enzymology	HC	3	0	0	3
2		Amino acid and Protein Metabolism	HC	3	0	0	3
3		Practical- 2: Experiments in Enzymology and metabolism, seminar	HC	0	1	4	5
4		Carbohydrate metabolism	SC	3	0	0	3
5		Lipid Metabolism	SC	3	0	0	3
6		Plant Biochemistry	SC	3	0	0	3
7		Clinical Diagnosis in Health and Disease	OE	3	1	0	4

III Semester

Sl. No.	Code	Title of the Paper	Course Type	Credit pattern			Total Credits
				L	T	P	
1		Immunology	HC	3	0	0	3
2		Cell Biology	HC	3	0	0	3
3		Practical-3: Experiments in Immunology and Clinical Biochemistry and seminar	HC	0	2	4	6
4		Nucleic acid metabolism	SC	3	0	0	3
5		Clinical Biochemistry	SC	3	0	0	3
6		Genomics, Proteomics and Bioinformatics	SC	2	0	0	2
7		Fundamentals of Biochemistry	OE	3	1	0	4

IV Semester

Sl. No.	Code	Title of the Paper	Course Type	Credit pattern			Total Credits
				L	T	P	
1		Molecular Biology	HC	3	0	0	3
2		Practical-4: Experiments in Molecular Biology and seminar	HC	0	2	2	4
3		Practical-5: Project Work	HC	0	0	6	6
4		Genetics and Gene regulation	SC	3	0	0	3
5		Genetic Engineering	SC	3	0	0	3
6		Biotechnology	SC	3	0	0	3
7		Biostatistics	SC	2	0	0	2
8		Clinical Diagnosis in Health and Disease	OE	3	1	0	4

I Semester Biochemistry

Hard Core

Bioorganic and Bioinorganic Chemistry - 3 Credits 48 h

Bonding: Covalent bond; coordinate bond; coordinate bond formation in transition metals. Bonding of iron in hemologibin and cytochromes, cobalt in Vit B12, magnesium in chlorophyll. Special properties of water; Structure and bonding. Crystal field theory; Ligand field theory and Valence bond theory. Chelators; types of ligands and complexes. 12 h

Electrolytes, Non-Electrolytes and Electrodes: Osmotic pressure, vapor pressure, osmometer, Donnan membrane equilibrium. Hydrogen electrode, electrode potential, and redox potential. 6 h

Stereochemistry: Importance of stereochemistry, position and order of groups around carbon. Geometric and optical isomerism; absolute and relative configuration. Symmetry view of chirality, relation between chirality and optical activity, representation of chiral structures by Fischer. Structure and stereochemistry of sugars and amino acids; anomer, epimer, diastereomer, sterioisomer, D and L, (+) and (-), R and S. 12 h

Mechanism of organic reactions: Intermediates and rearrangements in organic reaction. Reaction energetic. Classification of rearrangement reactions. Reaction rates, order and molecularity of reaction. Mechanisms and stereochemistry of substitution (electrophilic and nucleophilic - sN1 and sN2 reactions) addition, elimination and rearrangement reactions. Mechanisms of ester hydrolysis. Property of aromaticity and resonance. 12 h

Heterocyclic Compounds: Chemistry of furan, indole, thiazole, pterine, pteridine, isoalloxazine, pyrrole. Chemistry of porphyrins and heme and their biological importance. 6 h

Biochemical Techniques - 3 Credits 48 h

Preliminary techniques in Biochemistry: Animal and Plant models, choice of animals, types of studies, mutant organisms (auxotroph), animal and plant cell culture. 4 h

Microbial techniques: Isolation and culture of microorganisms – aerobic, anaerobic and facultative culture methods and preparation of culture media. Isolation of pure colony and its characterization. Staining - Gram stain, acid fast, endospore, flagella. 5 h

Cell fractionation techniques: Cell lysis, homogenization, extraction, salting in, salting out, dialysis and ultra filtration. 3 h

Centrifugation: Svedberg's constant, sedimentation velocity and sedimentation equilibrium.

Ultra centrifugation: Differential and density gradient centrifugation, centrifugal elutriation. 6 h

Chromatographic techniques: Principles and applications of paper, TLC, adsorption, ion exchange, gel filtration, affinity, GLC, chromatofocusing, HPLC and FPLC. 10 h

Electrophoretic techniques: Polyacrylamide gel electrophoresis, SDS-PAGE,

2D-electrophoresis, diagonal, agarose gel electrophoresis, isoelectric focusing, pulsed field electrophoresis, high voltage electrophoresis, capillary electrophoresis.

Visualizing proteins, glycoproteisn, lipoproteins, and nucleic acids. Zymogram and reverse zymogram. 8 h

Blotting techniques: Dot blot, Southern, Northern, Western blot, DNA foot print assay, DNA finger print assay, gel retardation assay, nuclease protection assay. RFLP, RAPD. 10 h

PCR, RT-PCR, Microarray. 2 h

Biophysical Techniques - 3 Credits 48 h

Spectroscopic techniques: Principles of colorimeter, spectrophotometer, fluorimeter. Beer-Lambert's Law and its limitations. Extinction coefficient, fluorescent probes and their applications. 8 h

Physical methods of determining size, shape and structure of molecules:

Magnetic Resonance: NMR and ESR; principles and applications.

Vibration Spectra: IR and Raman; principles and applications.

Light Scattering: Determination of size and shape of macromolecules, Zimm’s method. Polarized Light: Plane and circularly polarized light, ORD and CD and their applications. 12 h

X-ray Crystallography: Protein crystals, Bragg's law, unit cell, isomorphous replacement, fiber pattern of DNA. 4 h

Turbidometry, flame photometry, atomic absorption, spectrophotometry; instrumentation and applications. 6 h

Isotopes: Heavy isotopes and radio isotopes, theory and construction of mass spectrometer.

Electrospray Ionization, fragmentation, m/e, time of flight, MALDI and ESI. LC-MS, LC-MS-MS. 6 h

Radioisotopes in Biology: 3H, 14C, 32P, 131I, 35S, concept of half-life, decay constant, detection and quantitation - GM counter and solid and liquid scintillation counter. Specific activity, autoradiography and their applications. 8 h

Applications of radioactivity: Labeling of proteins and nucleic acids, Dilution techniques, pulse chase method, carbon dating, substrate product relationship (cholesterol biosynthesis) and bond cleavage specificity. 4 h

Practical - 1: Biochemical techniques and Seminar 6 Credits

12 h/week (Practical and Tutorials)

Best laboratory practices

Preparation of buffer, pH titration of amino acid, formal titration.

Preparation of cell homogenates; Prepration of chloroplast, mitochondria and nuclei.

Extraction of neutral lipids, phospholipids and estimation of phospholipids.

Iodine number, saponification value, acid value, peroxide value. TLC of lipids.

Separation of amino acids by ascending, descending, circular and 2D-paper chromatography. Descending paper chromatography of sugars.

Purification of polysaccharides (Starch and Glycogen)

Colorimetry**;** applications of Beer-Lambert's law, determination of extinction coefficient,

Colorimetric and titrimetric estimation of sugars and proteins. Estimation of protein by Biuret and Lowry's methods. Estimation of sugar by DNS and anthrone methods.

Seperation of proteins by Native and SDS-PAGE

Separation of biomolecules by column chromatography

Seminar: Each student will give a 15 min seminar with power point presentation on a topic assigned.

Soft Core

Biomolecules - 3 Credits 48 h

Carbohydrates: Structure and classification of carbohydrates, monosaccharides, disaccharides and polysaccharides.

Chemistry of monosaccharides: Pentoses, hexoses, deoxysugars, amino sugars, muramic acid, neuraminic acid. Linkages in sucrose, lactose and maltose, trehalose and glycosides.

Chemistry of polysaccharides: Homopolysaccharides and heteropolysaccharides, starch, cellulose, glycogen, hyaluronic acid, chondroitin sulphate, chitin, xylans, bacterial cell wall polysaccharides, blood group polysaccharides. 8 h

Structure elucidation: degradation, graded acid hydrolysis, periodate oxidation, degradation of oxopolysaccharides, methylation, acetylation, GC-MS.

Glycobiology: Glycoproteins; Glycosidic bond, N- and O-glycosylation, lectins, carbohydrates in tissue engineering. Proteoglycans; agreecan, syndecan, and decorin. Pectin and pectic polysaccharides. 6 h

Aminoacids: Nomenclature, classification and buffering properties, zwitterionic structure, reaction of amino acids, unusual amino acids, non protein amino acids.

Peptide bond: Features of the peptide bond, naturally occurring peptides; glutathione, enkaphalins and endorphins. Chemical synthesis of peptides; solution phase synthesis, Merrifield's solid phase synthesis, and peptide ligation. 6 h

Determination of amino acid compositions: Acid and base catalyzed hydrolysis, separation, quantification, determination of N and C terminal residues, determination of site of glycosylation and type of linkage (o-glycosyl and n-glycosyl).

Elucidation of structure of proteins - Isolation of proteins; overview of purification and criteria of purity.

Determination of primary structure: Sequencing strategies; N-terminal and C-terminal, sequencing methods. Automated sequanators. Determiantion of s-s-bond position. Secondary structure of protein; α, β sheet, β bend, β turn and super secondary structures. Secondary structure prediction methods; Ramachandran plot, Chou and Fasman algorithm. Tertiary and quaternary structures. **6 h (hrs decreased)**

Factors responsible for protein folding: Anfinsen's experiment. Weak forces of interaction; hydrogen bonding, Vander Waal's forces, London force, ionic interactions, hydrophobic interactions, S-S bridges, allolysine, peptide bond, protein modification – glycosidic, phosphate, acetylation, methylation, hydroxylation and prenylation. Denaturation and renaturation of proteins, molten globule. 3D Structure of myoglobin hemoglobin, immunoglobulin, collagen, chymotrypsin and keratin. Chaperons and Levinthal paradox. 6 h

Lipids: Classification of lipids; oils, fats, and waxes. Occurrence and properties of fatty acids, esters of fatty acids, cholesterol, phospholipids, glycolipids, sphingolipids, cerebrosides and gangliosides. **Role in cell membrane. Quality analysis of fatty acids. (Added) 8 h (hrs Increased)**

Nucleic Acids: Isolation of DNA and RNA from biological sources. Physiochemical properties of nucleic acids, melting of DNA, Tm; factors affecting Tm, Cot curve, classification of DNA based on cot curve. Chemical reactions of DNA and RNA. 5 h

Sequencing of DNA: Maxam Gilbert method, dideoxy method. Chargaff's rule, secondary structure of DNA. Watson and Crick model; B and Z DNA, other models of DNA structure. Secondary structure of tRNA and clover leaf model. Other secondary structural

features in DNA, stem loop structure, palindromic sequences, cruciforms. DNA protein interaction; zinc finger, leucine zipper, helix-turn-helix, other motifs, DNA bending and kinks. 8 h

Physiology and Nutrition - 3 Credits 48 h

Blood: Composition, cells, plasma proteins and lipoproteins. Erythrocytes; shape and function. WBC; types, differential count and functions. Platelets and its function. Buffer systems, hemostasis, blood clotting, digestion of clot, anticoagulants, blood volume, blood pressure and their regulations. Plasma lipoproteins and their functions, HDL, LDL, VLDL, chylomicrons.

Nervous system: Structure of a neuron, nerve transmission, CSF; composition and function. **Neurological disorders- Alzeimer's, Parkinson's.** 6 h

Respiratory System: Lungs, structure and functions, gas exchange, oxygen binding by hemoglobin, factors affecting oxygenation and acid-base balance. 4 h

Excretory System: Ultra structure of the nephron, glomerular filtration, formation of urine, acid - base balance. 3 h

Hepatobiliary System: Anatomy of the liver, blood supply, cells; hepatocytes, endothelial cells and Kupffer cells, secretory and excretory function and formation of bile. 3 h

Digestive System: GI tract, digestion and absorption of carbohydrates, proteins and lipids. Mechanism of HCI production in the stomach. Gastrointestinal hormones and role of pancreas in digestion. 4 h

Muscle physiology: Skeletal muscle and smooth muscle, muscle proteins; actin, myosin, tropomyosine, troponins. 2 h

Nutrition: Concepts of macro and micro nutrients, essential nutrients and their classification. Food groups, proximate analysis of foods, chemical and biological analysis for nutrients. Food as source of energy, methods of determining energy value of foods, calorimetry, physiological fuel value, daily requirement of energy, high and low calorie diets. Basal metabolic rate (BMR), factors affecting BMR, specific dynamic action of foods. 7 h

Carbohydrates: Dietary sources, dietary fiber, essentiality of carbohydrates. 2 h

Proteins: Essential amino acids, evaluation of nutritive value of dietary proteins, PER, BV, nutritional classification of proteins, supplementary value of proteins, protein calorie malnutrition; Kwashiorkar and Marasmus. 4 h

Fats: Sources, invisible fat, essential fatty acids, PUFA. 2 h

Vitamins: Fat soluble and water soluble vitamins, provitamines, antivitamins, dietary sources, daily requirements, structure and function. Deficiency symptoms of B and C vitamins and fat soluble vitamins, hypervitaminosis, vitamin - like compounds. 4 h

Minerals: Macro and micro nutrients, sources, requirements, functions and deficiency symptoms. Water metabolism; distribution in body, water balances and factors affecting water balance. 4 h

Diet: Recommended daily allowances, special nutrition for infants, children, during pregnancy, lactation and old age. Nutrition for diabetes and cardiovascular disease patients. Wellness diets, fitness diets, obesity and BMI, 3 h

II Semester Biochemistry

Hard Core

Enzymology - 3 Credits 48 h

General aspects: Nature of enzymes, localization, isolation, purification and characterization of enzymes. Criteria of purity of enzymes, fold purity. Nomenclature and IUB classification of enzymes. Enzyme specificity, specific activity, assay methods; coupled enzyme assays, continuous, end point and kinetic assay. Units of enzyme activity, IU and Katal. 8 h

Enzyme kinetics: Michaelis-Menten equation for uni substrate reactions, initial velocity approach, steady state approach. Vmax, Km and their significance. Linear transformation of Michaelis-Menten equation; Lineweaver-Burk plot, Eadie-Hofstee, Wolf and Cornish-Bowden. Scatchard plot. 5 h

Rate of a reaction, order and molecularity. I order reaction kinetics. Rectangular hyperbola, Michaelis-Menten equation as rectangular hyperbola, linear transformation, calculation of slope, intercept. 4 h

Inhibition: Reversible and irreversible inhibition; competitive, non competitive, uncompetitive product inhibition and suicide inhibition.

Determination of Ki and Kd. 2 h

Bisubstrate reaction: Cleland's notation with examples of ordered, ping-pong, and random reactions. General rate equation. 2 h

Cooperativity: Binding of ligands to macromolecules; Scatchard plot, positive and negetive cooperativity. Oxygen binding to hemoglobin. Hill equation, homotropic and heterotropic effectors, aspartyltranscarbamylase as an allosteric enzyme. 5 h

Mechanisms of enzyme catalysis: Active site structure; methods of determining active site structure. Isolation of ES complex, affinity labeling, chemical modification studies, site directed mutagenesis. 4 h

Nature of enzyme catalysis: Transition state theory, proximity and orientation, orbital steering, acid base catalysis, covalent catalysis, metal ion catalysis, nucleophilic and electrophilic catalysis, intramolecular catalysis, entropy effects. Effect of temperature and pH on enzyme catalysed reaction. 4 h

Mechanisms of action of specific enzyme: Chymotrypsin; zymogen activation, acid-base catalysis, charge relay net work. Lysozyme, alcohol dehydrogenase, ribonuclease, carboxypeptidase A, RNA as an enzyme, abzymes, coenzymic action of NAD+, FAD, TPP, PLP, Biotin, CoA, folic acid and lipoic acid. 7 h

Isoenzymes; LDH, multifunctional enzymes (DNA polymerase) and multi enzyme complex (PDC). 4 h

Metabolic regulation of enzyme activity: Feedback regulation, fine control of enzyme activity. Fast reactions - Stopped flow, temperature jump method with examples of enzymes. 3 h

Amino acid and Protein metabolism - 3 Credits 48 h

Proteins: General mechanisms of degradation in cells; ubiquitin-proteosome pathway, lysosomal pathway. 4 h

Degradation and biosynthesis of glycoproteins and proteoglycans. 4 h

Degradation and Biosynthesis of heme and porphryns. 4 h

Non ribosomal peptide synthesis: glutathione, gramicidine. 4 h

Biosynthesis of physiologically active amines; serotonin, histamine, dopamine, norepinephrine and epinephrine. 6 h

General mechanisms of amino acid metabolism and regulations: Role of cofactors; PLP and THF in amino acid metabolism. Deamination, transamination, decarboxylation desulphuration process. 4 h

Degradation and biosynthesis of individual ammo acids: Aliphatic, aromatic, and branched chain amino acids. 6 h

Differences in the pathways in microorganisms, plants and animals. 2 h

Intermediatory metabolism: Ketogenic and glucogenic amino acids. 4 h

Regulation of amino acid biosynthesis; transglutaminase cycle, urea cycle. 6 h

In born errors of amino acid degradation; PhenylKetonuria, alkaptonuria, maple syrup urine. 4 h

Practical - 2: Experiments in Enzymology and Metabolism, Seminar and Dissertation. 5 Credits

12 h/week (Practical and Tutorials)

Protein assays: Biuret method, Lowry's method and Coomassie blue dye binding.

Enzymes: Salivary Amylase, Protease and Invertase from latex, Esterase from Pea and alkaline phosphatase from milk.

Specific activity, pH and temperature optimum, energy of activation, Km and Vmax. Ammonium sulphate fractionation of esterase from Pea.

Photo-oxidation of methylene blue.

Photosynthetic reduction of 2,6 dichlorophenolindophenols.

Seminar: Each student will give a 15 min seminar with power point presentation on a topic from the subjects assigned.

Soft core

Carbohydrate metabolism - 3 Credits 48 h

Introduction: - Catabolism, anabolism, and amphibolic pathways. 2 h

Carbohydrates: Cellular ingestion of glucose, glycolysis, energetics regulation. Pathways of utilization of pyruvate-lactate, ethanol, gluconeogenesis, regulation, Cori cycle, glucose paradox, citric acid cycle its regulation, energetics, anaplerosis, glyoxylate cycle. HMP shunt pathway, inter conversion of hexoses. Utilization of non glucose sugars. Biosynthesis of sucrose, lactose, starch and glycogen. 12 h

Hormonal regulation of glucose metabolism: Effect of hormones on carbohydrate metabolism; insulin, glucagon, catecholamines, growth hormones, corticosteroids and thyroid hormones in different tissues.

Secretion of Insulin and glucagon in response to various stimuli (Fasting, food, intestinal hormones etc.,)

Disorders of carbohydrate metabolism: diabetes mellitus, classification and clinical diagnosis. 10 h

Energy Utilization: I, II and III laws of thermodynamics. Enthalpy, entropy, free energy and chemical equilibrium. 2 h

High energy compounds: Energy currency, ATP, ADP, creatine phosphate, phosphoenol pyruvate as energy rich compound. 3 h

Mitochondrial electron transport: Entry of reducing equivalents for oxidation; malate-aspartate shuttle, glycerol phosphate shuttle. Organization of respiratory chain complexes, structure and function of the components; Fe-S proteins, cytochromes, Q cycle, proton transfer, P/O ratio, respiratory control, oxidative phosphorylation, uncouplers and inhibitors, sequence of electron carriers based on red-ox potentials. 10 h

ATP synthesis, ATP synthase complex, binding change mechanism, proton motive force, Mitchell's hypothesis. 7 h

Substrate level phosphorylation, futile cycles and their application. 2 h

Lipid Metabolism - 3 Credits 48 h

Lipids: Degradation of triacylglycerols, phospholipids and sphingolipids and regulations; lipase, hormone sensitive lipase, phospholipases and sphingomyelinase.

Fatty acid degradation; β-oxidation Knoop's experiment, saturated and unsaturated fatty acids. Regulatory aspects. 10 h

Oxidation: α , β and ϒ oxidation. Energetics and biosynthesis of fatty acids; fatty acid synthetase complex, chain elongation and desaturation. Pathways in plants and animals, conversion of linoleate to arachiodnante. Regulatory aspects. 8 h

Cholesterol synthesis, degradation, and regulations, cholesterol lowering drugs: Metabolism of circulating lipids; chylomicrons, HDL, LDL and VLDL. Reverse cholesterol transport by HDL. Oxidized lipids and their metabolism, Mechanism of foam cell formation. Obesity, and mechanisms, exercise and regulation of energy metabolism. 10 h

Phospholipid biosynthesis and regulations: Denovo pathway and inter conversion, biosynthesis of phospholipids, sphingolipids, ether lipids and glycolipids. Degradation and biosynthesis of gangliosides and cerebrosides. Biosynthesis of prostaglandins, thromboxanes, leukotrienes, and lipoxins. 10 h

Lipid mediators: Eicosanoids, prostaglandins, leukotrienes, prostacyclins, thrombaxanes, DAG, ceramide and PAF. Role of anti-inflammatory drugs and eicosanoids. 7 h

Integration of metabolic pathways: Integration of carbohydrate and lipid metabolism, and their regulation and manipulation. 3 h

Plant Biochemistry - 3 Credits 48 h

Photosynthesis: Photosynthetic apparatus in plants, photosystems I and II, light harvesting antenna complex. Electron flow and photophosphorylation; cyclic and noncyclic, oxygen evolution, Calvin cycle. C3, C4 and CAM cycle. Photorespiration, bacterial photosynthesis. Regulation of photosynthesis. RUBISCO. 8 h

Nitrogen metabolism: Importance of nitrogen in biological systems, nitrogen cycle. Nitrogen fixation; symbiotic and nonsymbiotic, nitrogenase complex, energetics and regulation. Formation of root nodules in legumes. Assimilation of nitrate and ammonium ion. 6 h

Plant hormones: Biosynthesis, storage, breakdown and transport. Physiological effects and mechanisms of action of auxines, gibberlines, cytokinins, ethylene, abscisic acid. 4 h

Sensory photobiology: Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins, stomatal movement, photoperiodism and biological clocks. Seed dormancy, inception of germination. Germination and growth regulators, juvenility, vernalization. 4h

Solute transport and photo assimilate translocation: Uptake, transport and translocation of water, ions, solutes and macromolecules from soil through xylem and phloem. Transpiration, mechanisms of loading and unloading of photoassimilates. 8 h

Phytochemicals: Extraction, fractionation and characterization. 4 h

Secondary metabolites - Terpenes, phenols, flavonoids and nitrogenous compounds and their roles in plant physiology and as alternative medicine. 6 h

Stress physiology: Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses; mechanisms of resistance to biotic stress and tolerance to abiotic stress. 4 h

Host parasite interaction: Recognition and entry processes of different pathogens like bacteria, viruses, alteration of host cell behavior by pathogens, virus-induced cell transformation, pathogen-induced diseases in plants, cell-cell fusion in both normal and abnormal cells and defense system in plants. 4 h

Open Elective (II and IV Semesters; Even)

Clinical Diagnosis in health and diseases - 4 Credits (3L + 1T) 48 h

Introduction: General health, syndrome and common diseases – communicable and non-communicable diseases. 3 h

Samples for analysis: Blood, urine, pleural fluid, synovial fluid, cerebrospinal fluid and tissues and histology. 3 h

General check up: Blood group, Hb, height and weight, waist to hip ratio, electro cardio gram, X-ray, abdomen scan and appearance of scars, urine analysis – routine analysis (protein, sugar, pigments and cells). 6 h

Special test: detection of metabolites and its importance.

Tests for liver function: Enzyme assay (SGOT, SGPT, Alkaline phosphatase, GGT), Total protein, albumin / globulin ratio and their significance. 3 h

Test for kidney function: Urea and creatinine estimation and their significance. 2 h

Test for heart function: Blood pressure (cystolic and diastolic), lipid profile (cholesterol, triglycerides, HDL, LDL estimation) and their importance. 4 h

Test for lung function: Chest X-ray, Spirometry.

Test for Brain function: EEG, MRI, CT.

Test for Surgery: Bleeding time, clotting time.

Infection: Bacterial, viral, fungal and protozoans.

Blood: Total cell count, differential count, erythrocyte sedimentation rate. 7 h

Infectious diseases: Tuberculosis, Leprosy, Malaria, Hepatitis, Cholera, Dengue, HIV, Chikun gunya and H1N1. TORCH – Panel (infertility profile), Infection in pregnancy, Koch postulations - Microscopic examination of body fluids, ELISA and PCR tests. 7 h

Non communicable diseases:

Diabetes: Blood sugar, urine sugar, glucose tolerance test, HbA1c.

Hyper tension: Lipid profile, electrolyte (sodium, potassium, chloride and biocarbonate) investigation. 4 h

Special test: X-ray, CT, MRI, Doppler, TMT, angioplasty.

Cancer markers: ELISA. 3 h

Professional hazard: High risk groups

(farmers, heavy duty machine workers, CEOs, athletes).

Doping in sports:

Drug addition: 6 h

Tutorials: Discussion, demonstration, laboratory visits

III Semester Biochemistry

Hard Core

Immunology - 3 Credits 48 h

Introduction: Historical development and milestones in immunology. Definitions; antigenicity, immunogenicity, innate and acquired immunity. Primary and secondary lymphoid organs, self and non self discrimination. Antigens and antibodies; haptens and determinants epitopes and paratopes. Antigenicity, carbohydrates, proteins, nucleic acids, and cells as antigens. Valency of antigen, epitope analysis. 8 h

Classes and subclasses of immunogloblins, structure of immunoglobulins, hyper variable region isotypic, allotypic and idiotypic variation. 4 h

Cellular Basis of Immunity: Primary and secondary immune response. Reticuloendothelial system, B and T and accessory cells. Development of B and T cells. Sub sets of B and T cells. T-helper cells, T-killer cells, T-suppressor cells. B and T cell receptors, antigen processing and presentation. B and T interaction. Cytokines and co-stimulatory molecules; lymphokines, interleukins, structure and function of IL-l□, IL-2, TNF□. Suppression of immune response, immunoglobulin genes, generation of immunoglobulin diversity, gene rearrangement and other mechanisms, clonal selection theory of Burnet. 10 h

MHC: MHC gene and its polymorphism, role of MHC in immune response and transplantation. 3 h

Non-specific defenses in man: Barriers to infection; skin, mucous membrane, inflammation, complement hyper sensitivity reactions (Type I, II, III and IV). 4 h

Transplantation: Autograft, isograft, allograft and xenograft. Graft rejection, graft vs. host reaction. Immunosuppressive drugs. 3 h

Tumour immunology: Tumour associated antigens, factors favoring tumour growth, immune surveillance. Tumour necrosis factor α and β. Antitumour drugs. 3 h

Disorders of immunity: Immunological tolerance, auto immune disorders, AIDS, SCID. Systemic Lupus Erythomatosus. 4 h

Vaccines: Adjuvants, vaccines and their preparations. Polyclonal and monoclonal antibodies; hybridoma technique. 3 h

In vitro antigen-antibody reaction: Precipitation, agglutination, complement fixation, immuno diffusion, immunoelectrophoresis, immunofluorescence, RIA, ELISA. 6 h

Cell Biology - 3 Credits 48 h

Cell: Structure of a cell, mitosis**,** meiosis**,** cell cycle and its regulation, different phases of cell cycle. Apoptosis, cyclins and CDKs. Cell-cell and cell-ECM interaction and ECM structure and function. 8 h

Endocrine System: Endocrine organs in man. Location and inter relationship of endocrine glands in man; classification and chemistry of hormones, hormones of hypothalamus, pituitary, thyroid, parathyroid, pancreas, liver, adrenals, gonads and intestine. 6 h

Functions and abnormalities: Hypo and hyper production of hormones secreted by; pituitary, thyroid, pancreas, adrenals and gonads. 3 h

Structure and control of hypothalamus function: Hormones produced; GRH, somatostatin, TRH, CRH, GnRH.

Pituitary gland: Structure, hormones of anterior, posterior and median lobes. Pro-opiomelanocortin.

Testes and ovaries: Structure, hormones produced by testes and ovaries, menstrual cycle. 6 h

Regulation of hormone production and release: hypothalamus-pituitary-target organ axis and regulation by feedback mechanism. 2 h

Mechanism of hormone action:

Peptide hormones: General mechanisms of cell signaling by hydrophilic factors, transmembrane receptors, transmembrane receptors, G protein coupled receptors, receptor tyrosine kinase, eicosanoid receptors. 8 h

Second messengers: 1P3, DAG, cAMP, protein kinases. Nitric oxide signaling; generation and action.

Growth factors: Structure, mechanism of action and receptors of EGF, PDGF, NGF and IGF. insulin receptor. 6 h

Mechanism of action of steroid hormones: Conversion of cholesterol to steroid hormone.Steroid receptors, isolation and characterization of steroid receptors. Receptor down regulation, desensitization and up regulation. 4 h

Pineal gland, melotonin and circadian rhythm.

Chemistry and action of prostaglandins, prostacyclins and thromoxanes. 3 h

Newly discovered hormones

Insect hormones: Structure and function of moulting hormone, ecdysone, juvenile hormones, Pheromones. Application of insect hormones. 2 h

Practical - 3: Experiments in Immunology and Clinical Biochemistry and Seminar 6 Credits

12 h/week (Practical and Tutorials)

Estimation of pyruvate, ascorbic acid, iron, calcium, phosphorus,

Lipid profile Total cholesterol, Triglycerides in serum.

Diabetic profile: Fasting blood sugar, Postprandial blood sugar, GTT by GOD and POD method.

Renal function test: Urea and creatinin.

Liver function test: Bilirubin, SGOT, SGPT, Alkaline Phosphatase, LDH, Albumin and globulin ratio.

Gout: Uric acid

Blood grouping. Ouchterlony diffusion test Purification of antibody from egg.

Seminar: Each student will give a 15 min seminar with power point presentation on a topic from the subjects assigned.

Soft core

Nucleic Acid Metabolism - 3 Credits 48 h

Purines and pyrimidines: Pathways of biosynthesis and degradation of nucleic acids, purines and pyrimidines, uric acid formation. Salvage pathways, de novo biosynthetic pathways and regulations. 14 h

Gout and Lysch-Nyhan syndrome. Conversion of nucleotides to deoxynuclotides. Mchanisms of action of methotrexate, 5-fluorouridine, azathymidine. 6 h

Biosynthesis of cofactors: NAD+, FAD and coenzyme A, polyamine biosynthesis and their metabolic role. 8 h

Photosynthesis: Photosynthetic apparatus in plants, photosystems I and II, light harvesting antenna complex. Electron flow and phosphorylation; cyclic and noncyclic, oxygen evolution, Calvin cycle. C3, C4 and CAM cycle. Photorespiration, bacterial photosynthesis. Regulation of photosynthesis. RUBISCO. 12 h

Nitrogen metabolism: Importance of nitrogen in biological systems, nitrogen cycle. Nitrogen fixation; symbiotic and non-symbiotic, nitrogenase complex, energetics and regulation. Formation of root nodules in legumes. Assimilation of nitrate and ammonium ion. 8 h

Clinical biochemistry - 3 Credits 48 h

Basic concepts: Health and disease. Normal and pathological changes, affecting cells in the body. Cell death and the physiological causes; physical, chemical, biological agents and nutritional deficiency. 4 h

Blood: Composition, cells, functions of plasma proteins and lipo-proteins in diseases. Disorders of hemoglobin; thalassemia, sickle cell anemia. Importance of differential and total blood count in the clinical diagnosis.

Anemias; microcytic, normocytic and macrocytic. 4 h

Diagnostic enzymology: Clinically important enzymes; alkaline phosphatase, AST, ALT and isoenzymes of creatine kinase and LDH. 4 h

Endocrine disorders: Laboratory diagnosis to assess the function of pituitary, thyroid, adrenals and gonads.

Disroders; graves disease, Hashimoto disease, Addission's disease, hypo and hyper secretion of hormones. Acromegaly, gigantism. 4 h

Liver: Biochemical indices of hepatobiliary diseases. Diagnosis of liver function tests. Bile pigments - formation of bilirubin, urobilinogen, bile acids.

Jaundice; prephapatic, hepatic and post hepatic.

Diseases of the liver - Hepatitis cholestasis, cirshosis, fatty liver and gallstones. Alcohol metabolism and its impact on the liver functions. 5 h

Kidney: Assessment of renal function; creatine clearance, renal calculi, uremia, laboratory investigation of kidney disorders. 4 h

Gastrointestinal disorders: Fractional gastric analysis, hypo and hyper acidity, gastric ulcers, malabsorption syndrome, steatorrhea and diarrhoea. 3 h

Metabolic disorders: Amino acid, lipid, nucleic acid and carbohydrates: Phenylketone urea, alkapton urea. Lesch-Nyhan, Gout. Diagnosis of metabolic disorders, Amniocentesis.

Disorders of carbohydrate metabolism; diabetes mellitus, classification, etiology, management. Laboratory investigations; GTT, HbAlc, diabetic complications and advanced glycation end products.

In born errors of carbohydrate metabolism; glycogen storage diseases, galactosemia, lactose intolerance, pentosuria. 11 h

Determination of lipids and lipoproteins. Hyper lipoprotenemia and types of modification of lipoproteins. Taysachs, Nieman- Pick disease, Fabry's disease.

Cardiovascular disorders: Major Cardio vascular system, atherosclerosis, risk factors and pathogenesis. Diagnosis and prognosis. 4 h

Cancer: Etiology, diagnosis, treatment and prognosis. Carcinogens, oncogens, mechanism. Biochemistry of ageing: Cellular senescence, cystic fibrosis. Mechanism of detoxification of xenobiotics. 5 h

Genomics, Proteomics and Bioinformatics - 2 Credits 24 h

Introduction to Genomics: DNA isolation, sequencing by dideoxy method and next generation sequence analysis. Hybridization methods, microarray analysis, and reverse transcribed and real time PCR. 2 h

Biological databases: Introduction, classification of biological databases, retrieval of biological database systems. Molecular Modeling Database at NCBI, Molecular visualization software (RASMOL). Phylogenetics Clustal. Prediction of genes (Gene finder, ORF finder). 2 h

Sequence comparison and database search: Introduction, pair wise alignment, global alignment, local alignment, multiple sequence alignment, scoring a multiple alignment, multiple sequence alignment, methods-dynamic programming approach, progressive alignment, iterative refinement methods, pattern matching in DNA and protein sequences, PAM matrices, BLAST, FAST and FASTA. ucleotide sequence analysis, tools and methods, single nucleotide polymorphism. 3 h

Molecular phylogenetics: Introduction, application of phylogenetic trees, basic terminology, taxa, taxanomy, root, leaf, node, tree, branch, clade, dendogram, cladogram, rooted tree, unrooted tree, scaled tree. Phylip, Clustal. 2 h

Introduction to proteomics: Analytical methods of protein and peptide separations, protein digestion techniques, Mass spectrometers for protein and peptide analysis. Protein identification by peptide mass fingerprints, peptide sequence analysis by tandem mass spectrometry. 3 h

Protein sequence analysis using softwares; Emboss, data mining proteomes, motif mapping using prosite, prodom, protein expression profiling, protein-protein interactions,

protein complexes. Mapping protein modifications. Protein secondary structure analysis, Molecular visualization, protein 3D structure using Rasmol, pdb file format. 2 h

Protein and secondary structure prediction: Secondary structure prediction methods, softwares for secondary structure prediction, protein families and classification, prediction of transmembrane regions. CATH and SCOP. 3 h

Protein modeling: Introduction, methods of protein modeling, homology or comparative modeling, model refinement, evaluation of the model. 1 h

Molecular modeling: Concepts of Molecular Modeling, molecular structure and internal energy, energy minimization of small molecules, *Ab initio*, and semi-empirical methods, Construction of initial model, refining the model, manipulating the model, three-dimensional structure prediction, comparative modeling, homology modeling, threading, energy based prediction of protein structures, modeling software. 3 h

Introduction to drug designing: In silico analysis, physico-chemical property prediction, aqueous solubility, Lipinski's rule of five.

Docking methods: Three dimensional descriptions of binding site environment and energy calculation, automatic docking method. Three dimensional database search approaches, design of ligands, drug-receptor interactions, automated structure construction methods, AUTODOCK. 3 h

IV Semester Biochemistry

Hard Core

Molecular biology - 3 Credits 48 h

Introduction: Historical perspective, composition of RNA and DNA. Bases, Chargaff s rule. Types of RNA. Isolation and purification of RNA and DNA, structure of RNA and DNA, central dogma of molecular biology. 4 h

DNA-antiparellel nature: Nearest neighbour base frequency analysis. Replication of DNA, semi conservative nature; Messelson and Stahl experiment. Replication of double stranded DNA, direction of replication, discontinuous replication, Okazaki fragements. DNA polymerase I II and III, DNA ligase, DNA topoisomerases. Fidelity of replication, replication in viruses, rolling circle model, single stranded DNA virus. Applications of mitochondrial DNA. Trombon model, translesion synthesis (DNA pol IV and V). 10 h

Transcription: Colinerity of genes and proteins, RNA polymerase I, II and III. RNA biosyntehsis in prokaryotes and eukaryotes; initiation, elongation and termination. RNA dependent RNA synthesis, RNA replicase of Qβ virus. Processing of eukaryotic RNA, cap addition, poly A tail addition, RNA editing. Processing of tRNA and mRNA transcripts. 10 h

Translation: Genetic code, triplet codon, universality features of the genetic code, assignment of codons, studies of Khorana, Nirenberg, triplet binding techniques, degeneracy, wobble hypothesis, evolution of genetic code and codon usage, variation in the codon usage. 10 h

3D structure of prokaryotic and eukaryotic ribosomes, ribosomal protein synthesis; initiation elongation and termination. Role of mRNA and tRNA. Aminoacyl tRNA synthesis and its role in translation accuracy. 10 h

Post translation modification of proteins: signal cleavage, disulphide bond formation, O and N-glycosylation, folding of nascent protein, role of chaperones, attachment of glycosyl anchor, and other modifications.

Enzymes in DNA and RNA degradation: Nucleases, ribonucleases, classification and role. 4 h

Practical - 4: Experiments in Molecular biology, and

Seminar 4 Credits

6 h/week (Practical and Tutorials)

Isolation of DNA and RNA from plant and animal source, purity of DNA

Assay of DNA, electrophoresis of DNA and RNA.

Preparation of media, culturing of transgenic E.coli and Yeast. Preparation competent cells.

Isolation of plasmids, ligation, transformation. Restriction digestion of DNA.

PCR: Primer design and amplification. RT-PCR, blotting.

Paper Presentation: Presentation of recent Research Article published in the last two years which is appropriate in the various disciplines of Biochemistry from a peer reviewed Journal.

Practical - 5: Project work 6 Credits

12 h/week (Practical)

Project work will be on defined research topic allotted to the students. The students will also have to present a research data paper published recently in peer reviewed journals preferably in the area of project work.

Soft Core

Genetics and Gene Regulation - 3 Credits 48 h

Basic Principles of Mendelism: Laws of inheritance, dominance, codominance, epistasis, (coomb shape in chickens) pleiotropism. Cytoplasmic inheritances (male sterility in plants, shell coiling). 2 h

Gene linkage and chromosome: Linkage and recombination of genes in a chromosome. X-linked inheritance. Polygenic inheritance, mitochondrial inheritance, Y-chromosome inheritance. Map unit. 2 h

Chromosome number: Ploidy, Karyotyping, sex chromosome and dosage compensation. Mobile genetic elements. 2 h

Molecular Genetics: Mutations; nature of mutations, spontaneous and induced mutation, conditional, lethal (temperature sensitive) mutation. Biochemical basis of mutation. Point mutation, base substitution mutation, missense, nonsense and silent mutation. Mutation rates. Chemical mutagens, radiation induced mutation, reverse mutations and suppressor mutations - intergenic and intragenic suppression, reversion as a means of detecting mutagens - Ames test. 6 h

Repair Mechanism: Reciprocal recombination, site specific recombination, Ecoli rec system. Holliday model of recombination. 3 h

Chromosomal Basis of Human Diseases: Extra or missing chromosome, abnormality in chromosome structure; deletion, duplication, inversion, translocation. 3 h

Regulation of gene expression in prokaryotes: Operon model; lac operon, structure and regulation. Galactose operon; role of two promoters. Arabinose operon; positive control. Tryptophan operon; T attenuation control. 6 h

Eukaryotic gene regulation: Regulation of gene expression at the level of DNA structure; super coiling, DNA methylation. Role of nucleosome structure in enkaryotic gene expression; glucocorticoid gene, DNA kinking, bending and gene regulation. Chromatin structure, chromatin remodeling, Swi/Snf, remodeling assay, ChIP. 6 h

Regulation at the level of transcription: Transcription factors, TF II, NFkB, regulation of NFkB and its activation. Formation of initiation complex. Role of enhancer. 4 h

Regulation at the level of RNA processing: RNA export and RNA stability, factors affecting RNA stability and RNA degradation. 4 h

Regulation at the level of translation: Secondary structure in the 5' and 3' untranslated region; regulation of ferretin and transferring, mRNA. Role of upstream AUG codons. (GCN 4 gene regulation), transplanting and translational introns, protein splicing inteins. 6 h

Role of aminoacyl t-RNA synthetase in the regulation of accuracy of translation, proof reading mechanism. Ribosomal optimization of translation. Regulation at the level of ribosome assembly. 2 h

DNA binding protein motifs: Zinc finger, leucine zipper, helix-turn-helix and other motifs.

Regulation at the level of post translational modification: proteins stability, N-end rule, PEST and other sequences, unbiquitin mediated degradation. 2 h

Genetic engineering - 3 Credits 48 h

Genetic Engineering: Extraction and purification of nucleic acids (DNA and RNA) from biological sources. Definition, aims and objectives of recombinant DNA technology, restriction-modification systems, restriction enzymes; type I, II and III, specificity, sticky ends and blunt ends, isoschizomers. Gene cloning; genomic cloning, shot gun cloning, cDNA cloning. 10 h

Vectors: Plasmids, phage, cosmids and phagemid. Yeast cloning vectors, plant vectors, bacterial artificial chromosome, SV40, shuttle vectors, construction of expression vectors.

Ligation: Blunt end and sticky end ligation, use of linkers and adopters, homo polymer tailing, colony hybridization, plaque hybridization.

Transformation: Micro injection, electroporation, lipofection, calcium phosphate method, protoplast fusion/somatic cell hybridization and biolistic methods. Transgenic plants and animals, gene knocks out. 10 h

Techniques: DNA sequencing, shot gun and orderly sequencing, chromosome walking, PCR; analysis of products, nested PCR, applications of PCR in cloning, agriculture and medicine. RT-PCR technique and applications. Real time PCR for quantification. 10 h

Identifying the right clones: Direct screening; insertional inactivation of marker gene, visual screening, plaque phenotype. Indirect screening; immunological techniques, hybrid arrest translation, hybrid select translation. Screening using probes; construction of gene probes, hybridization and labeling. 10 h

Mapping in Prokaryotes and Viruses: Bacterial transformation and transduction, conjugation; F+ plasmids, Hfr cells, time of entry mapping. Arrangement of genes in phage chromosome, plaque formation and lytic cycle. Fine structure of rII locus of T4. Lysogeny and λ phage. 4 h

Applications: Gene therapy, applications in agriculture medicine, industry. GM foods, terminator gene, negative impact of genetic engineering. 4 h

Biotechnology - 3 Credits 48 h

Historical Aspects : Discovery of microorganisms. Theory of spontaneous generation. Era of Louis Pasteur. Microbes and fermentation. Microbes and diseases Koch's Postulates. 2 h

General characteristics: morphology, nomenclature and classification of bacteria, yeast, molds, fungi actinomycetes, rickettesiae. 5 h

Techniques: Isolation and culture of microorganisms - aerobic and anaerobic culture methods, culture media. Isolation of pure colony, characterization. Staining - Gram stain acid fast, endospore, flagella. 5 h

Microbial Nutrition: Factors influencing growth, growth curve of bacteria. Measurement of growth, continuous culture, synchronous culture chemostat. Auxotrophs, autotrophs, heterotrophs, methods of cultivations and preservation of microorganisms. 5 h

Methods of Control of Microorganisms : Bacteriostatic and bacteriocidal agents. Mechanisms of disinfection and sterilization. Physical and chemical methods. 5 h

Cell culture techniques: Introduction to plant and animal tissue/cell culture. Laboratory design, aseptic conditions, equipments and materials for cell culture. Different constituents of culture medium, types of media and their applications. 4 h

Plant cell culture: Micro propagation, callus culture, haploid production, somatic embryogenesis, somatic hybridization, cybridization and somaclonal variation. Production of disease free plants. 4 h

Animal cell culture: Culture techniques, media, preparation of primary culture; disaggregation of tissue and primary cultures, chick embryo, HUVEC, characterization of cultures, ploidy, cell doubling time. 4 h

Cell lines: Characteristics and routine maintenance, cell separation techniques. Measurement of viability and cytotoxicity. Scaling-up of animal cell culture; bioreactors used in animal cell culture, amplified cultures, continuous cultures and their applications. 6 h

Industrial applications: Fermentor; stirred fermentor, micro carrier, encapsulation, hollow fiber chambers, packed glass bead reactors. Cell immobilization techniques.

Characterization of the cultured cells, measuring parameters of growth. Cell synchronization, Somatic cell fusion, cell cloning and cryopreservation.

Applications of animal cell culture: Organ and histotypic cultures; three-dimensional culture, tissue engineering; example skin . 8 h

Biostatistics - 2 Credits 24 h

Introduction to Biostatistics: Population, sample, sampling techniques, random sample. 2 h

Mean, median, mode, range, variance, coefficient of variation, frequency, standard deviation, standard error. Representation of statistical data line graph, histogram, bar diagram, pie chart, scatter diagram. 6 h

Collection of data: Relevance of sample size. Sources, methods-questionairs, records, archives, scaling-Likert and Gutman. Validation and standardization of the methods, modification and experimental design. 6 h

Probability: Rules of probability, binomial distribution, normal distribution, area under the curve, Z value, choosing sample size, hypothesis testing, Student's t test. One way ANOVA, correlation and regression. 7 h

X2 test: goodness of fit, test of independence.

Non parametric statistics, sign test, rank sum test, rank correlation. 3 h

PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE [AUTONOMOUS]

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

Affiliated to University of Mysore

DEPARTMENT OF STUDIES IN BIOTECHNOLOGY

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

UPDATED REGULATIONS FOR CHOICE BASED CREDIT SYSTEM (CBCS) AND CONTINUOUS ASSESSMENT GRADING PATTERN (CAGP) FOR M.Sc., BIOTECHNOLOGY PROGRAMME WITH EFFECT FROM 2019-2020

PREAMBLE

The University Grants Commission (UGC) has stressed on speedy and substantive academic and administrative reforms in higher education for promotion of quality and excellence. The Action Plan proposed by UGC outlines the need to consider and adopt Semester System, Choice Based Credit System (CBCS), and Flexibility in Curriculum Development and Examination Reforms in terms of adopting Continuous Evaluation Pattern by reducing the weightage on the semester- end examination so that students enjoy a de-stressed learning environment. Further, UGC expects that institutions of higher learning draw a roadmap in time bound manner to accomplish the above.

The Post-graduate wing of SBRR Mahajana First Grade College (Pooja Bhagavat Memorial Mahajana PG Centre) is an advanced learning centre of Mahajana Education Society. It was started in 1999, affiliated to the University of Mysore to offer Post Graduate Programmes and diploma courses of direct relevance in 16 disciplines and is poised to start new courses in the years to come. The postgraduate wing is a member of well known professional bodies like CSI (Computer Society of India), ISTE (Indian Society for Technical Education), NIPM (National institute of Personal Management) and CII (Confederation of Indian Industry) so that the students are exposed to recent trends in the industry by attending programmes conducted by the above professional organizations.

ABOUT THE COURSE

The M.Sc., Biotechnology course of the University of Mysore is approved by the University Grants Commission. All the courses in the programme are carefully designed to equip the students for competitive exams like CSIR NET, SET etc and also to write research proposals for grants. The Department is well furnished and provided with state-of-the-art laboratory facilities. The Department has highly qualified and experienced faculty for the students to learn and experiment, hands on, with techniques of great relevance to current day bio industries. Besides, the Centre also invites eminent Scholars, Scientists and Professors from UOM, CFTRI, DFRL and other institutions for special lectures to enlighten students on most recent developments in the subject. The students are also encouraged to take part in scientific seminars, group discussions and quiz competitions apart from the other extracurricular activities. Our students have won prizes in intercollegiate essay, debate and music competitions.

OBJECTIVE

The Department of Studies in Biotechnology came into existence in the year 2004. The Department is striving to be recognized as a leader for offering societal relevant innovative Post Graduate education. It endeavors to build and enhance the capabilities of the future generation by providing quality education. The curriculum exposes the young graduates to the recent and applied knowledge of interdisciplinary branches of biotechnology.

The Department makes it their mission to provide socially and industrially relevant post-graduate education and training. The Department also undertakes research in create fundamental area of applied science that utilizes living cells and cellular materials to pharmaceutical, diagnostic, agricultural, environmental, and other products to benefit society.

The Department endeavors to build and enhance the capabilities of the future generation by providing quality education that provides a deep insight into the subject with the following objectives:

- To develop a detailed technical understanding of the key methods used in the contemporary biotechnology sector;
- To appreciate the techniques applied in biotechnology and advanced research;
- To acquire and critically appraise new data arising from the use of these techniques and to interpret the implications of such data;
- To develop an understanding of the commercial, financial and regulatory context in which the biotechnology sector operates.

1. TITLE AND COMMENCEMENT

These Regulations shall be as per the University of Mysore regulations for Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) for M.Sc., Biotechnology program. These Regulations shall come into force from the academic year 2019-20.

2. **PROGRAM OFFERED :** M.Sc Biotechnology

3. **DEFINITIONS**

Course: Every course offered will have three components associated with the teaching-learning process of the course, namely

(i) Lecture – L (ii) Tutorial- T (iii) Practicals - P, where

L stands Lecture session. **T** stands Tutorial session consisting participatory discussion / self study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents

delivered in the Lecture classes.

P stands Practice session and it consists of Hands on experience / Laboratory Experiments / Field Studies / Case studies that equip students to acquire the much required skill component.

In terms of credits, every one hour session of L amounts to 1 credit per semester and a minimum of two hour session of T or P amounts to 1 credit per semester, over a period of one semester of 16 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components. That means a course may have only lecture component, or only practical component or combination of any two or all the three components.

The total credits earned by a student at the end of the semester upon successfully completing the course are L + T + P. The credit pattern of the course is indicated as L: T: P.

If a course is of 4 credits then the different credit distribution patterns in L : T : P format could be

4 : 0 : 0,	1 : 2 : 1,	1 : 1 : 2,	1 : 0 : 3,	1 : 3 : 0,
2 : 1 : 1,	2 : 2 : 0,	2 : 0 : 2,	3 : 1 : 0,	3 : 0 : 1,
0 : 2 : 2,	0 : 4 : 0,	0 : 0 : 4,	0 : 1 : 3,	0 : 3 : 1,

The concerned BoS will choose the convenient credit pattern for every course based on the requirement. However, generally, a course shall be of 3 or 4 credits.

Different courses of study are labeled and defined as follows:

Core Course

A course which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

A Core course may be a **Soft Core** if there is a choice or an option for the candidate to choose a course from a pool of courses from the main discipline / subject of study or from a sister/related discipline / subject which supports the main discipline / subject. In contrast to the phrase Soft Core, a compulsory core course is called a **Hard Core** Course**.**

Elective Course

Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline / subject of study or which provides an extended scope or which enables an exposure to some other discipline / subject/domain or nurtures the candidate's proficiency/ skill is called an Elective Course. Elective courses may be offered by the main discipline/ subject of study or by sister / related discipline / subject of study. A Soft Core course may also be considered as an

elective.

An elective course chosen generally from an unrelated discipline / subject, with an intention to seek exposure is called an **open elective**.

An elective course designed to acquire a special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher is called a **Self Study Elective**.
A core course offered in a discipline / subject may be treated as an elective by other discipline / subject and vice versa. Project work/Dissertation work is a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A project work up to 4 credits is called Minor Project work. A project work of 6 to 8 credits is called Major Project Work. Dissertation work can be of 10-12 credits. A Project/Dissertation work may be a hard core or a soft core as decided by the BoS concerned.

4. ELIGIBILITY FOR ADMISSION

M.Sc., Biotechnology

Candidates with Bachelor's Degree in Science including Agricultural, Pharmacy, Chemical Engineering, Medicine, Veterinary, Dairy, Fisheries, Horticulture, Forestry from any University recognized by UGC / ICAR / AICTE / Medical Council with an aggregate minimum of 55% (50% in case of SC/ST) or equivalent grade.

5. SCHEME OF INSTRUCTIONS

5.1 A Masters Degree program is of 4 semesters-two years duration. A candidate can avail a maximum of 8 semesters – 4 years (in one stretch) to complete Masters Degree (including blank semesters, if any). Whenever a candidate opts for blank semester(s)/DROP in a course or in courses or is compelled to DROP a course or courses as per the provision of the regulation, he/she has to study the prevailing courses offered by the department as per the prevailing scheme, when he/she continues his/her study.

5.2 A candidate has to earn a minimum of 76 credits, for successful completion of a Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	Credits
Hard Core	A minimum of 42, but not exceeding 52
Soft Core	A minimum of 16
Open Elective	A minimum of 04

Proposed Scheme of Study (2019- 2020 Onwards)

Master's Degree Program in Biotechnology

Credits to be earned	**76**
Core papers	51 credits
Soft core	21 credits
Open elective paper*	04 credits

*Open elective shall be entirely from different discipline of study

Credit matrix for Master's Degree Program in Biotechnology

Credits to be earned	**I**	**II**	**III**	**IV**	**Total Credits**
Hard Core	14	14	14	09	51 credits
Soft Core	06	06	06	03	21 credits
Open elective	-	04	-	-	04 credits
Total	20	24	20	12	76

Every course including project work, practical work, field work, seminar, self study elective should be entitled as hard core or soft core or open elective by the BoS concerned

5.3 A candidate can enroll for a maximum of 24 credits per semester.

5.4 Only such candidates who register for a minimum of 18 credits per semester in the first two semesters and complete successfully 76 credits in 4 successive semesters shall be considered for declaration of ranks, medals and are eligible to apply for student fellowship, scholarship, free ships and hostel facilities.

5.5 In excess to the minimum of 76 credits for masters degree in the concerned discipline / subject of study, a candidate can opt to complete a minimum of 18 extra credits to acquire **add on proficiency diploma** in that particular discipline / subject along with the masters' degree. In such of the cases wherein, a candidate opts to earn at least 4 extra credits in different discipline / subjects in addition to a minimum of 76 credits at masters level as said above then an **add on proficiency certification** will be issued to the candidate by listing the courses studied and grades earned.

5.6 A candidate admitted to Masters program can exercise an option to exit with Bachelor Honors degree / PG diploma after earning 40 credits successfully.

6.0. CONTINUOUS ASSESSMENT, EARNING OF CREDITS AND AWARD OF GRADES

The evaluation of the candidate shall be based on continuous assessment. The Structure for evaluation is as follows:

6.1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified as C1, C2, and C3.

6.2 The performance of a candidate in a course (30:70 patterns) will be assessed for a maximum of 100 marks as explained below:

6.2.1 The first component (C1), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions, etc. During the first half of the semester; the first 50% of the syllabus will be completed. This shall be consolidated during the 8^{th} week of the semester. Beyond 8^{th} week, making changes in C1 is not permitted.

6.2.2 The second component (C2), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions etc. The continuous assessment and scores of second half of the semester will be consolidated during the 16^{th} week of the semester. During the second half of the semester the remaining units in the course will be completed.

6.2.2.1. The outline for continuous assessment activities for Component-I (C1) and Component-II (C2) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective Departmental Council. The students should be informed about the modalities well in advance. The evaluated courses/assignments during component I (C1) and component II (C2) of assessment are immediately returned to the candidates after obtaining acknowledgement in the register maintained by the concern teacher for this purpose.

6.2.3 During the 18^{th} - 20^{th} week of the semester, a semester-end examination of 3 hours duration shall be conducted for each course. This forms the third/final component of assessment (C3) and the maximum marks for the final component will be 70.

Setting question papers and evaluation of answer scripts:

IX. Question papers in two sets shall be set by the internal examiner and one set by external examiner for a course. Whenever there are no sufficient internal examiners, The Chairman, BoE shall get the question papers set by external examiners.

Whenever there are no external examiners, The Chairman, BoE shall get the question papers set by internal examiner.

X. The Board of Examiners shall scrutinize and approve the question papers and scheme of evaluation.

XI. (i) There shall be single evaluation for all theory papers by internal examiner and 25% of the total scripts will be reviewed by an external examiner.

(ii) The average of first valuation and the review evaluation will be considered as the final marks of the candidate.

(iii) If there is difference of marks in maiden and reviewed evaluation is greater than 15 marks then the script will go for third evaluation by the external examiner and marks awarded in the third evaluation will be final.

(iv) The examination for Practical work/ Field work/ Project work will be conducted jointly by one internal and one external examiner.

XII. Challenge Evaluation

A student who desires to apply for challenge evaluation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Controller of Examinations within 15 days after the announcement of the results. This challenge evaluation is only for C3 component.

The answer scripts, for which challenge evaluation is sought for, shall be sent to external examiner. The marks awarded in the challenge evaluation will be final.

6.2.4 In case of a course with only practical component a practical examination will be conducted with two examiners (one Internal and one external)

A candidate will be assessed on the basis of

a) Knowledge of relevant processes

b) Skills and operations involved

c) Results / products including calculation and reporting.

If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the Departmental council.

6.2.5 If **X** is the marks scored by the candidate out of 70 in C3 in theory examination, if **Y** is the marks scored by the candidate out of 70/50/40 in C3 in Practical examination, and if **Z** is the marks scored by the candidate out of 70/50/40 in C3 for a course of (L=0):T:(P=0) type that is entirely tutorial based course, then the final marks (M) in C3 is decided as per the following table.

L.T.P distribution	Formula to compute Mark (M) in C3
L:T:P	$\frac{[(L+T)*X]+[(T+P)*Y]}{L+2T+P}$
L:(T=0):P	$\frac{(L*X)+(P*Y)}{L+P}$
L:T:(P=0)	X
L:(T=0):(P=0)	X
(L=0):T :P	Y
(L=0): (T=0):P	Y
(L=0): T:(P=0)	Z

6.2.6 The details of continuous assessment (30:70 patterns) are summarized in the following table:

Component	Syllabus in a Course	Weightage	Period of Continuous Assessment
C1	First 50%	15%	First half of the semester To be consolidated by 8th week
C2	Remaining 50%	15%	Second half of the semester. To be consolidated by 16th week
C3	Semester-end examination (All units of the course)	70%	To be completed during 18th-20th Week.

6.2.7 A candidate's performance from all 3 components will be in terms of scores, and the sum of all three scores will be for a maximum of 100 marks (15 +15 + 70).

6.2.8 Finally, awarding the grades should be completed latest by 24th week of the semester.

6.3 **Minor/ Major Project Evaluation:**

Right from the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his/her progress in the form of seminars in addition to the regular discussion with the guide. Components of evaluation are as follows:

Component – I (C1): Periodic Progress and Progress Reports (15%)

Component – II (C2): Results of Work and Draft Report (15%)

Component– III (C3): Final Viva-voce and evaluation (70%).

The report evaluation is for 40% and Viva-voce examination is for 30%.

6.4 In case a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

In case a candidate's class attendance in a course is less than 75%, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

Teachers offering the courses will place the above details in the Department Council meeting during the last week of the semester, before the commencement of C3, and subsequently a notification pertaining to the above will be brought out by the Chairman of the Department before the commencement of C3 examination. A copy of this notification shall also be sent to the office of the Director & the Controller of Examinations.

6.5 In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUP option.

In case a candidate secures more than or equal to 30% in C3, but his/her grade (G) = 4, as per section 6.9 below, then he/she may be declared to have been conditionally successful in this course, provided such a benefit of conditional clearance based on G=4 shall not be availed for more than 8 credits for the entire program of Master's Degree of two years.

In case a candidate secures more than 30% in C3, he/she may choose DROP/MAKE-UP option.

The candidate has to exercise his/her option immediately within 10 days from the date of notification of results.

A MAKE UP examination for C3 shall be conducted in all the semesters. Candidates can register for the MAKE UP examination within 10 days from the date of notification of results. The MAKE UP examination will be conducted within one month of the notification of the results.

If a candidate is still unsuccessful, A MAKE UP Examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with next regular even semester examinations; however, not exceeding double the duration norm in one stretch from the date of joining the course.

6.6 A candidate has to re-register for the DROPPED course when the course is offered again by the department if it is a hard core course. The candidate may choose the same or an alternate core/elective in case the dropped course is soft core / elective course. A candidate who is said to have DROPPED project work has to re-register

for the same subsequently within the stipulated period. **The details of any dropped course will not appear in the grade card.**

6.7 The tentative / provisional grade card will be issued by the Controller of Examinations at the end of every semester indicating the courses completed successfully. This statement will not contain the list of DROPPED courses.

6.8 Upon successful completion of Bachelors Honors/Master's Degree, a final grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Controller of Examinations.

6.9 The grade and the grade point earned by the candidate in the course will be as given below.

Marks(M)	**Grade**	**Grade Point (GP = V x G)**
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

Here, **P** is the Percentage of marks (P = [(C1+C2) + M] secured by a candidate in a course which is rounded to nearest integer. **V** is the credit value of course. **G** is the Grade and **GP** is the Grade Point.

6.10 A candidate can withdraw any course within ten days from the date of notification of final results. Whenever a candidate withdraws a paper, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is soft core/open elective.

A DROPPED course is automatically considered as a course withdrawn.

6.11 Overall Cumulative Grade Point Average (CGPA) of a candidate after successfully completing the required number of credits (76) is given by:

CGPA = ΣGP / Total Number of Credits

7. CLASSIFICATION OF RESULTS

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	FGP	
	Numerical Index	Qualitative Index
4 <= CGPA < 5	5	SECOND CLASS
5 <= CGPA < 6	6	
6 <= CGPA < 7	7	FIRST CLASS
7 <= CGPA < 8	8	
8 <= CGPA < 9	9	DISTINCTION
9 <= CGPA < =10	10	

Overall percentage=10*CGPA or is said to be 50% in case CGPA<5

8. MEDIUM OF INSTRUCTION

The medium of instruction shall be English. However, a candidate will be permitted to write the examinations either in English or in Kannada. This rule is not applicable to languages.

9. PROVISION FOR APPEAL

If a candidate, is not satisfied with the evaluation of C1 and C2 components, he / she can approach the grievance cell with the written submission together with all facts, the assignments, test papers etc, which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty as prescribed by the university on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she is found guilty. The decision taken by the grievance cell is final.
For every program there will be one grievance cell. The composition of the grievance cell is as follows.

1. The Controller of examinations-ex-officio Chairman / Convener

2. One senior faculty member (other than those concerned with the evaluation of the course concerned) drawn from the department/discipline and/or from the sister departments/sister disciplines.

3. One senior faculty members/course experts drawn from outside the University department.

Biotechnology Syllabus -2019 -20

I Semester

Title of the course	HC/SC/ OE/etc	L	T	P	Credits
Bioanalytical Techniques	HC	3	0	0	3
Microbiology	HC	3	0	0	3
Biochemistry	HC	3	0	0	3
Practical-1 (Bioanalytical Techniques, Microbiology, Biochemistry)	HC	0	0	5	5
SOFTCORE (Choose any TWO from the below listed)					
Cancer Biology	SC	3	0	0	3
Food & Environmental Biotechnology	SC	3	0	0	3
Biostatistics & Bioinformatics	SC	3	0	0	3

Bioanalytical techniques (HC)

48h

Unit-I

General considerations, pH and buffers, cell disruption techniques. Cell fractionation, Lysis buffer, Salting in and salting out, dialysis.

Chromatographic techniques: General principles, Sample preparation, Selection of chromatographic system, Low pressure column chromatography, HPLC, Adsorption chromatography, Partition chromatography, Ion exchange chromatography, Exclusion chromatography, Affinity chromatography, GLC, TLC, Paper chromatography. UPLC , chromatofocusing

Unit-II

Electrophoretic Techniques: General principles, Support media, Native gels, SDS-PAGE, IEF, 2D gel electrophoresis, Agarose gel electrophoresis, Pulse field gel electrophoresis (PFGE), Capillary electrophoresis (CE).

Centrifugation Techniques: Introduction, Basic principles of sedimentation, Types of centrifuges and their uses, Preparative centrifugation- differential and density gradient separation, Analytical ultracentrifuges and their applications.

Zymogram, reverse zymogram,, Visualising the separated components, staining, fluroscence, PAS staining.

Unit-III

Spectroscopic techniques: Introduction, UV and visible light spectroscopy, IR and Raman spectroscopy, Electron Spin Resonance (ESR), NMR, Spectrofluorimetry, Luminometry, Atomic spectroscopy, X-ray diffraction, ORD, CD.

Mass spectrometric techniques: Introduction, mass spectrometer, Ionization techniques- Electron impact ionization (EI), Electrospray Ionization, Chemical ionization (CI), Field ionization (FI), MALDI, Ion disruption methods, Ion desorption and evaporation methods, Analyzers- Magnetic sector, time-of-flight, quadropole, ion trap, Detectors- electron multipliers, Tandem mass spectrometry, applications.

Unit-IV

Microscopy techniques: Light microscopy, phase contrast microscopy, fluorescence microscopy, electron microscope- TEM and SEM, confocal microscopy, flow cytometry-FACS.

Radioisotope techniques: Nature of radioactivity, detection and measurement, GM counter, scintillation counting, autoradiography, Safety aspects and applications of radioisotopes in biology.

Electrochemical techniques: Introduction, Principles, Redox reactions, Types of electrodes- pH electrode, ion-sensing electrodes, gas sensing electrodes, oxygen electrode,Biosensors.

Microbiology (HC)

48 h

Unit-I

The beginning of microbiology and Microbial Characteristics

Introduction to Microbiology and Microbes; History and scope of Microbiology – Hook, Antony van Leeuwenhoek and Cohn; Contribution of Pasteur and Koch. Prokaryotic cell

structure, pure culture techniques; bacterial genetics: transformation, transduction and conjugation; antimicrobial resistance. Culture collection and Maintenance of cultures.

Unit-II

Microbial Taxonomy and Microbial diversity

Criteria for classification of bacteria; Bergy's manual, Cyanobacteria, acetic acid bacteria,lactic nacid bacteria and Mycobacteria. Archaea: Halophiles, Methanogens and thermophiles. Viruses: general properties of virus, viral structure, sub-viral particles – viroids and prions. Eukarya: algae and fungi, general characteristics and outline classification.

Unit-III

Microbial Growth and Control

Microbial growth: Growth curve, batch and continuous culture system culture, factors affecting growth like temperature, acidity, alkalinity. Sterilization, disinfection and antisepsis: physical and chemical methods for control of microorganisms, antibiotics, Microbes and environment: Nutrient cycles (carbon and nitrogen cycle); microbial communication system; quorum sensing, prebiotics and probiotics.

Unit-IV

Beneficial and Harmful effects of Microorganism

Beneficial aspects of microbes and their metabolites in food industry, Bioremediation. Important microbial diseases of Plants caused by fungi, bacteria and viruses. Important infectious diseases of humans, caused by bacteria, protozoa and viruses - tuberculosis, malaria and AIDS. Emerging and resurgent infectious diseases.

Biochemistry (HC)

48 hr

Unit-I

Carbohydrates, Lipids and Nucleic acids

Carbohydrates: Structure of starch, glycogen and bacterial cell wall polysaccharides. Structure and biological significance of glycoproteins and proteoglycans.

Lipids: Classification, structure and functions of storage and membrane lipids- TAG, phospholipids, sphingolipids, glycolipids, isoprenoids and eicosanoids.

Nucleic acids: Structure of DNA, chemical synthesis of DNA, Isolation and characterization. structure of RNA, types and functions.

Unit-II

Proteins: Amino acids- structure and functional group properties, peptide bond, structural organization of proteins- primary, secondary, super-secondary, tertiary and quaternary, protein structures- myoglobin, collagen, keratin, immunoglobulin, Ramachandran plot, end group analysis, primary structure determination, synthesis of peptides, structure-function relationships in model proteins- Myoglobin, Haemoglobin, denaturation and renaturation of proteins- Ribonuclease A

Unit-III Enzymology

Classification, enzyme activity, Michaelis-Menten kinetics, LB plot, inhibition - competitive, uncompetitive, non-competitive, mixed, partial, substrate inhibition,

suicide inhibition, determination of Ki, active site, allosterism - ATCase, isoenzymes-LDH, catalytic strategies, co-enzymes and cofactors, multienzyme complexes- PDC.

Unit-IV Bioenergetics

Electron transport chain and Oxidative phosphorylation: organization of respiratory chain complexes, structure and function of components, Oxidative phosphorylation. Mechanism of ATP synthesis, ATP synthase complex, proton motive force, Mitchell's hypothesis, mitochondrial permeability transition pore and its implications. Overview of Integration of metabolic pathways to bioenergetics-Glycolysis, TCA cycle, Glycogen metabolism, Pentose phosphate pathway, Gluconeogenesis, Amino acid metabolism, fatty acid metabolism, Nucleicacidmetabolis

Practical-1 (Bioanalytical Techniques, Microbiology, Biochemistry) HC

- Measurement of pH
- Preparation buffers and solutions
- Determination of pKa of amino acids
- Estimation of reducing sugar by DNS method
- Estimation of proteins by Lowry's method
- Estimation of proteins by Bradford's method
- Estimation of proteins by Bicinchonic acid method
- Wavelength scan of proteins and nucleic acids
- Ascending, descending and circular paper chromatography for separation of amino acids
- TLC of amino acids (1D and 2D)
- Ultracentrifugation
- UV-Visible Spectrophotometry
- Column chromatography- gel filtration
- Gel electrophoresis- native and SDS-PAGE and estimation of molecular weight of proteins
- Demonstration of HPLC, LC-MS, XRD, NMR, Confocal and Electron microscopy
- Assay of acid phosphatase- Specific activity, effect of pH, determination of Km, Vmax, IC50 value
- Preparation of liquid and solid media for growth of microorganisms

- Isolation and maintenance of organisms by plating, streaking and serial dilution methods, slants and stab cultures, storage of microorganisms
- Isolation of pure cultures from soil and water
- Growth, growth curve; measurement of bacterial population by turbidometry and serial dilution methods. Effect of termperature, pH, carbon and nitrogen sources on growth.
- Microscopic examination of bacteria, yeast and molds and study of organisms by gram stain, acid fast stain and staining for spores.
- Assay of antibiotics and demonstration of antibiotic resistance.
- Biochemical characterization of selected microbes

Softcore Papers – Semester 1

Cancer Biology (SC)

48 h

Unit-I

Cancer Biology: the basics

Introduction, historical perspective, classification, Carcinogenesis, cancer initiation, promotion and progression, Cancer cell cycles, Genomic instability, Apoptosis, Genes and proteins as players in apoptosis, DNA viruses/ cell immortalization.

Unit-II

Cancer Genes I: Oncogenes and signal transduction

Cellular proto-oncogenes, oncogene activation, Growth factors, growth factor receptors, signal transduction , Transcription, Transcription factors and cancer, Retroviral oncogenes, Tumor suppressor, Tumor suppressor gene pathways, DNA methylation, epigenetic silencing of suppressor genes.

Unit-III

Understanding Cancer as a Disease: natural history of cancer development

Free radicals, antioxidants and metabolic oxidative stress and cancer, Epidemiology of selected cancers, Gene rearrangements, detecting oncogene abnormalities in clinical specimens, Cell: cell interactions, cell adhesion, angiogenesis, invasion and metastasis, Antiangiogenic therapy of cancer.

Unit-IV

Current concepts in cancer therapy

Strategies of anticancer chemotherapy, Strategies of anticancer gene therapy/translating therapies from the laboratory to the clinic, Gene discovery in cancer research, cancer genome anatomy project , Cancer immunity and strategies of anticancer immunotherapy, stem cells and their applications in cancer therapy.

Food and Environmental Biotechnology (SC)

48hr

Unit-I

Introduction to Food biotechnology, Fermented foods, milk-based products, fermented vegetables, fermented meats, fish, beverages, vinegar, mould fermentation - tempeh, soysauce, rice wine. Enzymatic processing of fruit juices; DNA-based methods for food authentication, comparative methods of toxicity testing in (novel) foods, application of

generic technologies in food and nutritional sciences; anti-cancer components in foods.

Unit-II

Functional foods and Biotechnology: Biochemical processing in the improvement of functional foods with targeted health benefits and increased nutrient value; Pre- and Pro-biotics, single cell protein, single cell lipids. Manipulation of fruit ripening process. Food processing, principles and practices, food ingredients and processing aids from biotechnological processes, corn sweeteners, bacterial starter cultures, cold-adapted enzymes. Food spoilage, preservation, mycotoxins in food commodities. Genetically modified foods, designer foods, detection of GM foods, Nutraceuticals, Concept of food parks.

Unit-III

Introduction to Environment, Renewable and non-renewable resources, current status of biotechnology in environment protection. Waste water management: Bioreactors for waste-water treatment, treatment of industrial effluents-dairy, distillery, paper and sugar industries. Membrane-based waste water treatment. Biotechnology &Environment, Biodiversity and its conservation, Microbial ecology.

Unit -IV

Bioremediation: Concepts and principles, bioremediation using microbes, in situ and ex situ bioremediation, biosorption and bioaccumulation of heavy metals. Phytoremediation Xenobiotics: Degradation capabilities of microorganisms with reference to toxicology, pesticides, herbicides, polyaromatic hydrocarbons.

Biostatistics and Bioinformatics (SC)

48 h

Biostatistics

Unit I

Statistical concepts: Data structure, sampling methods, descriptive statistics - data collection, tabulation Measures of central tendency: mean, median, mode Measures of dispersion: Range, interquartile range, mean deviation, standard deviation, standard error, coefficient of variation, confidence limits.

Unit II

Types of distribution of data: Normal, Binomial, Poisson

Hypothesis testing: Z-test, t-test, ANOVA, multiple comparisons – LSD and DMRT, chi-square test; Regression and correlation; Non-parametric significance tests; Experimental designs- CRBD, RCBD, LSD, factorial; data transformation- arcsine, log, square-root. Probability

Bioinformatics

Unit III

Bioinformatics- an overview, Definition and History, Applications of Bioinformatics.

Introduction to Genomics: Genome mapping, Genome sequencing, human Genome project.

Introduction to Proteomics: Tools and techniques in proteomics.

Sequence formats. Homology and similarity.

Introduction to Data mining, NCBI, EBI, DDBJ,

Database search software: ENTREZ, SRS, Expasy.

Protein Sequence Databases, UNIPROT, Structure Database: PDB.

Sequence Analysis: definition of sequence analysis, Introduction to Sequences, alignments and Dynamic Programming; Local alignment and Global alignment (algorithm and example), Pair wise Alignment, and significance of alignment, Tools of sequence alignment, Homology sequence search, Nucleotide Sequence Analysis, Protein Sequence Analysis, Parameters of Blast, BlastN, BlastP, Interpreting Blast Results.

Unit IV

Multiple sequence analysis, scoring pattern, exhaustive and heuristic algorithms; Parameters of CLUSTAL-W and CLUSTALX for multiple sequence alignment, interpretation; Phylogenetic analysis: methods and tools.

RASMOL Display Styles- Wire Frame, Ball and Stick, Space Fill, Ribbons, Cartoons.

Drug discovery: Introduction, drug discovery technologies, virtual high-throughput *in silico* screening, Target validation EMBOSS Introduction to emboss Software package and its key features, other latest commercial softwares

Second emester

Title of the course	HC/SC/ OE/etc	L	T	P	Credits
Molecular Biology	HC	3	0	0	3
Genetic Engineering	HC	3	0	0	3
Immunotechnology	HC	3	0	0	3
Practical-2 (Molecular Biology, Genetic Engineering, Immunotechnology)	HC	0	0	5	5
SOFTCORE (Choose any TWO from the below listed)					
Molecular Genetics	SC	3	0	0	3
Genomics & Proteomics	SC	3	0	0	3
Cell Biology and Cellular Signalling	SC	3	0	0	3
OPEN ELECTIVE (Choose from other department)					
Biotechnology and its applications (For other discipline students)	OE	4	0	0	4

Molecular Biology (HC)

48 h

Unit-I

DNA helix topology: closed and super-coiled DNA, DNA topoisomerases.

DNA replication: Semi conservative, bidirectional, semidiscontinuous replication, Enzymes in DNA replication in prokaryotes- initiation, elongation and termination. Eukaryotic DNA replication, replicons, eukaryotic DNA polymerases, role of other proteins and enzymes in replication, end-replication problem, telomeric DNA and telomerase, Replication of organelle genomes, fidelity of replication, inhibitors of replication

Unit-II

Transcription: Transcription unit, RNA polymerase in prokaryotes, bacterial promoters, mechanism of transcription- initiation, elongation and termination, eukaryotic transcription, eukaryotic RNA polymerases, eukaryotic promoters- Class I, II, III, Enhancers and silencers, transcription factors, initiation, elongation and termination of transcription, inhibitors of transcription, mRNA processing- capping, polyadenylation, splicing, rRNA and tRNA processing, structural organization of mRNA, tRNA and rRNA, nuclear export of mRNA and mRNA stability.

Genetic code: Elucidation, triplet binding assay, Wobble hypothesis.

Unit-III

Translation: Composition and ultrastructure of prokaryotic and eukaryotic ribosomes, partial reconstitution experiments, amino acid activation, amino acylation of tRNA, aminoacyl tRNA synthetases, prokaryotic and eukaryotic translation- mechanism of initiation, elongation and termination, inhibitors of translation

Protein localization: Synthesis of secretory proteins and membrane proteins, import into nucleus, mitochondria, chloroplasts and peroxisomes, post translational modifications-signal cleavage, covalent modification, Protein folding, protein degradation pathway.

Unit-IV

Regulation of gene expression in Prokaryotes: Basic control circuits, positive and negative regulation, operon concept-*lac, ara* and *trp* operons, catabolite repression, regulatory elements in prokaryotes, attenuation, antitermination, stringent response, regulation of gene expression in bacteriophage - lytic and lysogenic cycle.

Regulation of gene expression in Eukaryotes: Cis control elements- promoters, enhancers, Trans acting factors, DNA binding motifs of transcription factors, mechanism of regulation by transcription factors- activators and repressors, NFkB pathway, role of chromatin in regulating gene expression and gene silencing, chromatin remodeling complexes, histone acetyl transferase and deacetylase, DNA methylation and gene regulation, hormonal regulation of gene expression (peptide and steroid hormones), post-transcriptional control- alternative splicing, RNA editing, translational control- regulation of ferritin and transferrin receptor mRNA, RNA interference, gene silencing by siRNA and miRNA.

Genetic Engineering (HC)

48 h

Unit-I

Cloning and Expression vectors: Plasmids, lambda vectors, M13 Phage, cosmids,phagemids, Artificial chromosome vectors-YACs, PACs and BACs, plant and animal viruses as vectors, Transposons, Expression vectors- prokaryotic (pRSET, pET), eukaryotic (pcDNA3, pCEP), Baculovirus and Pichia vector system, plant based vectors-Ti and Ri, binary and shuttle vectors,Gene cloning: genomic cloning, c-DNA cloning,

Unit-II

Gene manipulation Restriction enzymes, restriction mapping, cloning in plasmid, Phage and cosmid vectors, insertion of foreign DNA into host cells-transformation, electroporation, Transfection transient and stable, screening methods for transformants, downstream processing of recombinant proteins, affinity tags- His-tag, GST-tag, MBP-tag, Fc-tag. Construction and screening of genomic and cDNA libraries, chromosome walking, Chromosome Jumping, BAC libraries and assembly of BACs into contigs.

Unit-III

Gene analysis techniques

Hybridization techniques- Southern, Northern, South-western, Far-western, Colony hybridization, fluorescence *in situ* hybridization, molecular probes-preparation, labelling, amplification, applications, Polymerase chain reaction-Principle, primer designing, Types- RT-PCR, Realtime PCR, colony PCR, Multiplex PCR, Hot-start PCR, asymmetric PCR, Sequencing methods- chemical sequencing of DNA (Maxam and Gilberts methods andSangers dideoxy method), automated DNA sequencing, sequencing by DE-MALDI-TOFMS,microarray. ChIP and Chip-on-chip techniques Chromogenic *in situ* hybridization, qPCR,

Unit-IV

Gene therapy, transgenics and Genome editing

Ex vivo and *in vivo* gene therapy, Vectors and other delivery systems for gene therapy, Invitro gene therapy, gene therapy of genetic diseases: eg. Neurologocal, metabolic disorders and cystic fibrosis, viruses for gene therapy- lentivirus, adenovirus. Gene targeting, knockout mice, genome editing by CRISPR-CAS

Immunotechnology (HC) 48 h

Unit-I

Immunity and nonspecific immune system: Immunity, mechanical, chemical and physiological factors, phagocytosis, humoral factors, lymphocytic cells.

Antigens and immunogenicity: The immune response, immunogenicity, molecular differences in epitope structure.

Imunoglobulins: General structure, structure and functions of specific immunoglobulins, antibody diversity, plasma cell dyscrasias.

Unit-II

The complement system: Complement, pathways of complement activation, membrane

attack pathway, biological consequences of complement activation, regulatory mechanisms.

The immune response system: Exposure to an antigenic substance, the lymphoid system, cells involved in the immune response, events in the induction of the immune response, intracellular events occurring during cell maturation, phases of the humoral immune response.

Unit-III

Immune regulation: Introduction, immunosuppression, tolerance, immunopotentiation.

Immunization: Introduction active immunization, passive immunization, experimental immunization procedures, adverse reactions of vaccines.

Immunological techniques: *In vitro* antigen- antibody reactions, procedures for direct observation and demonstration of reactions, complex serological procedures, assays of immune competence, identification of specific allergens in type I hypersensitive reactions, detection of immune complexes, production and use of monoclonal antibodies.
Immunologic mechanisms of tissue damage: Introduction, immediate hypersensitivity (typeI) reactions, cytotoxic (typeII) reactions, immune complex- mediated (typeIII) reactions, cell-mediated (type-IV) reactions: delayed hypersensitivity and cell –mediated cytotoxicity.

Unit-IV

Auto immune diseases: General considerations, representative auto immunodisorders.

Immunodeficiency disorder: Phagocytic cell defects, B-cell deficiency disorders, T-cell deficiency disorders, secondary immunodeficiency disorders combined B-cell and T-cell deficiency disorders, secondary immunodeficiency conditions, complement deficiencies.

Transplantation immunology: Introduction, histocompatibility gene complex, clinical transplantation immunology.

Tumor immunology: Neoplasms, tumor-associated antigens, immune response to tumor antigens, immunologic factors favouring tumor growth, immunotherapy.

Practical-2 (Molecular Biology, Genetic Engineering, Immunotechnology)**(HC)**

- Estimation of DNA by Diphenylamine (DPA) method.
- Estimation of RNA by orcinol method
- Isolation of DNA different samples: plant leaves, coconut endosperm, yeast, animal tissues
- Determination of purity and concentration of isolated DNA using spectrophotometer

- Isolation of plasmid DNA from *E. coli*
- Agarose gel electrophoresis of DNA
- Purification of DNA from gel
- Determination of RNAse activity
- Isolation of RNA & analysis using Bleach Gel electrophoresis
- Restriction digestion of plasmid and analysis
- DNA ligation
- Transformation and screening
- Production of recombinant protein
- Polymerase chain reaction
- Demonstration of realtime PCR and Next generation sequencing
- Preparation of antigen and antibody production.
- Purification of IgG.
- Slide agglutination test/ Blood grouping.
- Immunoprecipitation test- Ouchterlony double diffusion.
- Immunoaffinity purification of IgG.
- Immunofluorescence for localization of an antigen.
- ELISA for quantification of an antigen.
- Western blotting and detection.

Softcore Papers – Semester II

Molecular Genetics (SC) 48 h

Unit-I

Genomic organization: Prokaryotes, eukaryotes, viral genome-DNA & RNA viruses extrachromosomal genome-plasmids, mitochondria and chloroplast, C-value paradox, Repetitive DNA-satellite DNAs and interspersed repeated DNAs, LINES, SINES, Alu family.

Mobile genetic elements: discovery, insertion sequence in prokaryotes, complex transposons (Tn10, Tn5, Tn9 and Tn3 as examples), mechanisms, control. Transposable elements in eukaryotes- Maize, Drosophila and humans

Unit-II

Mutation: Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, Molecular basis of mutations, insertional mutagenesis, site-specific mutagenesis

Recombination: Homologous and non-homologous recombination, Holliday model, site-specific recombination.

DNA Repair: Mechanism of genetic repair- direct repair, photoreactivation, excision repair, mismatch repair, post-replicative recombination repair, Repair of double-strand breaks, SOS repair.

Unit-III

Microbial genetics: Methods of genetic transfers – transformation, conjugation, transduction and sex-duction, mapping genes by interrupted mating, fine structure analysis of genes.

Gene mapping methods: Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants.

Quantitative genetics: Polygenic inheritance, heritability and its measurements, QTL mapping.

Unit-IV

Genes and development: **Model systems for studying development- Drosophila, Caenorhabditis, Arabidopsis.**

Genetic control of development in Drosophila: Anterioposterior axis specification, role of maternal genes, segmentation of larval body, gap genes, pair rule genes, homeotic genes, complex gene interaction in development, sequential gene action. Floral meristems and floral development in *Arabidopsis,* ABC model.

Genomics & Proteomics (SC) 48 h

Unit-I

Genome: Brief overview of prokaryotic and eukaryotic genome organization; extrachromosomal DNA: bacterial plasmids, mitochondria and chloroplast

Genome mapping: Genetic and physical maps; markers for genetic mapping; methods and techniques used for gene mapping, physical mapping, linkage analysis, cytogenetic techniques, FISH technique in gene mapping, somatic cell hybridization, radiation hybrid maps, *in situ* hybridization, comparative gene mapping.

Genome sequencing: Next generation sequencing, Human Genome Project, genome sequencing projects for microbes, plants and animals, accessing and retrieving genome project information from the web.

Unit-II

Comparative genomics: Identification and classification of organisms using molecular

markers- 16S rRNA typing/sequencing, SNPs; use of genomes to understand evolution of eukaryotes, track emerging diseases and design new drugs; determining gene location in genome sequence.

Functional genomics: Transcriptome analysis for identification and functional annotation of gene, Contig assembly, chromosome walking and characterization of chromosomes, mining functional genes in genome, gene function- forward and reverse genetics, gene ethics,Pharmacogenomics & Personalized medicine.

Unit –III

Introduction to proteomics: Proteome and nature of proteome, Proteins - amino acids,

peptides and polypeptides, separation of proteins /peptides by single and two-dimensional gel electrophoresis and detection- staining and immunoblot

Unit-IV

Structural and functional proteomics: Mass spectrometry – fundamentals, mass spectrometry ionization techniques, mass analyzers – MALDI-TOF, MS-MS, LC-MS-MS; In-gel digestion, PMF, Mass spectra analysis – search engines: Mascot, swiss-prot, protein prospector, identification, molecular weight, determination of peptide sequence, determination of post-translational modifications, peptide sequencing using tandem mass spectrometry, quantitative proteomics-iTRAQ, functional annotation of proteins, protein chips and functional proteomics; clinical and biomedical applications of proteomics

Cell Biology and Cellular Signaling (SC) 48 h

Unit I

Dynamic organization of the cell

Ultra-structure of prokaryotic and eukaryotic cells; Universal features of cells; Characteristics of cancer cells. Structure of plant cell wall,structure of cell membrane and models, functions of cell membrane intracellular organelles: Golgi apparatus; Mitochondria, chloroplast, Lysosomes Nucleus-Internal organization, Chromatin-structure and function, cellular cytoskeleton.

Unit- II

Cellular processes

Cell cycle and its regulation; cell division: mitosis, meiosis and cytokinesis: cell differentiation: stem cells, their differentiation into different cell types and organization into specialized tissues; Apoptosis.

Molecular mechanisms of membrane transport active, passive, facilitated.

Unit III

Basics of Signal Transduction

Extra-cellular matrix components, Cell junctions, Cell adhesion molecules, Hormones and their receptors, Cell surface receptors as reception of extra-cellular signals, Types of cell signaling, Growth factors- EGFR, VEGF, PDGF and their Signaling, adapter proteins required for signal transmission; signaling through G-protein coupled receptors; Second messengers in signal transduction pathways: cAMP and calcium ions (Ca2+), signaling through Receptor tyrosine kinases;

Unit-IV

Signal transduction pathways in animals: MAP kinase, Intracellular signaling in Development and Disease, SAP/JNK, p38, Wnt signaling, Jak/Stat, Smad, TGF β Signaling, Cytoskeleton And Cell Signalling, MMPs And Cell Signalling, Cross talks among cytoplasmic components, NF-κB signaling from cytoplasm to nucleus. Nuclear receptors and transcription factors in signaling.

Host-parasite interaction: pathogen-induced signaling pathways in plants- ROS, Jasmonate, SA-mediated pathways.

Third Semester

Title of the course	HC/SC/ OE/etc	L	T	P	Credits
Plant Biotechnology	HC	3	0	0	3
Animal Biotechnology	HC	3	0	0	3
Bioprocess Technology	HC	3	0	0	3
Practical-3 (Plant and Animal Biotechnology, Bioprocess Technology	HC	0	0	0	5
SOFTCORE (Choose any TWO from the below listed)					
Molecular Diagnostics	SC	3	0	0	3
Natural Products &Drug Discovery	SC	3	0	0	3
Nanobiotechnology	SC	3	0	0	3

Plant Biotechnology (HC)

48 h

Unit-I: Techniques in plant tissue culture

Methods in Plant Tissue culture: Concept of cellular Totipotency, Role of phytohormones in tissue culture techniques. Establishment of cultures- Nutritional requirements for in vitro cultures, Media preparation and sterilization. **Micropropagation:** Propagation from shoot apical meristem, node cultures, stages of micropropagation and applications. **Germplasm preservation**: Plant germplasm storage using different methods. **Haploid Production**: Methods of androgenic haploid cultures. **Protoplast Culture and Somatic Hybridization**: Protoplast isolation, purification and culture, protoplast fusion, somatic hybridization, applications of somatic hybrids.

Unit-II: Genetic manipulation of plants

Plant transformation techniques: Agrobacterium-plant interaction, Ti plasmids, T-DNA transfer, disarmed Ti plasmid. Agrobacterium-mediated gene delivery- binary and co-integrated vectors.

Direct gene transfer methods- Particle bombardment, PEG-mediated, electroporation.

Transgenic plants: Herbicide resistance, pest resistance, plant disease resistance, improvement of nutritional quality. Biosafety regulations of transgenics.

Unit III: Applications of Plant Tissue culture

Secondary metabolite production: Major secondary metabolic pathways- Phenylpropanoid pathways, Shikimate pathway; Induction of bioactive secondary metabolites by plant tissue culture; Value addition via biotransformation; hairy root cultures for production of pharmaceuticals. Bioreactor systems for mass cultivation of plant cells, Molecular pharming: edible vaccines.

Unit-IV: Commercial product development

Micro algal biotechnology: Cyanobacteria, culture media, cultivation methods, Medicinal compound from cyanobacteria.
Single-Cell Proteins (SCP): Spirulina, Chlorella, Yeast as SCP; Production and process; Health benefits of SCP.
Agricultural products: biofertilizers and Vermiculture.
Biofuels: production of Ethanol, Methane, and their applications.

Intellectual Property Rights (IPR): IPRs and agricultural technology- implications for India. Plant Breeder's Rights. Labeling of GM crops and foods. Biodiversity, traditional knowledge, access and benefit sharing.

Animal Biotechnology (HC) 48h

Unit-I

Culture of animal cells: Advantages and limitations of tissue culture, aseptic handling, facilities required, media and cell lines. Primary culture: Isolation of mouse and chick embryos, human biopsies, methods for primary culture, nomenclature of cell lines, sub culture and propagation, immortalization of cell lines, cell line designation, selection of cell line and routine maintenance. Secondary cell culture,

Cloning and Selection: Cloning protocol, stimulation of plating efficiency, suspension cloning, isolation of clones, isolation of genetic variants, interaction with substrate, selective inhibitors.

Unit-II

Cell separation and characterization: Density based, antibody based, magnetic and fluorescence based cell sorting. Characterization of cells based in morphology, chromosome analysis, DNA content, RNA and protein, enzyme activity, antigenic markers, cytotoxicity assays, cell quantitation, cell culture contamination: monitoring and eradication, cryopreservation.

Culturing of specialized cells: Epithelial, mesenchymal, neuro ectodermal, hematopoietic gonad and tumor cells, Lympocyte preparation, culture of amniocytes, fish cells, confocal microscopy. Stem cell culture and its applications

Organic and embryo culture: Choice of models, organ culture, histotypic culture, filter-well inserts, neuronal aggregates whole embryo culture eggs, chick and mammalian embryos.

Unit-III

Cell and Tissue engineering: Growth factors for *in situ* tissue regeneration, biomaterials intissue engineering, approaches for tissue engineering of skin, bone grafts, nerve grafts. Haemoglobin-based blood substitutes, bio artificial or biohybrid organs. Limitations and possibilities of tissue engineering, 3D bioprinting. ***In vitro*** **fertilization and Embryo transfer:** *In vitro* fertilization in Humans, Embryo transfer in Humans, Super ovulation and embryo transfer in farm animals e.g: Cow.

Cloning of Animals: Methods and uses. Introduction, nuclear transfer for cloning, cloning from- embryonic cells, adult and fetal cells. Cloning from short-term cultured cells: cloning of sheep, monkeys, mice, pets, goats and pigs. Cloning from long-term cultured cells: Cloning of cows from aged animals. Cloning efficiency, cloning for production of transgenic animals, gene targeting for cloned transgenic animals, cloning for conservation, human cloning: ethical issues and risks.

Unit-IV

Transfection methods and transgenic animals: Gene transfer, transfection of fertilized eggs or embryos, unfertilized eggs, cultured mammalian cells, targeted gene transfer.

Transgenic animals and applications: mice and other animals, sheep, pigs, goats, cows and fish.

The legal and socio-economic impact of biotechnology at national and international levels, public awareness.

Biosafety regulations- guidelines for research in transgenic animals, public awareness of the processes of producing transgenic organisms.

Bioprocess Technology (HC)

48h

Unit I

Basic principles: Isolation, screening and maintenance of industrially important microbes;effect of nutrients, temperature, pH for the growth of industrially important microorganisms; strain improvement for increased yield.
Batch and continuous fermenters: types of fermenters, chemostat, turbidostat, upstream processing: media formulation and optimization; sterilization; aeration, agitation, pH.

Unit II

Downstream processing:

Separation of insoluble products – separation of cells and foam; filtration (plate filters, rotary vacuum filter), centrifugation (continuous, basket and bowl centrifuge), Stokes law, sedimentation, flocculation; cell disruption (mechanical and non-mechanical

methods); chromatographic techniques,drying (spray, drum, freeze driers); storage and packaging.

UnitIII

Microbial products: Microbial production and application of vitamins, enzymes, organic acids (acetic, citric, gluconic, itaconic, lactic,), amino acids (glutamic acid, lysine, tryptophan), polymers (polysaccharides – xanthan, curdlan, dextran, pullulan,), antibiotics, ethanol, biosurfactants.

UnitIV

Bioprocess in agro-industry: Isolation and screening of bioagents for the production of biofertilizers, biopesticides and plant growth promotion;, mass cultivation, formulation and storage life; Bioprocess in sustainable agriculture (organic matter recycling, composting, Jeevamrutha)

Practical-3 (Plant and Animal Biotechnology, Bioprocess Technology) (HC)

Plant Biotechnology

- Preparation of plant tissue culture media
- Callus induction
- Induction of somatic embryogenesis
- Establishment of cell suspension cultures for plant secondary metabolite production
- Encapsulation of somatic embryos and production of synthetic seeds
- Organ cultures: Shoot tip, nodal, anther and leaf cultures
- Micropropagation technique – banana
- Protoplast isolation technique
- Secondary metabolite estimations: Colorimetry and TLC methods

Animal Biotechnology

- Preparation of media, culture and maintenance of cell lines, trypsinization
- Culture of transformed cells
- MTT assay for cytotoxicity
- Lymphocyte preparation

Bioprocess Technology

- Immobilization of yeast by calcium alginate gel entrapment and assay for enzymes- invertase and catalase
- Screening of antibiotic producing microorganisms
- Study of alcohol fermentation- alcohol from different substrates-estimation of alcohol content
- Bioassay methods- Vitamins and amino acids
- Analysis of microbial quality of foods
- Study of fermenter (demonstration)

Softcore Papers – Semester III

Molecular Diagnostics (SC) 48h

Unit-I:

Introduction to Plant molecular diagnostics, Conventional diagnostic techniques for the detection of plant pathogens – fungi, bacteria and viruses, seed-borne pathogens, Koch rules, Direct detection and identification of pathogenic organisms. Culture based and GOTs, Indirect detection of pathogenic organisms, Serology based detection – IF, ODD, ELISA, DIBA, ISEM. Automated identification methods.

Unit-II

Genome resolution, detection and analysis: Different types of PCR: Real-time; Multiplex; FISH; RFLP; DGGE; SSCP; Nucleic acid sequencing: new generations of automated sequencers; Microarray chips; EST; SAGE; microarray data normalization & analysis; molecular markers: 16S rRNA typing; MALDITOF-MS; Metabolite profile for biomarker detection the tissues in various disorders by making using LCMS & NMR technological platforms.

Unit-III

Background and scope of molecular diagnostics, Current and emerging technologies, Nonamplified Probe-Based Assays, Cytogenetics and FISH, PCR and Other Amplification Technologies, Microarrays, DNA Methylation Assays, Infectious Disease Diagnostics: Human Immunodeficiency Virus, Hepatitis C Virus, Hepatitis B Virus, Molecular Tests for Blood Screening, Chlamydia and Gonorrhea, Human Papillomavirus and Cervical Cancer, Methicillin-Resistant Staphylococcus aureus, Genetic Testing: Tests for Inherited Disorders and Prenatal Diagnostics: Cystic Fibrosis, Prenatal Diagnosis, Ashkenazi Jewish Genetic Panel, Predicting Risk of Disease, Risk of Venous Thromboembolism

Unit -IV

Molecular Oncology Tests, Analysis of the Expression of Multiple Genes and Cancer Prognosis, Analysis of Lymph Nodes to Detect Metastasis of Breast Cancer, Screening for Colorectal Cancer: Stool-Based DNA Screening, Leukemias and Lymphomas, DNA Methylation Tests and Cancer, Predicting Risk of Developing Cancer. Personalized Medicine: Pharmacogenomics and Companion Diagnostics, Cytochrome P450 and Drug Metabolism, Targeted Cancer Therapies and Companion Diagnostics Tests, Testing for HER2/neu Overexpression in Breast Cancer, Testing for Epidermal Growth Factor Receptor (EGFR), UGT1A1 Genetic Variants, Pharmacogenetics and Response to Antiretroviral Therapy, Thiopurine Methyltransferase and Metabolism of Thiopurine Drugs

Natural Products and Drug Discovery (SC) 48 h

Unit I

Prospects of Natural Products research in the 21st Century: Introduction, use of natural products in traditional medicines, Marine natural products, Use of herbal remedies and the potential of drug development from natural products and novel drug templates: paclitaxel, podophyllotoxin, artimisinin etc. Recent development in the research on naturally occurring polyphenolic compounds: - Introduction, biosynthetic pathway, isolation and characterization, biological and pharmacological activities of different class of phytoconstituents - alkaloids, flavonoids, terpenoids, glycosides, steroids, saponins, (Antioxidant activity, cyto-toxic activity, anticancer and anti-microbial activity etc). aid design of clinical studies.

Unit II

Natural product drug discovery from different sources (marine, microbial, mineral etc): Introduction, recent developments, applications. Extraction and Isolation techniques: Introduction, Principle and Applications of different extraction & isolation methods viz Soxhlet extraction, microwave extraction, supercritical fluid extraction, solid phase extraction,Column chromatography, Flash chromatography.

Unit III

Target identification and molecular modeling: Identification of target or drug leads associated with a particular disease by different techniques including combinations of molecular modeling, combinatorial libraries and high-throughput screening (HTS); Use of bioinformatics and data processing in identification of lead compounds; Rational drug design, Modelling drug/receptor interactions with the emphasis on molecular mechanisms, molecular dynamics simulations and homology modelling; Conformational sampling, macromolecular folding, structural bioinformatics, receptor-based and ligand-based design and docking methods, in silico screening of libraries, semi-empirical and ab-initio methods, QSAR methods, molecular diversity, design of combinatorial libraries of drug-like molecules, macromolecular and chemical databases.

Unit IV

Lead optimization: Identification of relevant groups on a molecule that interact with a receptor and are responsible for biological activity; Understanding structure activity relationship; Structure modification to increase potency and therapeutic index; Concept of quantitative drug design using Quantitative structure–activity relationship models (QSAR models); Bioanalytical assay development in support of in vitro and in vivo studies (LC/MS/MS, GC/MS and ELISA). Preclinical development: Principles of drug absorption, drug metabolism and distribution - intestinal absorption, metabolic stability,

drug-drug interactions, plasma protein binding assays, metabolite profile studies, Principles of toxicology, Experimental design for preclinical and clinical PK/PD/TK studies, Selection of animal model; Regulatory guidelines for preclinical PK/PD/TK studies; Scope of GLP, SOP for conduct of clinical & non clinical testing, control on animal house, report preparation and documentation. Integration of nonclinical and preclinical data to

Nanobiotechnology (SC)

48 h

Unit I

Introduction and Fundamentals of nanobiotechnology Concepts, historical perspective; Nanoscale materials: Definition and properties; Different formats of nanomaterial and applications; Cellular nanostructure; nanopores; Biomolecular motors; Bio-inspired Nanostructures, Quantum dots. Synthesis and characterization of different nanomaterials: Synthesis of nanomaterials from plant, microbial and animal cell sources. Characterization of nanomaterials using Optical Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, Scanning Tunneling Microscopy, Optical Absorption and Emission Spectroscopy, Thermogravimetric Analysis, Differential Scanning Calorimetry, Thermomechanical Analysis, X-Ray, neutron diffraction. Applications of nanobiotechnology in Plant and animal cell cultures, stem cell culture and artificial organ synthesis. delivery of fertilizers, pesticides (nanocides); Nanoremediation.

Unit II

Nano-particles Concepts of Nanoparticles: Basic structure of Nanoparticles- Kinetics in nano-structured Materials- Zero dimensional, size and shape of nanoparticles; one-dimensional and twodimensional nanostructures; clusters of metals and semiconductors, bionano-particles. Bionancomposites: Nano-particles and Microorganisms; Microbial Synthesis of Nano- materials; Biological methods for synthesis of nano-emulsions using bacteria, fungi and Actinomycetes; Plant-based nanoparticle synthesis; Nano-composite biomaterials – Fibres, devices and structures, Nano Bio-systems.

Unit III

Applications of Nanobiotechnology Applications of Nanomedicine: Nanotechnology in diagnostic applications, materials used in Diagnostics and Therapeutics. Nanomaterials for catalysis, development and characterization of nanobiocatalysts, application of nano-scaffolds in synthesis, applications of nano-biocatalysis in the production of drugs and drug intermediates. Nano-films: Thin films; Colloidal nanostructures; Self-assembly, Nanovesicles; Nanospheres; nanocapsules and their characterization. Nanoparticles for drug delivery: Strategies for cellular internalization and long circulation, strategies for

enhanced permeation through various anatomical barriers. Nanoparticles for diagnostics and imaging: Concepts of smart stimuli responsive nanoparticles, implications in cancer therapy, nanodevices for biosensor development. Applications in Agriculture: Biogenic nanomaterials and their role in soil, water quality and plant protection; Smart nanoscale systems for targeted

Unit IV

Sustainable bionanotechnology: Application of industrial ecology to nanotechnology, Fate of nanomaterials in environment, environmental life cycle of nano-materials, environmental and health impacts of nano materials, Nano-materials in future - implications. Toxicity and safety of nanomaterials: Introduction to Safety of nanomaterials; Concept of Nanotoxicology – Models and assays for nanotoxicity assessment; Laboratory rodent studies. Ecotoxicologic studies: Methodology for Nanotoxicology - toxicity testing; Mechanism of nano-size particle toxicity; Reactive oxygen species mechanisms of NSP toxicity; Interactions between nanoparticles and living organisms.

Fourth Semester

Title of the course	HC/SC/ OE/etc	L	T	P	Credits
SOFTCORE (Choose any ONE from the below listed)					
Stem Cell & Regenerative Medicine	SC	3	0	0	3
Molecular Plant Pathology	SC	3	0	0	3
Project work/Dissertation*	HC	0	3	6	9

Additional Softcores

Title of the course	HC/SC/ OE/etc	L	T	P	Credits
SOFTCORE (Choose any ONE from the below listed)					
Bioentrepreneurship	SC	3	0	0	3
Seed Health and Diagnostics	SC	3	0	0	3

Softcore Papers – Semester IV

Stem Cells And Regenerative Medicine (SC) 48

Unit I:

Introduction to Stem Cells Overview of basic and translational research of stem cells. Differentiation in early development, Preimplantation development; From implantation to gastrulation. Pluripotent stem cells I: Rodent embryonic stem cells – Origin, properties, self-renewal pathways, application. Human embryonic stem cells- Derivation and maintenance, selfrenewal pathways. Induced pluripotent stem cells- Generation, Characterization, Induced pluripotency-the underlying mechanism. Primordial and embryonic germ cells- Origin, Properties, Derivation and maintenance. Stem cells: Molecular and cellular basis of organ development.

Unit II

Tissue engineering principles and perspectives; Limitations and hurdles of using embryonic stem cells in tissue engineering; Amniotic fluid and amniocentesis; Isolation and characterization of amniotic fluid-derived stem cells. New technologies for genetic modification in stem cells, CRISPR/Cas9, TALENs/ZFN. Neurogenesis and neural stem cells I- Establishment of neural tissue, Molecular basis of neural induction. Neurogenesis and neural stem cells II- Neural stem cells in brain; Pluripotent stem cell-derived neural stem cells Hematopoietic stem cells- Embryonic hematopoiesis; Hematopoietic stem cell niche; Embryonic stem cell-derived Hematopoietic stem cells. Cord blood hematopoietic stem cells, Cord blood transplantation; Characteristics, Genomics and proteomics of cord blood stem cells

Unit III

Stem cells in retina and inner ear- Sources and Properties Skin organization, Skin stem cells, bulge as a residence of skin stem cells, Cell signaling in skin stem cells. Skeletal muscle stem cells- Sources, Intrinsic and extrinsic regulation Stem cells in kidney- Anatomy of kidney development, Sources and characterization of kidney stem cells. Stem cells in liver, pancreas and intestine- Organization of adult liver and pancreas, Liver/Pancreatic stem cells, Intestinal stem cells. iPSCs for disease modeling; Models of nuerological diseases, hematopoietic disorders, cardiovascular conditions, metabolic disorders. Mesenchymal stem cells- Location, isolation and culture; tissueengineering

Unit IV:

Therapeutic uses of stem cells Stem cells to treat diabetes and liver disease, β-cell replacement therapy; Sources of insulinproducing cells; Hepatocyte transplantation; Challenges and future directions Cancer stem cell theory – Isolation and characterization of cancer stem cells; Implications for cancer treatment: Stem cells to treat heart disease, Distribution of stem cells in heart; Preclinical studies. Orthopedic applications of stem

cells, Biology of musculoskeletal tissues; Tissue engineering strategies for bone and cartilage defects. Neural stem cells for central nervous system repair, Therapeutic potential of neural stem cells; Cell replacement using neural stem cells. Stem cells for the treatment of muscular dystrophy, Celluar environment of a dystrophic muscle; Myogenic stem cells from embryonic stem cells and inducible pluripotent stem cells; Current stem cell-based therapeutic approaches. Regeneration of epidermis, Epidermal stem cells; Stem cells in burned and skin ulcers Regulatory aspects for stem cell research; Regulation of use of human embryonic stem cells

Molecular Plant Pathology (SC)

48 h

Unit I

The fundamentals of plant pathology: The concept of plant disease, the causal agents, the significance of plant diseases, the control of plant diseases. Fungal diseases: establishing infection – dispersal spores, finding a suitable host, spore attachment, germination process, penetration, germ-tube elongation, induction appressoria, cell-wall degrading enzymes. Development of disease – Basic concepts of necrotrophy and biotrophy, host barriers, the role of toxins and enzymes, biotrophy.

Unit II

Bacterial and viral diseases: communication between bacteria, plant penetration, attachment, stimulation gene expression, cell wall degrading enzymes, toxins, hormones, extracellular polysaccharides, determinants of host specificity. Plant viruses: Structure and replication, infection, types of viruses, viroids.

Unit III

Genetics of plant diseases and resistance: Genes and diseases, Mechanism of variability, stages of variation in pathogens, Types of plant disease resistance to pathogens. Defence mechanism of plants, Pre-existing, structural, chemical and induced biochemical defences. Resistance genes: Gene-for-gene resistance, features of cloned resistance genes. MAP kinases, ion fluxes and calcium homeostasis, The oxidative burst, Nitric oxide, (p)ppGpp signaling,

Unit IV

Application of molecular biology to conventional disease control strategies: Breeding for resistance, the use of tissue culture in plant breeding, marker-assisted breeding, identification of novel resistance gene specificities, the use of chemicals for disease control, biological control-PGPR and PGPF. Transgenic approaches for crop protection-Bt cotton and brinjal.

Bioentrepreneurship (SC)

48 h

Unit I

Innovation and entrepreneurship in bio-business Introduction and scope in Bio-entrepreneurship, Types of bio-industries and competitive dynamics between the sub-industries of the bio-sector (e.g. pharmaceuticals vs. Industrial biotech), Strategy and operations of bio-sector firms: Factors shaping opportunities for innovation and entrepreneurship in bio-sectors, and the business implications of those opportunities, Alternatives faced by emerging bio-firms and the relevant tools for strategic decision, Entrepreneurship development programs of public and private agencies (MSME, DBT, BIRAC, Make In India), strategic dimensions of patenting & commercialization strategies.

Unit II

Bio markets - business strategy and marketing Negotiating the road from lab to the market (strategies and processes of negotiation with financiers, government and regulatory authorities), Pricing strategy, Challenges in marketing in bio business (market conditions & segments; developing distribution channels, the nature, analysis and management of customer needs), Basic contract principles, different types of agreement and contract terms typically found in joint venture and development agreements, Dispute resolution skills.

Overview of Research Methodology & Project Proposal writing.

Unit III

Finance and accounting Business plan preparation including statutory and legal requirements, Business feasibility study, financial management issues of procurement of capital and management of costs, Collaborations & partnership, Information technology.

Unit IV

Technology management Technology – assessment, development & upgradation, Managing technology transfer, Quality control & transfer of foreign technologies, Knowledge centers and Technology transfer agencies, Understanding of regulatory compliances and procedures (CDSCO, NBA, GCP, GLA, GMP).

Seed Health and Diagnostics (SC)

48 h

Unit-I:

Introduction Seed Biology: Floral biology, mode of reproduction; Embryogenesis and seed development; Seed structure of monocots and dicots; Chemical composition of seeds; Orthodox and recalcitrant seeds, seed dormancy; Apomixis, parthenocarpy, polyembryony; Somatic embryogenesis and synthetic seeds. Development of Seed Industry: Agricultural situation in India; impact of green revolution; cropping systems; International cooperation – ISTA, OECD, UPOV, AOSA, APSA, CGIAR and other organizations. Seed Production: Introduction to crop breeding methods; Variety testing, release and certification; Different classes of seeds and their maintenance; Seed production requirements and planning; Male sterility; Clonal propagation; Transgenic seeds. Disease tolerance screening. Seed drying, processing, storage and marketing: Seed drying principles and methods; Seed treatment, safe storage seeds and marketing strategies.
, factors influencing mycotoxin production, harmful effects, detection.. Gene targets and primer designing.

Unit-II:

Seed Quality Control Importance of seed quality: Seed legislation - Seed act 1965, seed rules 1969 and new seed act 2004. Seed certification - History, concept, organization, phases and seed certification standards; Field inspection principles and methods; Determination of seed quality - seed sampling, physical purity, moisture, germination, genetic purity; Seed certification agencies; Testing of transgenic seeds.

Unit-III:

Seed Health Importance: Designated plant diseases, tolerance, seed health and trade, Pest-free areas (PFA), Pest Risk Analysis (PRA). Significance of seed health - important seed borne diseases of cereals, pulses, oil seeds, fiber and vegetable crops; Mechanism of seed transmission and disease cycle. Management of seed-borne diseases: Quarantine and phytosanitary certificates, Physical and chemical control, biological control, cross protection. Storage fungi and insects: Causes and indices of seed deterioration during storage, fumigation. Mycotoxins – Important mycotoxins

Unit-IV:

Diagnostics - Seed health testing procedures for Fungi – symptoms, dry seed examination, incubation tests, embryo extraction technique, seedling symptom test; Bacteria – symptoms, colony appearance, liquid assay, selective and semi-selective media, staining techniques, biochemical & physiological tests, pathogenicity tests, immune-fluorescent technique, Biolog; Viruses – symptoms, seed examination, growing-

on test, indicator plant test, electron microscopy, ISEM, ELISA, DIBA, IC-RT-PCR; Nematodes – Extraction and identification. Application of serological methods – monoclonal and polyclonal antibodies, conventional serological techniques – precipitin tests, agglutination tests, ELISA, DIBA, and nucleic acid based techniques; Multiplex ELISA and PCR, Application of Real Time (RT)-PCR; FTA technology. Sequence databases of seed-borne pathogens

Open elective

Biotechnology and its Applications 48 h

Unit I

Introduction to biotechnology. Principles of biotechnology, classification. Recombinant DNA Technology Introduction, outline of genetic engineering procedure, restriction endonucleases, cloning & expression vectors- plasmids, cloning in plasmid, transformation and detection of transformants- lacZ, genomic and cDNA libraries, gene analysis techniques-hybridization: Southern, Northern, Western, in situ, Polymerase chain reaction.

Unit II

Microbial and food and environmental Biotechnology Basics of fermentation technology: Types of microbial culture- batch, continuous and fedbatch. Microbial production: Use of microbes in production of vitamins, enzymes, organic acids, amino acids, polysaccharides, flavors, sweeteners, proteins and antibiotics. Fermented food products- yogurt, cheese, tempeh, sauerkraut; beverages- wine and beer. Pre- and Pro-biotics, single cell proteins, Genetically modified foods, designer foods. Current status of biotechnology in environment. Bioconservation, biofuels, gasohol, biogas. Bioremediation: Concepts and principles, bioremediation using microbes, in situ and ex situ bioremediation, biosorption and bioaccumulation of heavy metals.

Unit III

Plant Biotechnology Landmarks in Plant tissue culture. Types of cultures- embryo, organ, callus and cell cultures, Somatic embryogenesis, Haploid Production, Androgenesis, Protoplast culture and somatic hybridization. Micropropagation- Methods and stages, applications. Synthetic seeds, somaclonal variation. Production of secondary metabolites by plant cells, Biotransformation. Plant transformation techniques: Direct and indirect methods of gene transfer in plants. Transgenic plants and crop improvement- herbicide tolerance, disease resistance, abiotic stress tolerance, delayed ripening, improvement of nutritional quality, molecular pharming.

Unit IV

Animal Biotechnology Basics of animal cell culture techniques, cell lines, physical

conditions for culturing animal cells, equipments required, scale-up of culture methods. Application of animal cell culture- Hybridomas, production of therapeutic antibodies, stem cell technology, cell and tissue engineering. Genetic engineering of animals: Methods for gene transfer in animals, microinjection, nuclear transplantation, retrovirus-mediated gene transfer, gene knockdown techniques. Transgenic- animals- sheep, pigs, cattle, chickens; applications of transgenic animals.

Reference books

1. Practical Biochemistry- Principles and Techniques. Fifth Edition Wilson K. and Walker, J. Cambridge Univ. Press. 2000 \
2. Biophysical Chemistry. Upadhyay A., Upadhyay K., and Nath N. Himalayan Publishing House., 1995.
3. Biophysics. V. Pattabhi and N. Gautham. Narosa Publishing House. 1999.
4. Microbiology (Pelczar, M. J., Reid, R. D., & Chan, E. C. (2001). 5th ed.). New York: McGraw-Hill.
5. Prescott's Microbiology. Willey, J. M., Sherwood, L., Woolverton, C. J., Prescott, L. M., & Willey, J. M. (2011). New York: McGraw-Hill.
6. Microbiology, Principles and Explorations. Boston, MA: John Wiley & Sons. Matthai, W., Berg, C. Y., & Black, J. G. (2005).
7. Biochemistry Donald Voet and Judith G. Voet. 5th Edn. John Wiley and Sons Inc. 2016
8. . Biochemistry. Stryer L. 8th edn. W.H. Freeman, New York. 2015
9. Biochemistry. Garret, RH, and Grisham, CM. Saunders College Publishing. 1995
10. Biochemistry. Rawn D. J. 2004 Panima Publishing Corp.
11. Principles of Biochemistry. Lehninger, A. L. (2012). (6th ed.). New York, NY: Worth.
12. Instant notes in Biochemistry. Hames, BD., Hopper, NM and Houghton, JD. Viva Books Pvt. Ltd. New Delhi. 2001
13. Fundamentals of Enzymology. Price, NC and Stevans L. Oxford Univ. Press. 1998.
14. Enzymes. T. Palmer. Harwood Publishing. 1999
15. Molecular Biology of the Cell. Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. 2008. (5th Ed.) New York: Garland Science.
16. Molecular Cell Biology . Lodish, H. F. 2016 (8th Ed.). New York: W.H. Freeman.
17. Lewin's Genes XI. Krebs, J. E., Lewin, B., Kilpatrick, S. T., & Goldstein, E. S. (2014). Burlington, MA: Jones & Bartlett Learning.

18. The Cell: a Molecular Approach. Cooper, G. M., & Hausman, R. E. (2013). (6th Ed.). Washington: ASM; Sunderland.
19. Becker's World of the Cell. Hardin, J., Bertoni, G., Kleinsmith, L. J., & Becker, W. M. (2012). Boston (8th Ed.). Benjamin Cummings.
20. Molecular Biology of the Gene . Watson, J. D. (2008). (5th ed.). Menlo Park, CA: Benjamin/Cummings.
21. Gene Cloning and DNA Analysis: an Introduction. Brown, T. A. (2006). Oxford: Blackwell Pub.
22. Principles of Gene Manipulation and Genomics. Primrose, S. B., & Twyman, R. M. (2006). Malden, MA: Blackwell Pub.
23. From Genes to Clones. Winnacker EL. VCH. 2003
24. Genomes (3rd ed.).Brown, T. A. (2006). New York: Garland Science Pub.
25. Kuby Immunology. Kindt, T. J., Goldsby, R. A., Osborne, B. A., & Kuby, J. (2006). New York: W.H. Freeman.
26. Clinical Immunology. Brostoff, J., Seaddin, J. K., Male, D., & Roitt, I. M. (2002). London: Gower Medical Pub.
27. Janeway's Immunobiology.Murphy, K., Travers, P., Walport, M., & Janeway, C. (2012). New York: Garland Science.
28. Fundamental Immunology. Paul, W. E. (2012). New York: Raven Press.
29. The Immune System. Parham, P. (2005). New York: Garland Science
30. Immunology - a Short Course. Coico, R., Sunshine G., and Benjamini E. John Wiley & Sions. 2003
31. Immunology. Roitt. Gower Medical Publisher 1990
32. Introduction to Plant Biotechnology. Chawla, H. S. (2000). Enfield, NH: Science.
33. Introduction to Plant Tissue Culture.Razdan, M. K. (2003). Enfield, NH: Science.
34. Plant Biotechnology: an Introduction to Genetic Engineering. Slater, A., Scott, N. W., & Fowler, M. R. (2008). Oxford: Oxford University Press.
35. Biochemistry & Molecular Biology of Plants.Buchanan, B. B., Gruissem, W., & Jones, R. L. (2015).
36. Chichester, West Sussex: John Wiley & Sons.
37. Plant Biotechnology. Umesha, S. (2013). The Energy And Resources.
38. Molecular Biotechnology: Principles and Applications of Recombinant DNA. Glick, B. R., & Pasternak, J. J. (2010). Washington, D.C.: ASM Press.
39. Plant Biotechnology: The Genetic Manipulation of Plants. Slater, A., Scott, N. W., & Fowler, M. R. (2003). Oxford: Oxford University Press.

40. Reproductive Techniques in Farm Animals. Gordon, I. (2005). Oxford: CAB International.
41. . New Generation Vaccines. Levine, M. M. (2004). New York: M. Dekker.
42. Animal Cell Biotechnology: Methods and Protocols. Pörtner, R. (2007). Totowa, NJ: Humana Press.
43. Industrial Microbiology – An Introduction. Waites, M.J., Morgan, N.L., Rockey, J.S. and Higton, G. 2001. Blackwell Science
44. Biotechnology – A Textbook of Industrial Microbiology (Second Edition)Crueger , W. and Crueger, A. 1989.. Panima Publishing Corporation, New Delhi.
45. Bio & Enzyme Engineering. Manjula, P. and Dawn, S.S. 2004. Scitech Publications (India) Pvt. Ltd., Chennai.
46. . Biotechnology and Bioprocess Engineering. Narayan, C.M. 2011. Galgotia Publications Pvt. Ltd.
47. Advances in Bioprocess Technology. Ravindra, P. (Ed). 2015. Springer.
48. Bioprocess Engineering Principles. Doran, P.M. 2012. AP
49. Principles of Fermentation Technology. Stanbury, P.G. and Whitaker, A. 2008. Elsevier.
50. Bioprocess Engineering: Basic Concepts. Shuler, M.L. and Kargi, F. 2002. Prentice Hall
51. Industrial Microbiology (Second Edition). Casida, L.E. 2016. New Age International Publishers.
52. Product Recovery in Bioprocess Technology.BIOTOL Biotechnology Open Learning. 2004. Elsevier India
53. Prescott & Dunn's Industrial Microbiology. Reed, G. 2004.. CBS Publishers & Distributors.
54. Principles of Biostatistics (Second Edition). Pagano, M. and Gauvreau, K. 2000. Duxbury – Thomson Learning, CA, USA.
55. Maths from scratch for Biologists Cann, A.J. 2003.. John Wiley & Sons Ltd., West Sussex, England.
56. Statistical Methods for Agricultural and Biological Sciences Amdekar, S.J. 2014.. Narosa Publishing House Pvt. Ltd., New Delhi
57. Statistics and Experimental Design(Second Edition). Clarke, G.M. 1980. Edward Arnold, London.
58. Methods in Biostatistics for Medical Students and Research Workers (Fourth Edition)Mahajan, B.K. 1984.. JAYPEE Brothers, New Delhi.

59. Introduction to Statistics for Biology (Third Edition)McCleery, R.H., Watt, T.A. and Hart, T. 2007.. Chapman & Hall/CRC, Taylor & Francis Group, Boca Raton, FL.
60. Statistics for terrified biologists Helmut van Emden. 2008.. Blackwell Publishing, Oxford UK.
61. Bioinformatics – A modern approach. Srinivas, V.R. 2007. Prentice-Hall of India Pvt. Ltd., New Delhi
62. BIOS Instant Notes - Bioinformatics (Second edition; Indian Reprint 2015).Hodgman, C., French, A. and Westhead, D. 2010. Garland Science, Taylon & Francis Group, New York and London.
63. . Introduction to Bioinformatics. Attwood, T.K., Parry-Smith and Phukan, S. 1999 (Indian Reprint 2008). Dorling Kindersley (India) Pvt. Ltd. New Delhi.
64. Bioinformatics – Sequence, structure and databanks. Higgins, D. and Taylor, W. (Ed.) 2000.. Oxford University Press, Oxford
65. Bioinformatic – A practical guide to the analysis of genes and proteins.Baxevamis, A.D. and Francis Ouellette, B.E. (Ed.). 2004. Wiley, John & Sons
66. Bioinformatics for Dummies. Claverie Jean-Michel and Notredame, C. 2003. Wiley, John, & Sons.
67. Bioinformatics: Methods and Applications: Genomics, Proteomics and Drug Discovery. Rastogi, S.S., Mendivata, N. and Rastogi, P. 2013. Prentice Hall
68. Genetics: Principles and Analysis. Hartl, D. L., & Jones, E. W. (1998). Sudbury, MA: Jones and Bartlett.
69. Genetics: a Conceptual Approach. Pierce, B. A. (2005). New York: W.H. Freeman.
70. . Principles of Genetics. Tamarin, R. H., & Leavitt, R. W. (1991). Dubuque, IA: Wm. C. Brown.
71. Introduction to Proteomics: Tools for the New Biology. Liebler, D. C. (2002). Totowa, NJ: Humana Press.
72. . Discovering Genomics, Proteomics, and Bioinformatics. Campbell, A. M., & Heyer, L. J. (2003). San Francisco: Benjamin Cummings.
73. Genetics: Analysis & Principles. Brooker, R. J. (2009). New York, NY: McGraw-Hill.
74. Molecular Biotechnology: Principles and Applications of Recombinant DNA.Glick, B. R., Pasternak, J. J., & Patten, C. L. (2010). Washington, DC: ASM Press.

75. Molecular Diagnostics: for the Clinical Laboratorian.Coleman, W. B., & Tsongalis, G. J. (2010). Totowa, NJ: Humana Press.
76. 76. Molecular Plant Pathology, Dickinson, M. BIOS Scientific Publishers, London, 2003.
77. Text Book of Microbiology By J.H ,Blaru
78. Animal Biotechnology By Ian Freshney
79. Protein Primers by Ringe
80. Immunology by Tizard

PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE [AUTONOMOUS]

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

Affiliated to University of Mysore

DEPARTMENT OF STUDIES IN BOTANY

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

1. **NAME OF THE DEPARTMENT: M. Sc. IN BOTANY**

2. **DATE OF APPROVAL FROM BOS: 23-02-2019**

3. **CONTENT OF THE REGULATIONS**

REGULATIONS FOR CHOICE BASED CREDIT SYSTEM (CBCS) AND CONTINUOUS ASSESSMENT GRADING PATTERN (CAGP) FOR MASTER OF SCIENCE IN BOTANY PROGRAMME WITH EFFECT FROM 2019-2020

*A. **PREAMBLE**:*

The University Grants Commission (UGC) has stressed on speedy and substantive academic and administrative reforms in higher education for promotion of quality and excellence. The Action Plan proposed by UGC outlines the need to consider and adopt Semester System, Choice Based Credit System (CBCS), and Flexibility in Curriculum Development and Examination Reforms in terms of adopting Continuous Evaluation Pattern by reducing the weightage on the semester- end examination so that students enjoy a de-stressed learning environment. Further, UGC expects that institutions of higher learning draw a roadmap in time bound manner to accomplish theabove.

The M.Sc. Botany course syllabus is designed to provide a holistic insight into the subject by experts of the University, Industry, Research organization and was adopted for teaching in the Centre. The Department is well furnished and provided with state-of-the-art laboratory facilities. The Department has highly qualified and experienced faculty for the students to learn and experiment, hands on, with techniques of great relevance to current day bio industries. Besides, the Centre also invites eminent Scholars, Scientists and Professors from different universities, research organization and industries across the country for special lectures to enlighten students on most recent developments in the subject. The students are also encouraged to take part in scientific seminars, conference, symposium, workshops, group discussions and quiz competitions apart from the other extra curricular activities.

The Post-graduate wing of SBRR Mahajana First Grade College (Pooja Bhagavat Memorial Mahajana PG Centre) is an advanced learning centre of Mahajana Education Society. It was started in 1999, affiliated to the University of Mysore to offer Post Graduate Programmes and diploma courses of direct relevance in 16 disciplines and is poised to start new courses in the years to come. The postgraduate wing is a member of well known professional bodies like CSI (Computer Society of India), ISTE (Indian Society for Technical Education), NIPM (National institute of Personal Management) and CII (Confederation of Indian Industry) so that the students are exposed to recent trends in the industry by attending programmes conducted by the above professional organizations.

B. ***OBJECTIVE****:*

The study of Botany, dealing with the structure, function, classification and evolution of plants, has inspired many great minds. Plants are unique as solar energy converters and providers of energy for all heterotrophic organisms. It is fascinating to study the wide spectrum of reproductive processes in algae, fungi, lichens, bryophytes, gymnosperms, and flowering plants. A student of Botany has been learning these aspects together with taxonomy, anatomy, plant pathology, plant breeding, microbiology, plant physiology, plant biochemistry, ecology, cytology, genetics, cytogenetics, molecular biology and plant biotechnology. Renewing and updating of the curriculum is the essential ingredient of any vibrant academic system. Curriculum with necessary additions and changes are introduced in it from time to time, with a prime objective to maintain updated curriculum and also providing therein inputs to take care of paced development in the knowledge of the subject. Revising the curriculum should be a continuous process to provide an updated education to the students by and large. The last few decades have ushered in new advances, not only in general biology, but also in Botany, which now need to be incorporated in the Botany curricula.

The objectives of curriculum development are listed below:

1. To update course contents by introducing (in good measure) recent developments in plant sciences.
2. To prepare the curriculum as such that it can attract, enthuse, sustain and promote the interest of learners for selecting Botany and allied disciplines as their career and make them realize that their choice is intellectually rewarding.
3. To ensure that the curricula are not overloaded .Minimizing the descriptive aspects and eliminating repetition of contents between under graduate and post graduate syllabi is the major objective.
4. To provide the students of Bachelor's programme in Botany, an opportunity to opt one or more courses in allied disciplines to help them pursue specialization / research in interdisciplinary areas.
5. To make provision for improvement in the quality of laboratory and field work in the lack of which the students are not able to appreciate the beauty and variety of form, structure, function and ecological significance of plants and their biological services.
6. To increase the awareness of young learners about the abuse to which plants have been subjected by human greed, and to expertise in exploration, identification and evaluation of plants, conservation of nature and natural resources and in the protection of endangered plant species and other biota dependent on them.
7. To provide for the mobility of students among institutions and different disciplines so as to acquaint with the latest trends and techniques adopted in the field of applied botany.

8. Each course shall be assigned credits depending on the quantum of work required to be done in each semester. The formula for assigning credits to a course is based on the number of contact hours per week.

OurMission

Development of world class human resources for the relevant Research Institutes of the Council for Scientific and Industrial Research (CSIR) Government Ministries, Departments, agencies such as the Ministries of Lands and Forestry, Agriculture, Science and environment, Education and the Non-Governmental Organizations (NGOs) and the private sector.

C. *SCHEME OF INSTRUCTIONS*:

***C.1. TITLE OF THE COURSE*: MASTER OF SCIENCE IN BOTANY**

DEFINITIONS:

***C.1.1.* Course** Every course offered will have three components associated with the teaching-learning process of the course, namely

a. Lecture – L (ii) Tutorial- T (iii) Practicals - P,where

L stands Lecture session. **T** stands Tutorial session consisting participatory discussion / self study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands Practice session and it consists of Hands on experience / Laboratory Experiments / Field Studies / Case studies that equip students to acquire the much required skill component.

In terms of credits, every one hour session of L amounts to 1 credit per semester and a minimum of two hour session of T or P amounts to 1 credit per semester, over a period of one semester of 16 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components. That means a course may have only lecture component, or only practical component or combination of any two or all the three components.

The total credits earned by a student at the end of the semester upon successfully completing the course are L + T + P. The credit pattern of the course is indicated as L: T: P.

If a course is of 4 credits then the different credit distribution patterns in L : T : P format could be

4 : 0 : 0,	1 : 2 : 1,	1 : 1 : 2,	1 : 0 : 3,	1 : 3 : 0,
2 : 1 : 1,	2 : 2 : 0,	2 : 0 : 2,	3 : 1 : 0,	3 : 0 : 1,
0 : 2 : 2,	0 : 4 : 0,	0 : 0 : 4,	0 : 1 : 3,	0 : 3 : 1,

The concerned BoS will choose the convenient credit pattern for every course based on the requirement. However, generally, a course shall be of 3 or 4 credits.

Different courses of study are labeled and defined as follows:

C.1.2. CORE COURSEA course which should compulsorily be studied by a candidate as a core- requirement is termed as a Core course.

A Core course may be a **Soft Core** if there is a choice or an option for the candidate to choose a course from a pool of courses from the main discipline /subject of study or from a sister/related discipline / subject which supports the main discipline / subject. In contrast to the phrase Soft Core, a compulsory core course is called a **Hard Core** Course**.**

C.1.3. ELECTIVE COURSE

Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline / subject of study or which provides an extended scope or which enables an exposure to some other discipline / subject/domain or nurtures the candidate's proficiency/ skill is called an Elective Course. Elective courses may be offered by the main discipline/ subject of study or by sister / related discipline / subject of study. A Soft Core course may also be considered as an elective.

An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called an **open elective**.

An elective course designed to acquire a special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher is called a **Self StudyElective**.

A core course offered in a discipline / subject may be treated as an elective by other discipline / subject and vice versa.

Project work/Dissertation work is a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A project work up to 4 credits is called Minor Project work. A project work of 6 to 8 credits is called Major Project Work. Dissertation work can be of 10-12 credits. A Project/Dissertation work may be a hard core or a soft core as decided by the BoSconcerned.

C.1.4. ELECTIVE.A core course offered in a discipline / subject may be treated as an elective by other discipline / subject and vice versa.

Project work/Dissertation work is a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A project work up to 4 credits is called Minor Project work. A project work of 6 to 8 credits is called Major Project Work. Dissertation work can be of 10-12 credits. A Project/Dissertation work may be a hard core or a soft core as decided by the BoS concerned.

***C.2. DURATION OF THE COURSE*:**

A Masters Degree programme is of 4 semesters-two years duration. A candidate can avail a maximum of 8 semesters – 4 years (in one stretch) to complete Masters degree (including blank semesters, if any). Whenever a candidate opts for blank semesters, he/she has to study the prevailing courses offered by the department when he/she continues his/her studies.

C.3. PERIOD OF THE COURSE: Semester I & II from July to December

Semester III & IV from January to June

***C.4. CREDITS (MINIMUM) MATRIX*:**

A candidate has to earn a minimum of ***76 credits***, for successful completion of a Master Degree. The 76 credits shall be earned by the candidate by studying Hardcore, Soft Core and Open Elective.

A candidate has to study a minimum ***42 credits*** in hard core but not exceeding 52. And a minimum of ***16 credits*** in Soft Core (sum total of 4 semesters) and ***04 credits*** in Open Elective for the successful completion of the Masters degree programme.

***C.5. MINIMUM FOR PASS*:**

1. **Minimum for Pass:**In case a candidate secures less than 30% in $C_1$and C_2put together,the candidate is said to have DROPPED the course, and such a candidate is not allowed to appear for C_3.
2. In case a candidate secures less than 30% in C_3, or secures more than 30% in C_3 but less than 40% in C_1, C_2 and C_3 put together, the candidate is said to have not completed the course and he/she may either opt to DROP the course or to utilize PENDING option.

C.6. CREDITS (MINIMUM) MATRIX*:** A candidate has to study a minimum ***42 credits in hard core but not exceeding 52. And a minimum of ***16 credits*** in Soft Core and ***04 credits*** in Open Elective for the successful completion of the Masters degree programme.

All other rules and regulations hold good which are governed by the University from time to time.

C.7. DEGREE AWARDING:

On successful completion of two year programme, the students will be awarded the M. Sc. Degree in Botany by the University of Mysore, Mysuru.

C.8. STRENGTH OF THE STUDENTS*:*

Intake = 30 candidates

C.9..ELIGIBILITY CRITERIA FOR ADMISSION:

M.Sc. BOTANY

Candidates possessing a B.Sc. with Botany as a Major /Optional subject and degree from UGC recognized University. Candidates applying for admission to M.Sc. Botany must be a graduate and must have obtained a minimum of 45% (40% in case of SC/ ST and Category-I candidates).

C.10 SCHEME OFINSTRUCTIONS

A Masters Degree program is of 4 semesters-two years duration. A candidate can avail a maximum of 8 semesters – 4 years (in one stretch) to complete Masters Degree (including blank semesters, if any). Whenever a candidate opts for blank semester(s)/DROP in a course or in courses or is compelled to DROP a course or courses as per the provision of the regulation, he/she has to study the prevailing courses offered by the department as per the prevailing scheme, when he/she continues his/herstudy.

A candidate has to earn a minimum of 76 credits, for successful completion of a Master's degree with a distribution of credits for different courses as given in the followingtable.

Course Type	Credits
Hard Core	A minimumof 42, but not exceeding52
Soft Core	A minimum of 16
Open Elective	A minimum of 04

Every course including project work, practical work, field work, seminar, self study elective should be entitled as hard core or soft core or open elective by the BoS concerned. A candidate can enroll for a maximum of 24 credits persemester.

Only such candidates who register for a minimum of 18 credits per semester in the first two semesters and complete successfully 76 credits in 4 successive semesters shall be considered for declaration of ranks, medals and are eligible to apply for student fellowship, scholarship, free ships and hostelfacilities.

In excess to the minimum of 76 credits for masters degree in the concerned discipline / subject of study, a candidate can opt to complete a minimum of 18 extra credits

to acquire **add on proficiency diploma** in that particular discipline / subject along with the masters' degree. In such of the cases wherein, a candidate opts to earn at least 4 extra credits in different discipline / subjects in addition to a minimum of 76 credits at masters level as said above then an **add on proficiency certification** will be issued to the candidate by listing the courses studied and gradesearned.

A candidate admitted to Masters program can exercise an option to exit with Bachelor Honors degree / PG diploma after earning 40 creditssuccessfully

C.10. ATTENDANCE AND CONDUCT:

The course is a full time course and students **SHALL NOT** take up any employment/course, part time or full time during their study. Students found violating this rule shall be removed from the course. Minimum attendance of 75% of actual working hours is required in each course. A student who does not satisfy the requirements of attendance and conduct shall not be permitted to write examination in the concerned subject.

C.11. MEDIUM OF INSTRUCTION: The medium of instruction shall be English. However, a candidate will be permitted to write the examinations either in English or in Kannada.

D. SCHEME OF EXAMINATION FOR C_1, C_2 AND C_3 COMPONENTS (CONTINUOUS ASSESSMENT, EARNING OF CREDITS AND AWARD OF GRADES)

Continuous Assessment, Earning of Credits and Award of Grades

The evaluation of the candidate shall be based on continuous assessment. The Structure for evaluation is as follows:

1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified as C1, C2, and C3.

2 The performance of a candidate in a course (30:70 pattern) will be assessed for a maximum of 100 marks as explained below:

2.1 The first component (C1), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions, etc., During the first half of the semester, the first 50% of the syllabus will be completed. This shall be consolidated during the 8^{th} week of the semester. Beyond 8^{th} week, making changes in C1 is not permitted.

2.2 The second component (C2), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions etc. The continuous assessment and scores of second half of the semester will be consolidated during the 16^{th}

week of the semester. During the second half of the semester the remaining units in the course will be completed.

2.2.1. The outline for continuous assessment activities for Component-I (C1) and Component-II (C2) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective Departmental Council. The students should be informed about the modalities well in advance. The evaluated courses/assignments during component I (C1) and component II (C2) of assessment are immediately returned to the candidates after obtaining acknowledgement in the register maintained by the concern teacher for this purpose.

2.3 During the 18^{th} - 20^{th} week of the semester, a semester-end examination of 3 hours duration shall be conducted for each course. This forms the third/final component of assessment (C3) and the maximum marks for the final component will be 70.

Setting question papers and evaluation of answer scripts:

XIII. Question papers in two sets shall be set by the internal examiner and one set by external examiner for a course. Whenever there are no sufficient internal examiners, The Chairman, BoE shall get the question papers set by external examiners.

Whenever there are no external examiners, The Chairman, BoE shall get the question papers set by internal examiner.

XIV. The Board of Examiners shall scrutinize and approve the question papers and scheme of evaluation.

XV. (i) There shall be single evaluation for all theory papers by internal examiner and 25% of the total scripts will be reviewed by an external examiner.

(ii) The average of first valuation and the review evaluation will be considered as the final marks of the candidate.

(iii) If there is difference of marks in maiden and reviewed evaluation is greater than 15 marks then the script will go for third evaluation by the external examiner and marks awarded in the third evaluation will be final.

(iv)The examination for Practical work/ Field work/ Project work will be conducted jointly by one internal and one external examiner.

XVI. Challenge Evaluation

A student who desires to apply for challenge evaluation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Controller of

Examinations within 15 days after the announcement of the results. This challenge evaluation is only for C3 component.

The answer scripts, for which challenge evaluation is sought for, shall be sent to external examiner. The marks awarded in the challenge evaluation will be final.

2.4. In case of a course with only practical component a practical examination will be conducted with two examiners (one Internal and one external)

A candidate will be assessed on the basis of

a) Knowledge of relevant processes

b) Skills and operations involved

c) Results / products including calculation and reporting.

If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the Departmental council.

2.5 If **X** is the marks scored by the candidate out of 70 in C3 in theory examination, if **Y** is the marks scored by the candidate out of 70/50/40 in C3 in Practical examination, and if **Z** is the marks scored by the candidate out of 70/50/40 in C3 for a course of (L=0):T:(P=0) type that is entirely tutorial based course, then the final marks (M) in C3 is decided as per the following table.

L.T.P distribution	**Formula to compute Mark (M) in C3**
L:T:P	$\frac{[(L+T)*X]+[(T+P)*Y]}{L+2T+P}$
L:(T=0):P	$\frac{(L*X)+(P*Y)}{L+P}$
L:T:(P=0)	X
L:(T=0):(P=0)	X
(L=0):T :P	Y
(L=0): (T=0):P	Y
(L=0): T:(P=0)	Z

2.6 The details of continuous assessment (30:70 patterns) are summarized in the following table:

Component	Syllabus in a Course	Weightage	Period of Continuous Assessment
C1	First 50%	15%	First half of the semester To be consolidated by 8th week
C2	Remaining 50%	15%	Second half of the semester. To be consolidated by 16th week
C3	Semester-end examination (All units of the course)	70%	To be completed during 18th-20th Week.

2.7 A candidate's performance from all 3 components will be in terms of scores, and the sum of all three scores will be for a maximum of 100 marks (15 +15 + 70).

2.8 Finally, awarding the grades should be completed latest by 24th week of the semester.

3. **Minor/ Major Project Evaluation:**

Rightfrom the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his/her progress in the form of seminars in addition to the regular discussion with the guide. Components of evaluation are as follows:

Component – I (C1): Periodic Progress and Progress Reports (15%)

Component – II (C2): Results of Work and Draft Report (15%)

Component– III (C3): Final Viva-voce and evaluation (70%).

The report evaluation is for 40% and Viva-voce examination is for 30%.

4. In case a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

In case a candidate's class attendance in a course is less than 75%, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

Teachers offering the courses will place the above details in the Department Council meeting during the last week of the semester, before the commencement of C3, and subsequently a notification pertaining to the above will be brought out by the Chairman of the Department before the commencement of C3 examination. A

copy of this notification shall also be sent to the office of the Director & the Controller of Examinations.

5. In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUP option.

In case a candidate secures more than or equal to 30% in C3, but his/her grade (G) = 4, as per section 6.9 below, then he/she may be declared to have been conditionally successful in this course, provided such a benefit of conditional clearance based on G=4 shall not be availed for more than 8 credits for the entire program of Master's Degree of two years.

In case a candidate secures more than 30% in C3, he/she may choose DROP/MAKE-UP option.

The candidate has to exercise his/her option immediately within 10 days from the date of notification of results.

A MAKE UP examination for C3 shall be conducted in all the semesters. Candidates can register for the MAKE UP examination within 10 days from the date of notification of results. The MAKE UP examination will be conducted within one month of the notification of the results.

If a candidate is still unsuccessful, A MAKE UP Examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with next regular even semester examinations; however, not exceeding double the duration norm in one stretch from the date of joining the course.

6. A candidate has to re-register for the DROPPED course when the course is offered again by the department if it is a hard core course. The candidate may choose the same or an alternate core/elective in case the dropped course is soft core / elective course. A candidate who is said to have DROPPED project work has to re-register for the same subsequently within the stipulated period. **The details of any dropped course will not appear in the grade card.**

7 . The tentative / provisional grade card will be issued by the Controller of Examinations at the end of every semester indicating the courses completed successfully. This statement will not contain the list of DROPPED courses.

8 . Upon successful completion of Bachelors Honors/Master's Degree, a final grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Controller of Examinations.

9 . The grade and the grade point earned by the candidate in the course will be as given below.

Marks(M)	**Grade**	**Grade Point (GP = V x G)**
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

Here, **P** is the Percentage of marks (P = [(C1+C2) + M] secured by a candidate in a course which is rounded to nearest integer. **V** is the credit value of course. **G** is the Grade and **GP** is the Grade Point.

10. A candidate can withdraw any course within ten days from the date of notification of final results. Whenever a candidate withdraws a paper, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is soft core/open elective.

A DROPPED course is automatically considered as a course withdrawn.

11 Overall Cumulative Grade Point Average (CGPA) of a candidate after successfully completing the required number of credits (76) is given by:

CGPA = ΣGP / Total Number of Credits

E. CLASSIFICATION OFRESULTS

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	FGP	
	Numerical Index	Qualitative Index
4 <= CGPA <	5	SECOND CLASS
5 <= CGPA <	6	
6 <= CGPA <	7	FIRST CLASS
7 <= CGPA <	8	
8 <= CGPA <	9	DISTINCTION
9 <= CGPA < =10	10	

Overall percentage=10*CGPA or is said to be 50% in case CGPA<5

F. ***PROVISION FOR APPEAL***

If a candidate, is not satisfied with the evaluation of C1 and C2 components, he / she can approach the grievance cell with the written submission together with all facts, the assignments, test papers etc, which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty as prescribed by the university on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she is found guilty. The decision taken by the grievance cell isfinal.

For every program there will be one grievance cell. The composition of thegrievance cell is asfollows.

1. Controller of Examination /Convener
2. One senior faculty member (other than those concerned with the evaluation of the course concerned) drawn from the department/discipline and/or from the sister departments/sisterdisciplines.
3. One senior faculty members / subject experts drawn from outside the University department.

M.Sc., Botany Choice - Based Credit System (CBCS) Syllabus

(CBCS-CGPA)

CORE SUBJECT: BOTANY

DEGREE: M.Sc., BOTANY

MINIMUM CREDITS TO BE REGISTERED BY A STUDENT IN A NORMAL PHASE TO SUCCESSFULLY COMPLETE M.SC. BOTANY DEGREE IN FOUR SEMESTERS

Semesters	Hardcore		Soft-core		Open -elective		Total	
	Number	Credits	Number	Credits	Number	Credits	Number	Credits
I semester	3	14	2	8			5	22
II semester	3	12	2	6	1	4	6	22
III semester	3	12	1	4			4	16
IV semester	2	12	1	4			3	16
Total	**11**	**50**	**6**	**22**	**1**	**4**	**18**	**76**

FIRST SEMESTER **Credits: 22**				
No.	**Course/Paper Code**	**Title of the Course/ Paper**	**Hrs/Week L:T:P**	**Credits**
1	**HARD CORE 1.1**	**Virology, Bacteriology, Mycology and Plant Pathology**	**2:2:2**	**4**
2	**HARD CORE 1.2**	**Phycology, Bryophytes, Pteridophytes and Gymnosperms**	**2:2:2**	**4**
3	**HARD CORE 1.3**	**Systematics of Angiosperms**	**2:2:2**	**4 + 2= 6**
4	**SOFT CORE 1.1****	**Fungal Biology and Biotechnology**	**2:2:2**	**4**
5	**SOFT CORE 1.2****	**Algal Biology and Biotechnology**	**2:2:2**	**4**
6	**SOFT CORE 1.3****	**Lichenology and Mycorrhizal Technology**	**2:2:2**	**4**
7	**SOFT CORE 1.4****	**Phytopathology**	**2:2:2**	**4**
*Field Study/Tour: The student shall undertake a field trip for a minimum of 2-3 days and shall submit the herbaria and tour report for evaluation-2 credits. **Any two soft core papers shall be studied.				

SECOND SEMESTER				**Credits: 18**
No.	Course/Paper Code	Title of the Course / Paper	Hrs/Week L:T:P	Credits
1	HARD CORE 2.1	Reproductive Biology of Angiosperms and Plant Morphogenesis	2:2:2	4
2	HARD CORE 2.2	Cell Biology and Genetics	2:2:2	4
3	HARD CORE 2.3	Plant Breeding and Evolutionary Biology	2:2:2	4
4	SOFT CORE 2.1*	Plant Anatomy and Histochemistry	2:0:2	3
5	SOFT CORE 2.2*	Ethno-Botany and Intellectual Property Rights (IPR)	2:0:2	3
6	SOFT CORE 2.3*	Economic Botany	2:0:2	3
7	OPEN ELECTIVE 2.1	Medicinal Plants	2:2:0	4
	** Any two soft core papers shall be studied.			

THIRD SEMESTER				Credits: 16
No.	Course/Paper Code	Title of the Course /Paper	Hrs/Week L:T:P	Credits
1	HARD CORE 3.1	Biochemistry and Plant Physiology	2:2:2	4
2	HARD CORE 3.2	Molecular Biology	2:2:2	4
3	HARD CORE 3.3	Plant Biotechnology	2:2:2	4
4	SOFT CORE 3.1*	Molecular Genetics of Plants	2:2:2	4
5	SOFT CORE 3.2*	Molecular Plant Pathology	2:2:2	4
6	SOFT CORE 3.3*	Plant Propagation and Plant Breeding	2:2:2	4
7	SOFT CORE 3.4*	Phyto-chemistry and Herbal Technology	2:2:2	4
8	OPEN ELECTIVE 3.1	Plant Propagation Techniques	2:2:0	4
	* Any one soft core courses/papers shall be studied.			

FOURTH SEMESTER				Credits: 16
No.	**Course/Paper Code**	**Title of the Course /Paper**	**Hrs/Wk L:T:P**	**Credits**
1	HARD CORE 4.1	Ecology, Conservation Biology and Phytogeography	2:2:2	4
2	HARD CORE 4.2	Project Work *	4:4:4	8
3	SOFT CORE 4.1*	Seed Technology	2:2:2	4
4	SOFT CORE 4.2*	Seed Pathology	2:2:2	4
5	SOFT CORE 4.3*	Bio -Analytical Techniques	2:2:2	4
6	OPEN ELECTIVE 4.1	Plant Diversity and Human Welfare	2:2:0	4
	*Project Work: The student shall undertake a Project Work in the Department or in any other University or Institute under the guidance of a Research Supervisor and shall submit a Project Report duly signed by Student and Research Supervisor for Evaluation.			

Semester- Wise Credit Pattern

I Semester = 22 (HC- 14 + SC-08)

II Semester = 18 (HC- 12 + SC-06)

III Semester = 16 (HC- 12 + SC- 04)

IV Semester= 16 (HC- 12 + SC-04)

Total Hard Core credits to be earned by the students = 50

Total Soft Core credits to be earned by the students=22

Student has to earn 4 credits from minimum of 4 credits from open Electives = 04

Total number of credits required for qualifying M.Sc. Botany Course = 76

Department of Botany

M.Sc., Botany Choice - Based Credit System (CBCS) Syllabus

(CBCS-CGPA)bb

CORE SUBJECT: BOTANY

DEGREE: M.Sc., BOTANY

FIRST SEMESTER			**Credits: 22**	
No.	**Course/Paper Code**	**Title of the Course/ Paper**	**Hrs/Week L:T:P**	**Credits**
1	**HARD CORE 1.1**	**Virology, Bacteriology, Mycology and Plant Pathology**	**2:2:2**	**4**
2	**HARD CORE 1.2**	**Phycology, Bryophytes, Pteridophytes and Gymnosperms**	**2:2:2**	**4**
3	**HARD CORE 1.3**	**Systematics of Angiosperms**	**2:2:2**	**4 + 2= 6**
4	**SOFT CORE 1.1****	**Fungal Biology and Biotechnology**	**2:2:2**	**4**
5	**SOFT CORE 1.2****	**Algal Biology and Biotechnology**	**2:2:2**	**4**
6	**SOFT CORE 1.3****	**Lichenology and Mycorrhizal Technology**	**2:2:2**	**4**
7	**SOFT CORE 1.4****	**Phytopathology**	**2:2:2**	**4**
*Field Study/Tour: The student shall undertake a field trip for a minimum of 2-3 days and shall submit the herbaria and tour report for evaluation-2 credits. **Any two soft core papers shall be studied.				

SECOND SEMESTER			**Credits: 18**	
No.	**Course/Paper Code**	**Title of the Course / Paper**	**Hrs/Week L:T:P**	**Credits**
1	**HARD CORE 2.1**	**Reproductive Biology of Angiosperms and Plant Morphogenesis**	**2:2:2**	**4**
2	**HARD CORE 2.2**	**Cell Biology and Genetics**	**2:2:2**	**4**
3	**HARD CORE 2.3**	**Plant Breeding and Evolutionary Biology**	**2:2:2**	**4**
4	**SOFT CORE 2.1***	**Plant Anatomy and Histochemistry**	**2:0:2**	**3**
5	**SOFT CORE**	**Ethno-Botany and Intellectual**	**2:0:2**	**3**

	2.2*	**Property Rights (IPR)**		
6	**SOFT CORE 2.3***	**Economic Botany**	**2:0:2**	**3**
7	**OPEN ELECTIVE 2.1**	**Medicinal Plants**	**2:2:0**	**4**
	** Any two soft core papers shall be studied.			

THIRD SEMESTER				**Credits: 16**
No.	**Course/Paper Code**	**Title of the Course /Paper**	**Hrs/Week L:T:P**	**Credits**
1	**HARD CORE 3.1**	**Biochemistry and Plant Physiology**	**2:2:2**	**4**
2	**HARD CORE 3.2**	**Molecular Biology**	**2:2:2**	**4**
3	**HARD CORE 3.3**	**Plant Biotechnology**	**2:2:2**	**4**
4	**SOFT CORE 3.1***	**Molecular Genetics of Plants**	**2:2:2**	**4**
5	**SOFT CORE 3.2***	**Molecular Plant Pathology**	**2:2:2**	**4**
6	**SOFT CORE 3.3***	**Plant Propagation and Plant Breeding**	**2:2:2**	**4**
7	**SOFT CORE 3.4***	**Phyto-chemistry and Herbal Technology**	**2:2:2**	**4**
8	**OPEN ELECTIVE 3.1**	**Plant Propagation Techniques**	**2:2:0**	**4**
	* Any one soft core courses/papers shall be studied.			

FOURTH SEMESTER				**Credits: 16**
No.	**Course/Paper Code**	**Title of the Course /Paper**	**Hrs/Wk L:T:P**	**Credits**
1	**HARD CORE 4.1**	**Ecology, Conservation Biology and Phytogeography**	**2:2:2**	**4**
2	**HARD CORE 4.2**	**Project Work ***	**4:4:4**	**8**
3	**SOFT CORE 4.1***	**Seed Technology**	**2:2:2**	**4**
4	**SOFT CORE 4.2***	**Seed Pathology**	**2:2:2**	**4**
5	**SOFT CORE**	**Bio -Analytical Techniques**	**2:2:2**	**4**

	4.3*			
6	**OPEN ELECTIVE 4.1**	**Plant Diversity and Human Welfare**	**2:2:0**	**4**
	***Project Work:** The student shall undertake a Project Work in the Department or in any other University or Institute under the guidance of a Research Supervisor and shall submit a Project Report duly signed by Student and Research Supervisor for Evaluation.			

Semester- Wise Credit Pattern

I Semester = 22 (HC- 14 + SC-08)

II Semester = 18(HC- 12 + SC-06)

III Semester = 16 (HC- 12 + SC-04)

IV Semester= 16 (HC- 12 + SC-04)

Total Hard Core credits to be earned by the students= 50

Total Soft Core credits to be earned by the students=22

Student has to earn 4 credits from minimum of 4 credits from open Electives=04

Total number of credits required for qualifying M.Sc. Botany Course= 76

PG Department of Botany

MODEL QUESTION PAPER (THEORY)

Course/Paper: ……

Course/Paper Code……..

Time: 3 Hrs **Max Marks: 70**

Instructions: 1) Answer all questions.

2) Draw neat and labelled diagrams wherever necessary.

I. Answer the following; (10MCQs of 1 Marks each) 10 X 1 = 10

2 from Unit I

3 from Unit II

2 from Unit III

3 from Unit IV

II. Answer the following; 4 X 5 = 20

2 from Unit I with internal choice

2 from Unit II with internal choice

2 from Unit III with internal choice

2 from Unit IV with internal choice

III. Answer the following; 4 X10 = 40

2 from Unit I with internal choice

2 from Unit II with internal choice

2 from Unit III with internal choice

2 from Unit IV with internal choice

PG Department of Botany

MODEL QUESTION PAPER (PRACTICAL)

Course/Paper: ……

Course/Paper Code……

Time: 3 Hours **Max Marks: 70**

Q I.Conducting Experiment/Micro-preparation /Plant identification	15
Q II. Minor experiment/ Demonstrations/ Procedure Writing	10
Q III. Critically comments (3x5 Marks)	15
Q IV. Identification (5x2 Marks)	10
Q V. Viva-voce examination	10
Q VI. Class Records/ Submissions	10

BOTANY: I SEMESTER- HARD CORE 1.1

VIROLOGY, BACTERIOLOGY, MYCOLOGY AND PLANT PATHOLOGY

Theory-32 Hrs

Unit-1: Virology: Origin and evolution of viruses; Classification of viruses-ICTV and Baltimore Systems; Genome diversity in viruses; Methods of cultivation of viruses; Purification and detection of viruses; Transmission of viruses; Mechanism of replication of DNA and RNA viruses; Viroids - Structure and multiplication; Prions - structure and multiplication; Prion diseases.

Unit-2: Bacteriology: Introduction and classification of Bacteria by Bergey's Manual of Determinative and Sytematic Bacteriology; C. R. Woese- Three domain classification of Bacteria; Archaebacteria and Eubacteria- diversity and evolution; Nutritional types of bacteria; Bacterial growth; Recombination in bacteria (conjugation transformation, and transduction); Brief account on actinomycetes; Structure and multiplication of Mycoplasma and Phytoplasmas; Economic importance of bacteria.

Unit -3: Mycology: Present status of fungi; Outline classification of fungi (Ainsworth-1973). Vegetative organization in fungi;Nutrition in fungi (saprotrophs, biotrophs, necrotrophs; symbiotrophs); Methods of reproduction in fungi - Asexual and sexual methods; Spore liberation in fungi; Evolution of sex in fungi; Heterothallism and parasexuality; Life cycle pattern and phylogeny of Myxomycotina, Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina; Fungi and their economic importance.

Unit-4: Plant Pathology: Concepts and scope of plant pathology; Plant diseases and crop losses; Classification of plant diseases; Parasitism and disease development; Effect on physiology of host; Host range of pathogens; Defence Mechanisms in Plants; Plant Disease epidemics and plant disease forecasting; Methods of plant disease management; Study of plant diseases- Sandal Spike, Citrus Canker, Bacterial Blight of Paddy, Late Blight of Potato, Downy Mildew of Bajra, Tikka Disease of Ground nut, Grain Smut of Sorghum. Phloem Necrosis of Coffee, Root Knot Disease of Mulberry.

Practicals-32 Hrs

1) Laboratory guidelines, design, tools, equipments and other requirements for studying microorganisms.
2) Measuring the dimensions of microorganisms using Micrometry.
3) Determining total count of microbes using Haemocytometer.
4) Gram and special staining of bacteria.
5) Preparation of NA, PDA, sterilization, pouring, inoculation and culturing of bacteria/fungi.
6) Staining of fungi including VAM fungi.
7) Identification of fungi.

8) Measurement of bacterial growth by Spectrophotometer.

9) Recording environmental factors (Temperature, RH, and Rainfall and wind velocity).

10) Splash liberation of spores from diseased tissue.

11) Estimation of total phenols in diseased and healthy plant tissues.

12) Study of the following diseases: Sandal Spike, Citrus canker, Bacterial Blight of paddy, Late Blight of Potato. Downy Mildew of Bajra, Tikka disease of ground nut, Grain smut of Sorghum, Phloem Necrosis of Coffee, Root Knot disease of Mulberry.

References

1) Madigan, M.T. 2012. Brock Biology of Microorgasms, 13t edn. Benjamin Cummings.

2)Willey, J, Sherwood, L. and Woolverton, C.J. 2013. Prescott`s Microbilogy 9th edn. Mc Graw-Hill Educations.

3) Wagner, E.K, and Hewlett, M.J. 2009. Basic Virology. Blackwell Science Ltd. 2nd edn. USA.

4) Kodo, C.I. and Agarwal, H.O. 1972. Principles and Techniques in Plant Virology, Van Nostrand, Reinhold Company, New York.

5) Conrat, F.H., Kimball, P.C. and Jay, L. 1988.Virology. Prentice Hall, Englewood Chiff, New Jercy.

6) Jawaid, A. Khan and Jeanne Dijkstra. 2002. Plant Viruses as Molecular Pathogens. Food Products Press, NY

7) Alexopoulos, C.J. Mims, C.W. and Blackwell, M. 2013. Introductory Mycology 4th edn. Wiley.

8) Singh, R. S. 2009. Plant Disease. 9th edn. Oxford and IBH Pub.Co., New Delhi.

9) Agrios, G. N. 2005. Plant Pathology 5th edn. Academic Press, San Diego.

10) Rangaswamy, G. and Mahadevan, A. 2002. Diseases of crop plants in India, Prentice Hall of India Pvt.Ltd. New Delhi.

11) Mehrotra, R. S. 2003. Plant Pathology. 2nd edn. Tata Mc Graw-Hill Pub. Co. Ltd., New Delhi.

12)Cann, A.J. 2012. Principles of Molecular Virology 5th edn. Elsevier Ltd, USA.

13) Flint, S.J. Enaquist, L.W., Rancnicllo, V. R. and Skalka, A.M. 2009. Principles of Virology pathogenesis and control. 3rd edn. APS Press, USA.

14)Hall, R. 2014. Plant Virology, 5th edn. Elsevier, USA.

15)Aneja, K.R. 2003. Experiments in Microbiology plant Pathology and Biotechnology, 4th edn. New Age International Publishers, New Delhi.

16) Holt, J.G., Krige, N.R., Sneath., P.H.A. Stuley, J.T. and Williams, S.T. 2010. Bergey`s Manual of Determinative Bacteriology, 9th edn. Williams and Wilkins, USA.

BOTANY: I SEMESTER - HARD CORE 1.2

PHYCOLOGY, BRYOPHYTES, PTERIDOPHYTES AND GYMNOSPERMS

Theory-32 Hrs

Unit-1:Phycology: Diversity and distribution of algae; Unicellular, colonial, filamentous, heterotrichous, parenchymatous, pseudoparenchymatous, siphonous forms; General characteristics, classification and phylogeny of algae; Pigmentation in algal groups; Role of photosynthetic and accessory pigments; Life cycles in algae- haplontic, diplontic, isomorphic, heteromorphic; Economic importance of algae.

Unit -2: Bryophytes: Introduction, general characteristics, classification and phylogeny of Bryophytes; Distribution, habitat, external and internal morphology and reproduction; Comparative account on gametophytes and sporophytes of bryophytes; Economic and ecological importance.

Unit -3: Pteridophytes: Introduction, classification and phylogeny; Morphology, anatomy reproductive biology and phylogeny; Psilophytes, Lycophytes, Sphenophytes, Filicophyta; Evolution of sorus; evolution of sporangium; Gemetophyte development - homosporous and heterosporous ferns; Heterospory and seed habit; Stelar evolution in Pteridophytes; Ecology of Pteridophytes; Economic importance.

Unit- 4: Gymnosperms: Distribution, general characteristics, classification and phylogeny of Gymnosperms; Range in morphology, anatomy, reproduction and interrelationships of - Cycadales, Ginkgoales, Coniferales, Gnetales; Pteridosperms; Economic importance of Gymnosperms.

Practicals-32 Hrs

1-4) Algae: Study of Cyanophyceae: *Anabaena, Oscillatoria*; Study of Chlorophyceae: *Oedogonium, Pediastrum;* Study of Phaeophyceae: *Turbinaria, Ectocarpus*; Study ofRhodophyceae: *Gracilaria, Batrachospermum*; Economic products of algae.

5-7) **Bryophytes:** Study of morphology, anatomy and reproductive morphology - Hepaticopsida- *Marchantia, Dumortiera*; Anthocerotopsida- *Anthoceros, Notothylas*; Bryopsida- *Bryum* and *Polytrichum*.

8-10) **Pteridophytes:** Study of vegetative habit, anatomy and reproductive morphology of *Psilotum,Lycopodium, Isoetes, Ophioglossum, Botrychium, Angiopteris, Pteris, Hymenophyllum,Marselia, Salvinia, Azolla;* **Paleobotany**- Study of Lepidodendrales, Calamitales, Sphenophyllales and Coenopteridales (Fossil Pteriodophytes).

11-12) **Gymnosperms:** Study of morphology, anatomy and reproductive morphology of *Zamia, Pinus* and *Ephedra, Ginkgo, Auracaria, Podocarpus, Gnetum, Agathis, Cupressus, Thuja*; Economic importance of Gymnosperms.

References:

1) Bower, F.O. 1935. Primitive land plants, Macmillan, London.
2) Campbell, D.H. 1972. Evolution of land plants (Embryophytes), Central Book Department Allahabad.
3) Watson, E.V. 1971. The structure and life of Bryophytes Hutchinson and Co. Ltd. London.
4) Parihar, N.S. 1970 An Introduction to Embryophyta Vol. 1. Bryophyta. Central Book Department, Allahabad.
5) Prempuri, 1981. Bryophytes, Morphology, Growth and Differentiation. Atmaram and sons, New Delhi.
6) Nayar, M.C., Rajesh, K.P. and Madhusoodanan, P.V. 2005. Bryophytes of Wyanad.
7) Murthy, A.V.S.S. 2005. A text book of algae. IK International Pvt., Ltd., New Delhi.
8) Bold, H. C. and Wynne, M.J. 1978. Introduction to the algae. Structure and reproduction. Prentice Hall.
9) Chapman and Chapman. 1973. The Algae. Macmillan Co., New York.
10) Fritsch, F. E. 1935. Structure and Reproduction of Algae Vol. I & II. Cambridge Univ. Press, London.
11) Odum, E.P. Fundamentals of Ecology. 3rd edn. Toppan Co., Ltd., Japan.
12) Round, F. E. 1973. Biology of the algae. Edward Arnold Ltd., London.
13) Smith, G.M. 1951. Manual of Phycology. Pub. Co. Waltham., Mass.
14) Venkataraman, G.S. 1974. Algae form and function. Today & Tomorrow's Pub., New Delhi.
15) South, G. R. And Whittick, A. 1987. Introduction to Phycology. Blackwell Scientific Publication, UK.
16) Hoek, V., Mann, D. G. And Jahns, H. M. 1995. An introduction to Phycology. Cambridge University Press, UK.
17) Biswas, C. and Johri, B. M. 1997. The Gymnosperms. New Age Publishers, New Delhi.
18) Rashid A. 1986. An Introduction to Pteridophytes. Vikas, New Delhi.
19) Sporne K. R. 1969. Morphology of Gymnosperms. Hutchinson University Library, London.
20) Sporne, K. R. 1969. Morphology of Pteridophytes. Hutchinson University Library, London.
21) Chase, M.W. and Reveal, J.L. 2009. A phylogenetic classification of the land plants to accompany APG III. Botanical Journal of the Linnean Society, 161: 122-127.
22) Sundararajan, S. 2007. Introduction to Pteridophyta. New Age International Publishers, New Delhi.
23) Vashishta, P.C. (2008). Botany for Degree Students: Pteridophyta. S. Chand & Co. Ltd., New Delhi.

BOTANY: I SEMESTER - HARD CORE 1.3

SYSTEMATICS OF ANGIOSPERMS

Theory-32 Hrs

Unit-1: Introduction to plant systematics; Plant classification systems-artificial, natural and phylogenetic systems; Contributions of Carolus Linnaeus, Michel Adanson, de Jussieu, de Candolle to plant classification; Concepts of taxonomic hierarchy; Taxonomic Categories-Genus concept; Species concept; Intraspecific categories; subspecies; varieties and forms; History of botanical nomenclature; ICBN and ICN aims and principles; Rules and recommendations; Rule of priority; Typification; Author citation, Legitimate and illegitimate names; Name changes and synonyms; Effective and valid publication; Herbarium and its significance; Botanical gardens.

Unit-2: **Taxonomic Literature:** General taxonomic indices, world floras and manuals; Monographs and revisions; Bibliographies, catalogues and reviews; Periodicals, glossaries and dictionaries; Hortus Malabaricus; Taxonomic websites-IPNI, Plant List, Tropicos, Botanico-Periodicum-Huntianum (BPH); Biodiversity Heritage Library (BHL); Botanicus, Index Herbariorum; Taxonomic Keys- bracketed keys, indented keys, numbered keys, edge punched and body punched keys.

Unit-3: Study of plant classification Systems; Broad outlines of Bentham and Hooker's system, Engler and Prantl's system, Hutchinson's system, Takhtajan's system, and Cronquist's system; Numerical Taxonomy-principles, selection of characters, merits and demerits; Angiosperm Phylogeny Group (APG) III & IV clasiification;Study of angiosperm families-Magnoliaceae, Nympheaceae, Urticaceae, Droseraceae, Podostemaceae, Balanophoraceae, Loranthaceae, Alismataceae, Cyperaceae, Commelinaceae, Dioscoreaceae and Orchidaceae.

Unit-4:Molecular Systematics: Nuclear, mitochondrial and chloroplast genes. Gene sequencing, analysis of molecular data, alignment of sequences; Phylogenetic tree construction-Maximum Likelihood and Neighbour Joining Methods; Phylogenetic analysis- rooted and unrooted trees; Data analysis- alignment, substitution, model building; Phylogentic softwares-CLUSTAL W, MEGA, Mesquite, PAUP, PHYLIP, Treefinder, TreeBase.

Practicals-32 Hrs

1) Methods of preparation and maintenance of Herbaria.

2-4) A field trip of three days to a floristically rich area to study plants belonging to different families (Every student shall submit a report for evaluation for two credits).

5-10) Identification of the flowering plants in and around Mysore using keys, floras and monographs.

11-12) Construction of phylogenetic tree based on molecular data of plant species retrieved from GenBank.

References:

1. Cronquist, A. 1981. An Integrated system of classification of flowering plants. Columbia University Press, New York.
2. Simpson, M.G. 2006. Plant Systematics. Elsevier, Amsterdam.
3. Swafford, D.L. 2001. PUAP. Phylogenetic Analysis Using Parsimony, version 4. Sinauer Associates, Sunderland.
4. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.A. and Donoghue, M.J. 2002. Plant Systematics: A phylogenetic Approach. Sinauer Associates, Inc., Massachusetts.
5. Gurucharan Singh. 2004. Plant Systematics: Theory and Practice, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Jeffrey, C. 1982. An introduction to Plant Taxonomy. II Edn., Cambridge Uni. Press.
7. Mondal, A.K. 2009. Advanced Plant Taxonomy. New Central Book Agency Pvt. Ltd., Kolkata, WB.
8. Pullaiah, T. 1998. Taxonomy of Angiosperms. Regency Publications, New Delhi.
9. Johri, B.M. and Bhatacharjee, S.P. 1994. Taxonomy of Angiosperms. Narosa Publishers, New Delhi.
10. Lawrence, G.H.M. 191. Taxonomy of Vascular Plants. MacMillan, London.
11. Chase, M.W. and Reveal, J.L. 2009. A phylogenetic classification of the land plants to accompany APG III. Botanical Journal of Linnaean Society, 161: 122-127.
12. Nei, M. and Kumar, S. 2000. Molecular Evolution and Phylogenetics. Oxford Univ. Press, New York
13. APG-IV. 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants APG-IV. Botanical Journal of Linnaean Society, 181: 1-20.

BOTANY: I SEMESTER - SOFT CORE 1.1

FUNGAL BIOLOGY AND BIOTECHNOLOGY

Theory-32 Hrs

Unit-1: Introductionand historical overview of mycology; General characteristics and importance of fungi in human life; Fungi –Taxonomy and Systematics;Fungiingenetic andappliedresearch; EstimationofFungaldiversity;QuantitativeIndices- species richness, species evenness and speciesabundance; Molecular methods used for fungal diversity estimation-nuclear genome, messenger RNA transcripts, Ribosomal/ DNA sequence comparisons and mitochondrial genome.

Unit-2: Macro fungi and microfung iliving on plan tsubstrata; Lignicolousmacrofungi; Lichenizedfungi; Sequestratefungi; Endophytic fungi; Saprobicsoilfungi; Fungi instressful environment; Mutualistic, arbuscular, and endomycorrhizal fungi;Yeasts; Fungicolous fungi;Fungiinfresh and marine water habitats; Fungi associated with aquatic animals; Fungiasparasitesofhumans and plants; Fungi associated with animals, insect, arthropod and nematodes; Coprophilous fungi.

Unit-3: Fungal Fermentation and Food Products: Food and Beverages; Single cell proteins-Myco-proteins; Food processing by fungi-bread, soybean products, cheese and fermented milk; Fungal secondary metabolites-antibiotics, immunosuppressive agents, anti-tumour agents, fungal toxins as medicines; Fungal pigments; Steroid transformation; Fungal enzymes; Bio-control agents; Application of molecularbiology in fungal biotechnology.

Unit-4:Mushrooms and fungi in medicine; Toxic macromycetes; Mushroom cultivation; Model organisms- *Saccharomyces cerevisiae*/*Neurospora crassa*; Bio-deterioration of food grains and mycotoxins; Fungalcommunitiesofherbivoredung; The fungal communities ofcomposts; Fungalinteractionsandpracticalexploitation; Heavy metals in fungi-accumulation and sorption; Biotechnology of wood rotting fungi.

Practicals-32 Hrs

1) StudyofMyxomycetes and Chytridiomycetes

2) StudyofPlasmodiophoromycetes and Oomycetes

3)Studyof Zygomycetes

4)StudyofAscomycetes

5)StudyofBasidiomycetes

6)StudyofDeuteromycetes

7)Studyof Lichens

8) Study of VAM fungi

9) Detection of aflatoxin B1

10) Cultivation of Oyster mushroom.

11) Alcoholic fermentation of grape juice by *Saccharomyces*.

12) Cultivation of *Penicillium* and testing antibiotic principle.

13) Study of edible and poisonous mushrooms.

14) Study of fungal model organisms- *Saccharomyces cerevisiae*/*Neurospora crassa*

References:

1) Alexopoulos, C. J., Mims, C. W. and Blakwell, M. 2007. Introductory Mycology 4th edn. Wiley India, New Delhi.

2) Deacon, J. W. 1997. Modern Mycology 3rd edn. Blackwell Science publishers, London.

3) Mehrotra, R.S. and Aneja, K.R. 1990. An Introduction to Mycology, New Age International (P) Limited, New Delhi.

4) Mueller, G M; Bills, GF and Foster, M.S. 2004. Biodiversity of Fungi, Elsevier Academic Press, New York.

5) Rai, M. and Bridge, P.D. 2009. Applied Mycology, CABI International, UK.

6) Carlile, M.J. Watkinson,S.C. and Gooday, G.W. 2001.The Fungi, 2ndedn. Academic Press, USA.

7) Webster, J. and Weber, R.W.S. 2007. Introduction to Fungi. 3rd edn. Cambridge University Press, Cambridge.

BOTANY: I SEMESTER - SOFT CORE1.2

ALGAL BIOLOGY AND BIOTECHNOLOGY

Theory-32 Hrs

Unit-1:Algal Biology: Historical development of Phycology and contributions of Phycologists; Thallus organization in algae-Cyanophyceae, Chlorophyceae, Charophyceae, Euglenophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae and Rhodophyceae; General characteristics, algal classification, affinities and phylogeny- polyphasic approach; Molecular markers for phylogenetic study; Algal physiology- ultra-structureof cells; Photosynthesis and respiration.

Unit-2:Algal blooms and Toxins: Blooms produced by algal groups; Toxins produced by cyanobacteria, diatoms, dinoflagellates, prymnesiophytes and eugleoids; bioaccumulation and biomagnification; effects of toxins on aquatic life and humans; Scenario in coastal waters of India- monitoring and safety measures; Algal communities of extreme environments-Thermal hot springs, cold springs, snow and ice; **Fresh water algae-** Ecological classification of fresh water organisms; Lentic communities of algae (pond, lake, bog, swamp); Lotic communities (streams, rivers, rapids; **Marine algae-** Marine biota; zonation; quantitative study of phytoplanktons, marine communities of algae.

Unit-3:Algal Biotechnology: Algal culture techniques; general principles; physical parameters; culture media; strain improvement; **Algal cultivation methods-**conventional, advanced; **Cultivation of microalgae-*Spirulina*** and ***Dunaliella***; Media, seeding, cultivation systems, harvesting; processing, drying methods, packaging, marketing; Algal cultivation and production in India; **Cultivation of macroalgae-*Porphyra;*** Nutritional value; importance of life cycle; methods of cultivation in advanced countries; Pillar, semi raft floating and open sea cultivation.

Unit-4: Applications of algae/products: Pollution indicators, treatment of waste water plants, heavy metal toxicity and phyco-remediation; Bio-fouling and biofuel production; Algal products as sources of nutraceuticals; Food colorants; Aquaculture feed; Therapeutics and cosmetics; Medicines; Dietary fibres from algae and uses; Biotechnological applications of algal silica and oils.

Practicals-32 Hrs

1) Study of fresh water planktonic forms in the lake samples.
2) Study of fresh water diatoms.
3) Chlorophyceae: *Ulva, Caulerpa, Halimeda, Acetabularia.*
4) Xanthophyceae: Mounting of *Botrydium* from soils.
5) Phaeophyceae: *Dictyota, Sargassum, Cystophyllum.*
6) Rhodophyceae: *Gracilaria, Gelidium.*
7) Cyanophyceae: *Microcystis, Nostoc, Spirulina.*
8) Estimation of carotene content in algal cells .

9) Culturing of microalgae: *Spirulina/ Chlorella/Scenedesmus/Dunaliella.*

10) Applications of algal products: Agar, spirulina tablets/powder, beta-carotene, phycobiliproteins, triglycerides, Mycosporine like amino acids (MAA), diatom silica as nanoparticles.

11) Visit to National Institute of Oceanography, Goa.

12) Study of algal herbaria.

References

1) Bold, H. C. and Wynne, M.J. 1978. Introduction to the algae. Structure and reproduction. Prentice Hall, New York.

2) Chapman and Chapman, V.J. 1973. The Algae. Macmillan Co., New York.

3) Fritsch, F. E. 1935. Structure and reproduction of Algae Vol. I and II. Cambridge University Press, London.

4) Hoek, V., Mann, D. G. and Jahns, H. M. 1995. An introduction to Phycology, Cambridge University Press, UK.

5) Murthy, A.V.S.S. 2005. A text book of algae. I.K. International Pvt., Ltd., New Delhi.

6) Odum, E. P. Fundamentals of Ecology. 3rd edn. Toppan Co., Ltd., Japan.

7) Round , F. E. 1973. Biology of the algae. Edward Arnold Ltd., London.

8) Southcott, G. R. and Whittick, A. 1987. Introduction to Phycology. Blackwell Scientific Publication, UK.

9) Venkataraman, G.S.1974. Algae form and function. Today and Tomorrow's Pub., New Delhi.

10) Bux *et al.* (eds.). 2016. Algae Biotechnology: Products and Processes, Springer, ISBN 9783319123332 (P), 9783319123349 (Online).

11) Chu, W. 2012. Biotechnological Applications of Microalgae. IeJSME 6(1): S24-S37.

BOTANY: I SEMESTER - SOFT CORE1.3

LICHENOLOGY AND MYCORRHIZAL TECHNOLOGY

Theory-32 Hrs

Unit-1: Introduction: Photobionts- identification, reproduction, and taxonomy of photobionts; Occurrence within lichens; Mycobionts- Lichenized versus nonlichenized fungi; Bryophilous and folicolous lichens; Thallus morphology and anatomy; Growth forms - crustose lichens, foliose lichens, fruticose lichens; Vegetative structures- Homoiomerous thallus, stratified thallus, cortex, epicortex, and epinecral layer, photobiont layer and medulla, lower cortex, Attachment organs and appendages; Cyphellae and pseudocyphellae; Cephalodia (Photosymbiodemes); Reproductive structures- sexual reproduction in lichen-forming ascomycetes; Mating systems, dikaryon formation, Ascomal ontogeny, Ascosporogenesis; Ascus structure and function; Generative reproduction: ascoma, perithecia, apothecia, Thallinocarpia, Pycnoascocarpia, Hysterothecia, Asci, Basidioma; Vegetative reproduction- aposymbiotic propagules, symbiotic propagules; Systematics of lichenized fungi- History, classification and phylogeny.

Unit-2: Morphogenesis- Acquisition of a compatible photobiont; Recognition and specificity; Structural and functional aspects of the mycobiont–photobiont interface; Genotypes and phenotypes, growth patterns; Biochemistry and secondary metabolites- intracellular and extracellular products; The fungal origin of the secondary metabolites; Major categories of lichen products; Application to pharmacology and medicine; Harmful properties of lichen substances, lichens in perfume, lichens in dyeing; Stress physiology and the symbiosis- stress tolerance, limits to stress tolerance; harmful effects of stress, constitutive and inducible stress tolerance, evolution of stress tolerance in lichens; Modes of water uptake, light, temperature, carbon dioxide; The carbon economy of lichens.

Unit-3: Nitrogen, its metabolism and potential contribution to ecosystems, Methods of determination of nitrogen fixation; Nutrients- chemical and physical properties of nutrients and metals; Nutrient requirements, sources of nutrients, accumulation mechanisms, compartmentalization of elements within lichens; Metal toxicity, metal tolerance; Environmental role of lichens- dispersal, establishment, pedogenesis and biodeterioration; Community structure, succession, ecosystem dynamics; Animal and lichen interactions; Forest management, conservation, environmental monitoring; Lichen sensitivity to air pollution- lichens in relation to sulfur dioxide, oxidants and lichens, hydrogen fluoride and organopollutants.

Unit-IV: Mycorrhizal fungi: Introduction and classification; Types of mycorrhizas- Arbutoid mycorrhizas, ectomycorrhizas, vesicular arbuscular mycorrhizas or arbuscular mycorrhizas, ectendomycorrhizas, ericoid mycorrhizas, monotropoid mycorrhizas and orchid mycorrhizas; Phoshate solubilisation; Ecological significance of AM fungi;

Importance of mycorrhiza in evolution of land plants; Role of mycorrhiza in agriculture, horticulture and forestry.

Practicals-32 Hrs

1-3) Survey of lichen vegetation in the study area: Frequency, density and abundance.

4) Determination of species richness and species diversity.

5) Isolation and maintenance of cyanobionts and phycobionts

6) Isolation and maintenance of mycobionts

7) Analysis of secondary metabolites of lichens.

8) Biological activity of secondary metabolites of the lichens.

9) Culture methods for lichens and lichen symbionts.

10) Root clearing and staining technique to study arbuscular mycorrhizal fungi.

11) Assessment of % root colonization of arbuscular mycorrhizal fungi.

12) Isolation and identification of arbuscular mycorrhizal fungi.

References:

1) Thomas H. Nash ,2008. Lichen Biology, 3rd edn. Cambridge University Press, The Edinburgh Building, Cambridge CB2 8RU, UK
2) Awasthi D.D. 2000. Lichenology in Indian subcontinent: A supplement to "A hand book of lichens". Publisher: M/s Bishen Singh Mahendra Pal Singh, Dehra Dun.
3) Awasthi D.D. 2013). A hand book of lichens ,Publisher: M/s Bishen Singh Mahendra Pal Singh, Dehra Dun.
4) Sally E. Smith and David J. Read (2008). Mycorrhizal Symbiosis. 3rd edn.Academic Press, New York.
5) Larry Peterson R., Hugues B. Massicotte, Lewis H. Melville, 2004. Mycorrhizas: Anatomy and Cell Biology, CAB International, UK.

BOTANY: I-SEMESTER - SOFT CORE 1.4

PHYTOPATHOLOGY

Theory-32 Hrs

Unit-1: Concept of plant disease, Economic aspects of plant diseases; Types of plant diseases-Infectious diseases and non-infectious diseases; Causative agents of plant diseases; Angiospermic parasites; Development of plant pathology; Plant pathology in practice- Plant Clinic and Plant Doctor Concept; Parasitism and pathogenicity; Disease triangle; Infections and colonization;Weapons of plant pathogens; Effect of pathogen on physiology of host plant (photosynthesis, translocation and transpiration, respiration, permeability, transcription and translation).

Unit-2:Defence mechanisms in Plants- Pre-existing structural and chemical defences, induced structural and biochemical defences; Plant disease epidemiology- Elements of an epidemic and development of epidemics; Plant Disease forecasting; Genes and Diseases, Gene for gene concept, non-host resistance; Types of plant resistance to pathogens (Horizontal and Vertical Resistance); 'R' Genes and 'avr' genes; Genetics of virulence in pathogens and resistance in host plants; Breeding for disease resistance.

Unit-3:Management of Plant Diseases: Exclusion, eradication, cross protection, direct protection, integrated disease management, chemical methods of plant disease control; Biotechnological approaches to plant disease management; Gene silencing and disease control; Mechanism of gene silencing and control of viral diseases; Engineered resistance to viral, bacterial, fungal and insect diseases of crop plants.

Unit-4:Study of diseases of crop plants: Potato Spindle Tuber Disease, Tobacco Mosaic Disease, Sandal Spike Disease, Bacterial blight of Paddy, Citrus Canker, Late Blight of Potato, Downy Mildew of Maize, Blight of Paddy, Angular leaf spot of Cotton, Tikka disease of ground nut, Rust of coffee, Grain and Head smut of Sorghum. Leaf blight of Paddy, Blast of Paddy, Powdery mildew of cucurbits, Wilt of Tomato, Phloem Necrosis of Coffee, Root Knot of Disease of Mulberry and Vegetables; Non-parasitic diseases of plants; Seed-borne diseases.

Practicals-32 Hrs

1) Isolation of bacterial, fungal, and nematode plant pathogens of crop plants.

2) Study of mineral deficiency diseases of Tomato and French bean.

3) Estimation of foliar infection by Stover's method.

4) Study of spore germination.

5) Estimation of total phenols in diseased and healthy plant tissues.

6) Mycoflora analysis by Standard Blotter Method SBM/agar plating method.

7)-9) Study of Tobacco mosaic, Bacterial blight; Downy mildew of Maize; Powdery mildew of cucurbits; Grain smut of sorghum; Leaf rust of Coffee; Root Knot of Mulberry. Bunchy top of banana, Grassy shoot of sugar cane, Little leaf of Brinjal; Potao Spindle Tuber Disease (PSTVd)

10) Study of effect of pathogens on seed germination and vigour index.

11) Study of effect of fungicide on seed-borne pathogens.

12) Study of Fungal bio-control agents.

References:

1) Agrios, G. N. 2005. Plant Pathology 5th edn. Academic Press, San Diego.

2) Dickinson, M. 2003. Molecular Plant Pathology, Garland Publishing Inc, CT.

3) Ingram,D.S. and Robertson, N.F. 1999. Plant Diseases, Collins Publishers, London.

4) Johnston, A and Both, C. 1983. Plant Pathologists Pocket-book. 2nd edn. Commonwealth Mycological Institute, Oxford and IBH Pub. Co. Calcutta.

5) Lane, C.R., Beales P.A. and Hughes, K.J.D. 2012. Fungal Plant Pathogens, CABI Publishing, Wallingford.

6) Mehrotra, R. S., 2003. Plant Pathology, 2nd edn. Tata Mc. Graw Hill Pub. Co. Ltd., NewDelhi.

7) Rangaswamy, G. and Mahadevan, A. 2002. Diseases of crop plants in India, Prentice Hall of India Pvt.Ltd. New Delhi.

8) Schumann, G. L. and D'Arcy, C. J. 2012. Hungry Planet: Stories of Plant Diseases, APS Press, USA.

9) Singh, R. S., 2009. Plant Diseases. 9th edn. Oxford and IBH Pub.Co. New Delhi.

10) Vidhyasekaran, P. 2004. Encylopedia of Plant Pathology.Viva Books Pvt. Ltd. New Delhi.

BOTANY: II- SEMESTER- HARDCORE 2.1

REPRODUCTIVE BIOLOGY OF ANGIOSPERMS AND PLANT MORPHOGENESIS

Theory-32 Hrs

Unit-1: Reproductive Biology of Angiosperms: Historical overview; Contributions of P.Maheshwari; BM Johri; BGL Swamy to the development of embryology in India; Microsporogenesis and Microgametogenesis- wall layers and functions; Tapetum- types, concept of male germ unit and its significance; Pollen morphological features; Unusual features-pollen development in Cyperaceae, pollen embryosac; Concept and scope of palynology.

Unit-2: Megasporogenesis and Megagametogenesis; Ovular structure and types; Development of monosporic, bisporic, tetrasporic and special types of embryo sacs; Ultra structureand nutrition of female gametophyte, concept of female germ unit and its significance; Fertilization- a general account, double fertilization, single fertilization, heterofertilization and polyspermy; Pollen recognition and rejection reactions- types, structures, methods to overcome incompatibility reactions; Endosperm- types, haustorial variations, ruminate and composite endosperm; Embryo- structure, development of monocot, dicot and grass embryo; Significance of embryonal suspensor; Experimental Embryology- scope and applications.

Unit-3: Plant Morphogenesis: Models of morphogenesis- comparison of plant v/s animal morphogenetic pathways: Embryo, *Arabidopsisthaliana*; Concepts- cell fate/ fate maps, gradients, stem cells in plants and their significance in development, polarity, symmetry, totipotency of cell types, pleuripotency, plasticity, differentiation, redifferentiation, dedifferentiation and regeneration in *Acetabularia* and *Arabidopsis thaliana.*

Unit-4: Plant Growth and Development: Types, shoot apical meristems, root meristems; control of cell division in meristems; Quiescent center and meresteme de attente; *Arabidopsis*- vascular patterning and leaf development, abnormal growth; Cellular basis of growth- maintenance of cell shape; Cytoskeletal elements; Photomorphogenesis- definition, history, Hartmann's technique; Photoreceptors and photo morphogenesis, localization and properties; Effect of blue light-mediated photomorphogenesis with suitable examples.

Practicals-32 Hrs

Reproductive Biology of Angiosperms:

1) Study of microsporangium- slides: wall layers, tapetal types, two-celled and three-celled pollen; pollen tetrads.

2) Study of pollen germination: *Balsam, Delonix, Hibiscus* and *Peltaphorum*

3) Study of megasporangium-slides: female gametophyte development in *Penstemon, Xyris pauciflora,* 2, 4, 8-nucleate stages, mature embryo sac.

4) Endosperm mounting-*Cucumis sativus, Grevellia robusta* and*Croton sparsiflorus*

5) Embryo: Slides-monocot, dicot and grass embryo.

6) Embryo mounting :*Crotalaria.*

Plant Morphogenesis:

7) Study of stem cells in plants: SAM, RM.

8) Regeneration abilities of shoot apical meristems of dicots on media with combinations of growth regulators.

9) Study of totipotency in cell types: stomata, epidermal cells, stem and leaf explants on a tissue culture media.

10) Polarity in stem cuttings: *Pothos* spp.

11) Study of regeneration in succulents *Kalanchoe, Byrophyllum.*

12)Study of leaf galls of plants: *Pongamia pinnata and Achyranthes aspera*: Morphological observations and histology.

13) Study of *Arabidopsisthaliana* as a model plant.

References:

1) Johri, B. M. 1984. The embryology of Angiosperms. Springer Verlag.

2) Johri, B. M. 1982. The experimental embryology of vascular plants. Springer Verlag, New York.

3) Swamy, B.G.L. & Krishnamurthy, K. V. 1982. From flower to fruit: The embryology of angiosperms. Tata McGraw Hill Co. New Delhi.

4) Eames, 1961. Morphology of Angiosperms. McGraw Hill book Co., Inc., New York.

5) Maheshwari, P. 1950. An introduction to the embryology of Angiosperms. McGraw Hill book Co., Inc., New York.

6) Maheshwari, P. 1963. Recent advances in the embryology of angiosperms. ed. New Delhi

7) Bhojwani, S. S.and Bhatnagar, S. P. 1978. The embryology of Angiosperms. Vikas Publishing House, New Delhi.

8) Turing, A. M. 1952. The chemical basis of morphogenesis. Phil. Trans. R. Soc. Lond. B. 237: 37- 72.

9) Sinnot, E. W. 1960. Plant Morphogenesis. Mc Graw- Hill Book Co. Inc. New York, USA.

10) Steeves, T.A. and Sussex, I. M. 1989. Patterns in Plant development. 2nd edn. Cambridge University Press. UK.

Chasan, R. 1994. Tracing tracheary element development. The Plant Cell 6:917-919.

11) Lyndon, R. F. 1990. Plant Development : The Cellular basis. Unwin Hyman, London.

12) Aloni, R. 1987. Differentiation of vascular tissues. Annu. Rev. Plant Physiol. 38:179-219.

13) Raman, A. 2007. Insect induced plant galls of India; unresolved questions. Curr. Sci. 92 (6): 748-757.

14) Smith, H. 1975. Phytochrome and Photomorphogenesis- an introduction to the photocontrol of plant development. Mc Graw- Hill Book Co. (UK), Ltd.

15) Mohr, H. 1972. Lectures in photomorphogenesis. Springler- Vohrleg, Berlin, Germany.

BOTANY: II- SEMESTER - HARD CORE 2.2

CELL BIOLOGY AND GENETICS

Theory-32 Hrs

Unit-1:Bio Moleculesand Membranes: Structure, composition of bio-molecules and their stabilizing interactions (carbohydrates, lipids, proteins and nucleic acids);Unit membrane structure and functions; Membrane proteins, membrane transport and the electrical properties;Intra-cellular compartments and protein sorting; Intracellular membrane traffic; Cytoskeletons.

Unit-2: Functions of Organelles: Cell wall, membranes, nucleus, mitochondria, Golgi bodies, lysosomes, spherosomes, peroxisomes, ribosomes, endoplasmic reticulum, Plastids, chloroplast, vacuoles and cytoskeleton; Cell cycle and mechanism of cell cycle regulations; A brief account of cell signalling, receptors, second messengers; General mechanism of signal transductionpathway; Programmed cell death in life cycles of plants.

Unit-3:ExtensionsofMendelian Principlesco-dominance, incomplete dominance, gene interactions, multiple alleles,lethal alleles, pleiotropy, penetrance and expressivity, polygenic inheritance, linkage and crossing over, sex linked inheritance, sex limited and influenced traits, genome imprinting, extra nuclear inheritance; C**oncept of the gene**-classical-alleles, multiple alleles, pseudo-alleles, complementation test, experiments on rII locus and lozenge locus, modern- jumping genes, overlapping and genes within genes, split genes, nested genes, fusion genes; **Gene mapping methods-** linkage maps, tetrad analysis; Recombination in bacteria mapping genes in bacteria by interrupted mating technique, fine structure mapping, transduction and transformation mapping, mapping genes in Bacteriophages**,**

Unit-4: Sex Determination and Dosage Compensation: Chromosomal and genetic basis of sex determination; Mechanism of sex determination in *Melandrium*, *C. elegans*, Drosophila and humans, dosage compensation mechanisms in humans, Drosophila and *C. elegans*. **Transposable elements**- discovery in maize and bacteria, transposal elements in bacteria and bacteriophage, types and functions; Transposable elements in eukaryotes-Plants, *Drosophila* and Humans, mechanisms of transpositions;Transposable elements in research.

Practicals-32 Hrs

1) Determination of reducing sugars by Nelson-Somogyim's method.
2) Estimation of total soluble sugars by volumetric method.
3) Quantitative determination of free Amino acid content in germinating seeds.
4) Estimation of ascorbic acid in plant tissues.
5) Estimation of Phospholipids by TLC.
6) Slides/Charts/photos NP (Cytology Genetics and Embryology).

7) Study of mitosis in normal and induced root tips cells of Onion.
8) Study of meiosis in onion flower buds , translocation in Rhoeo.
9) Study of special chromosomes- B chromosomes, and sex chromosomes.
10) Determination of chiasma frequency in onion.
11) -12)To solve genetic problems on linkage, ordered and unordered tetrads.

References:

1) Atherly, A.G. Girton, J.R. Donald, J.R. 1999. The Science of Genetics. Saunders College Publishers. Fortworth .
2) Griffith, A.J.F. Gelbart, W.M. Muller, J.H. and Lewintin, R.C. 1999. Modern Genetic Analysis. W.H. Freeman and Co. New York.
3) Hartl. D. 1991. Basic Genetics. 2edn., Jones and Barlett Publishers Inc. Boston.
4) Fairbanks, D.J. and Anderson, W.R. 1999. Genetics the continuity of Life. Brooks's/Cole publishing Company, California.
5) Brooker. R.J. 1999. Genetics –analysis and principles. Addison Wesley Longman Inc.California.
6) Snustad, D.P., Simmons, M.J. and Jenkins, J.R. 1997. Principles of Genetics. Hohn Wiley &son's inc. New York.
7) Brown, T.A. 1989. Genetics a molecular approach. Van Nostrand Reinhold (intn) Co., Ltd. London.
8) Winchester, A.M. 1969. Genetics. 3rd edn. Oxford and IBH, New Delhi.
9) Strickberger, Monroe W. 2000. Evolution. 3rd Edn. Jones & Bartlett Publishers, Inc. 40 TallPineDrive Sudbury, MA 01776, USA.
10) Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Rafi, Keith Roberts, and Peter Walter. 2008. Molecular biology of the cell, 5th ed., Garland science, Taylor & Francis Group, LLC, 270 Madison Avenue, NewYork NY f 0016, USA.
11) Alberts, B., Bray, D., Lewis, J , Raff, M., Roberts, K and Watson, J.D. 1999 . Molecular biology of the cell. Garland Publishing, Inc.,New York.
12) Kleinsmith, L.J. and Kish, V.M. 1995 .Principles of Cell and Molecular Biology 2nd edn.Harper Collins College Publishers, New York, USA.
13) Lodish, H. Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell,J. 2000. Molecular Cell Biology, 4th edn.W.H. Freeman and Co. New York, USA.
14) Buchanan, B.B. W.Gruissem and Jones, R.L. (2000).Biochemistry and Molecular Biology of Plants. ed. ASPP Press.USA.

BOTANY: II SEMESTER HARD CORE 2.3

PLANT BREEDING AND EVOLUTIONARY BIOLOGY

Theory-32 Hrs

Unit-1: Introduction: Objective and role of plant breeding; Evolution of plant breeding, scope of plant breeding, sciences related to plant breeding, Vavilov's concept of origin of centers of origin of crop plants; Recent trends in plant breeding; **Breeding Methods-**plant introduction and acclimatization, domestication and agriculture, pure line, clonal, mass and progeny selections, recurrent selection, pedigree, bulk and back cross methods; Heterosis breeding synthetic and composite varieties; **Breeding Techniques-**Mutation breeding, polyploidy, hybridization, tissue culture techniques in crop improvement, protoplast fusion, electrophoration, electro-fusion, biolistics, somatic hybridization, transgenic plants (GMO's); The role of Gene technology in plant breeding.

Unit-2: Breeding for Specific Purposes: Breeding for disease resistance, insect resistance, drought and salinity, quality trait, multiple cropping systems, ideotype breeding, breeding for Adaptation; **Crop breeding and seed production-** Breeding field crops, seed production techniques, release of new varieties, intellectual property rights, computer application in plant breeding, crop breeding Institutes/Centers; Genetic resources and germplasm conservation;Scientific Plant breeding;Green revolution; The elite crop (Golden rice); Contributions of **Dr.** M.S. Swaminathan, Dr. Norman E. Borlaug and N.I. Vavilov.

Unit-3: Nature of Evolution : The origin, theories of evolution of life, earth and the universe,; Conditions of the early earth, emergence of the first living cell, origin of prokaryotic and eukaryotic cells, life in the Palaeozoic, Mesozoic and Coenozoic era. **Development of Evolutionary thoughts;** Ecological context, before Darwin, Darwinism, Darwin's evolutionary theory, Neo – Darwinism, modern synthesis: **Fossil evidence of Ancient life,** fossilization,; Interpreting geological time scale and fossil records; Evidences from comparative, morphology, patterns of development, comparative physiology and biochemistry, biogeography, palaeontology, taxonomy, anatomy and embryology, plant and animal breeding; Evidence from changing earth and sea; Extinctions; Evolutionary ecology.

Unit-4: Natural Selection : Types of natural selection, selective forces, selection models, sexual selection, selection and non adaptive characters, Adaptive radiation, artificial selection, **Variation- g**ene flow, genetic drift, gene mutation - Mendelian concept, chromosomal mutation, architectural changes in chromosomes; The Hardy – Weinberg law, polyploidy in plant evolution**;** Speciation and origin of higher categories-Types of speciation, models of speciation, pattern of speciation, isolating mechanism and species formation, signification of speciation; Molecular evolution.

Practicals-32 Hrs

(1) Study of floral biology of crops - typical examples of self and cross pollinated plants.

(2) Selfing and hybridization techniques - Bagging and emasculation.

(3) Pollen viability: germination test and TTC test.

(4) Studying of centre's of origin of cultivated crops - N.I. Vavilov Concept.

(5) Mode of pollination study in different crops.

(6) Identification of crop breeding institutes/ centers and logos.

(7) Studying and identification of contributors of plant breeding - M.S. Swaminathan, N.I. Vavilov, Norman . E. Borlaug .

(8) Study of contributions of scientists to evolutionary biology.

(9)-12) Study of models and photographs related to evolution.

References

1) Atherly, A.G. Girton, J.R. Donald, J.R. 1999. The Science of Genetics. Saunders College 2) Publishers. Fortworth.

3) Griffith, A.J.F., Gelbart, W.M. Muller, J.H. and Lewintin, R.C. 1999. Modern Genetic analysis. W.H. Freeman and co. New York.

4) Hartl. D. 1991. Basic Genetics. II edn. Jones and Barlett Publishers Inc. Boston.

5) Fairbanks, D.J. and W.R. Anderson. 1999. Genetics the continuity of life. Brooks's/Cole publishing company. California.

6) Brooker, R.J. 1999. Genetics –analysis and principles. Addison Wesley Longman Inc. California.

7) Snustad, D.P., Simmons, M.J. and Jenkins, J.R. 1997. Principles of Genetics. Hohn Wiley & son's inc. New York.

8) Brown, T.A.1989. Genetics a molecular approach. Van Nostrand Reinhold (intn) Co., Ltd. London.

10) Winchester, A.M. 1969. Genetics. III edn. Oxford and IBH, New Delhi.

11) Strickberger, Monroe W. 2000. Evolution. 3rd Ed., Jones & Bartlett Publishers, Inc. 40 Tall PineDrive Sudbury, MA 01776, United States of America

12) Futuyma, Douglas J. 2005. Evolution. Sinauer Associates, Inc., 23 Plumtree Road, Sunderland, MA 01375, United States of America

13) Dodson E. O. and Dodson P. 1976. Evolution: Process and Product. 2nd Ed., D. Van Nostrand Company, 450 West 33rd Street, New York, N.Y. 10001

14) Chopra, V.L. 2000. Plant Breeding- theory and practices. Oxford and IBH Publishing Co. Pvt. Ltd., Oxford.

15) Chahal, G.S. and Gosal, S.S. 2002. Principles and procedures of Plant Breeding. Narosa Publishing House, New Delhi.

BOTANY: II- SEMESTER - SOFT CORE 2.1

PLANT ANATOMY AND HISTO-CHEMISTRY

Theory-32 Hrs

Unit-1: Plant Anatomy: Primary vegetative body of the plant; Anatomical features of leaf, stem and root (dicot and monocot); leaf of fern and gymnosperm; Structure of modified leaves- Kranz anatomy and C4 photosynthesis; Ultra-structureand chemistry of the cell wall; formation of the cell wall and its uses.

Unit-2: Anatomy of Vascular Tissue: Ultra structure and differentiation of xylem and phloem tissues; Apical meristems- shoot apex in Pteridophytes, Gymnosperms and Angiosperms, theories, root apical meristems.

Unit -3: Secondary Growth: Vascular cambium, secondary xylem of gymnosperms and dicots and secondary phloem of Gymnosperms and dicots; Periderm and bark; Anomalous secondary growth in monocots and climbers; Leaf ontogeny- Dicot- simple, compound, Monocot; Floral anatomy-flower parts, floral meristem, vascular system.

Unit-4: Plant Histochemistry: Tests for minerals, carbohydrates, lignins, polyphenols, proteins, lipids and nucleic acids; Study of instruments: (a) Camera lucida (b) Micrometry (c) Microtome. Principles of histo-chemical stains; Killing, fixing and staining of plant tissues; Double staining- TBA method.

Practicals-32 Hrs

1) Staining of xylem and phloem elements.

2) Study of anatomy of roots in: *Ficus, Musa, Dieffenbachia, Vanda.*

3) Study of anamalous secondary growth in the following examples: Stem of *Aristolochia, Nyctanthes, Pyrostegia, Peperomia, Tinospora, Achyranthes*.

4) Study of Ecological anatomy.

5) Study of Vasculature in floral organs.

6) Studying double staining technique.

7-11) Embedding: TBA method, embedding for electron microscope, Sectioning**,** Microtomes, whole mounts maceration.

12) Histochemical- PAS Test**,** Sudan black- lipids**,** Feulgen reaction – Nucleic acids.

References:

1) Abraham, F. 1982. Plant Anatomy. 3rd edn. Pergaon Press. Oxford.

2) Cariquist, S. 1967. Comparative Plant Anatomy- Holt Reinert and Winston, New York.

3) Cutter, D. G. 1971. Plant Anatomy- Part 1, Cell and Tissues Edward Arnold London.

4) Cutter, D. G, 1971. Plant Anatomy- Part 1, Cell and Tissues Edward Arnold London. Part- II.

5) Eames and McDaniel, 1947. Plant Anatomy. 2nd edn., McGraw Hill, New York.

6) Esau, K. 1965, Plant Anatomy, Joh Wiley and Sons, New York.

7) James, D. Mauseth, 1998. Plant anatomy The Benzamin/ Cummins Publishing Co.Inc.

8) Esau, K. 1979, Anatomy of seed plants- first Wiley eastern reprint. New Delhi.

9) Krishnamurthy, K. V. 1988. Methods in Plant Histochemistry. S. Viswanathan (Printers and Publishers) Pvt. Ltd. Madras.

BOTANY: II- SEMESTER - SOFT CORE 2.2

ETHNO-BOTANY AND INTELLECTUAL PROPERTY RIGHTS (IPR)

Theory-32 Hrs

Unit-1: Ethno-botany: Introduction, concept, scope and objectives; Ethno-botany as an interdisciplinary science; The relevance of ethno-botany in the present context; Ethnic groups; Ethno-botany- Major and minor ethnic groups of India and their life styles; Forest Vs. ethnic groups; Plants in tribal life with reference to Magico-religious rituals and social customs; Sacred groves.

Unit-2: Methodology used in the studyofEthnobotany and Ethnopharmacology: Field work,Herbarium, Ancient Literature, Archaeological findings, temples and sacred places, protocols. Preliminary phyto-chemical analysis of ethno-botanical important medicinal plants.

Unit-3: Role of ethno-botany in modern Medicine with special examples; Medico-ethno-botanical Sources in India with special reference to Karnataka; Tribals Vs. Agriculture: Shifting, Podu and Jhum cultivation; Role of ethnic groups on surrounding environment; Crop genetic sources; Endangered taxa and forest management (participatory forest management); Ethno-botany as a tool to protect interests of ethnic groups; Sharing of wealth concept with few examples from India.

Unit-4: Study of Intellectual Property Rights – patents, trademark, geographical indication, copyright; IPR and Traditional Knowledge; Bio-piracy of traditional knowledge; Ethno botany and legal aspects; National and international organizations and treaty related to traditional knowledge – WIPO, TKDL, TRIPS, CBD, Nagoya protocol etc., Ethno botany as a source (recent) of already known drugs: a) *Withania* as an antioxidant and relaxant b) *Sarpagandha* in brain ailments c) *Becopa* and *Centella* in epilepsy and memory development in children d) *Phyllanthus fraternus* in diabetic and viral jaundice e) *Artemisia* as a powerful cerebral antimalarial agent and its possible use in tuberculosis.

Practicals-32 Hrs

1) Survey and collection important ethnobotanical plants by using questionnaire and interview.
2) Preliminary phyto- chemical analysis of medicinal plants.
3) Study of biological functional properties of crude drugs – Anti microbial activity.
4) Study of methods of *in-situ* or *ex-situ* conservation of important medicinal plants.
5) Study of techniques used in Pharmacognosy – organoleptic, anatomy and chemical methods.
6) A visit to a Tribal area to conduct field work and collect ethnobotanical information / data.

7) Listing of Crude drugs in Pansali shops (local crude drugs shops) and their identification (little known drugs only).

8) -12) Visit to nearby Western Ghats and Sacred Groves.

References:

1) Jain, S.K. 1995. Manual of Ethno-botany, Scientific Publishers, Jodhpur.

2) Jain, S.K. 1981. Glimpses of Indian. Ethno-botany, Oxford and I B H, New Delhi

3) S.K. Jain 1989. Methods and approaches in ethno-botany. (ed.) Society of ethnobotanists, Lucknow, India.

4) Jain, S.K. 1990. Contributions of Indian ethno-botany. Scientific Publishers, Jodhpur.

5) Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons –

6) Rama Ro, N and A.N. Henry (1996). The Ethno-botany of Eastern Ghats in Andhra Pradesh, India. Botanical Survey of India. Howrah.

7) Rajiv K. Sinha – Ethno-botany The Renaissance of Traditional Herbal Medicine – INA – SHREE Publishers, Jaipur-1996

8) Faulks, P.J. 1958. An introduction to Ethno-botany, Moredale pub. Ltd. London

BOTANY: II- SEMESTER - SOFT CORE 2.3

ECONOMIC BOTANY

Theory -32 Hrs

Unit- 1:Economic Botany: The origin of cultivated plants and Agriculture; The future role of plants in relation to mankind; Introduction to Green revolution; Study of origin, distribution, cultivation and utility of the useful parts of the following- - rice, wheat, maize, barley, sorghum and millets; Red gram, green gram, black gram, horse gram, pea, cow pea, bengal gram; Oil Yielding plants- sunflower, safflower, groundnut, linseed, rape seed; A brief account of economically important horticultural and floricultural plants.

Unit- 2: Economic Botany: Study and utility of the useful parts of the following- Sugar yielding plants- sugar cane and sweet potato, sugar beet and *Stevia*; Spices and condiments - ginger, turmeric, cardamom, cinnamon, clove, saffron, all spice, black pepper, nutmeg, red pepper, coriander, cumin, fennel and *Vanilla.*

Unit -3:Economic Botany Study and utility of the useful parts of the following- fibre-cotton, jute, flax, hemp, Sunn hemp, China grass, coconut and Kapok; Timber yielding plants- *Tectona* and *Dalbergia*; Dyes- indigo, henna; Masticatories and fumitories-areca nut, betel leaf, tobacco; rubber- Para rubber and other substitutes; Gums- Gum Arabic, Karaya gum.

Unit-4:Medicinal Botany: Scope and importance of medicinal plants; Indigenous medicinal Sciences; Important medicinal plants and their uses; Major exporters and importers of traditional medicinal plants and plant products; Application of natural products to certain diseases- jaundice, cardiac, infertility, diabetics, blood pressure and skin diseases; Poisonous plants.

Practicals-32 Hrs

1) Utility, uses and economic importance of cereals and millets.
2) Utility, uses and economic importance of horticultural and floricultural plants
3) Utility, uses and economic importance of pulses and oil yielding crops.
4) Utility, uses and economic importance of sugar yielding crops.
5) Utility, uses and economic importance of spice and condiments.
6) Utility, uses and economic importance of fiber and timber yielding plants.
7) Utility, uses and economic importance of dye, rubber and gum yielding plants
8) Utility, uses and economic importance of masticatories and fumitories
9) -12) Study of medicinal and poisonous plants.

References:

1) Hill, A.F. 1952. Economic Botany, TataMcGraw Hill, New Delhi.
2) Kochhar, S.L. 1998. Economic Botany of Tropics, Macmillan India Publishers, New Delhi.
4) Pandey, B.P. 2000. Economic Botany. S. Chand & Company, New Delhi.
5) Pandey, S.N. and Chandha, A. 1999. Economic Botany. Vikas Publishing House Pvt. Ltd.New Delhi.

BOTANY: II SEMESTER- OPEN ELECTIVE 2.1

MEDICINAL PLANTS

Theory-32 Hrs

Unit-1: Medicinal Plants: History, scope and importance of medicinal plants; Indigenous medicinal sciences; History, origin, panchamahabhutas, saptadhatu and tridosha concept, Rasayana, plants used in ayurvedic treatments, Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations.

Unit-2: Medicinal Plants Conservation: Conservation of endangered and endemic medicinal plants; Endemic and endangered medicinal plants; Red list criteria; *In-situ* conservation-biosphere reserves, sacred groves, national parks; *Ex situ* conservation-botanic gardens, ethno medicinal plant gardens; Propagation of medicinal plants - objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding.

Unit - 3: Funding for Cultivation of Medicinal Plants: Sources of financial aids for medicinal plant cultivation: Aims and objectives, Functions and activities of the board, Schemes and Projects for Financial assistance, Funding of projects; Procedure for processing project proposal for approval, Implementation and monitoring.

Unit- 4: Ethno botany and Folk medicines: Definition; Ethno botany in India: Methods to study ethno botany; Applications of Ethno botany: National interacts. Ethno medicine. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases. Brief introduction to poisonous plants.

References:

1) Trivedi, P. C. 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
2) Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn.
3) Agrobios, India.
4) Yoganarasimhan, S.N. Medicinal Plants of India- Vol 1- Karnataka, Interline Publishing Pvt. Ltd.

BOTANY: III- SEMESTER - HARD CORE 3.1

BIOCHEMISTRY AND PLANT PHYSIOLOGY

Theory -32 Hrs

Unit-1: Biochemistry-Brief account of plant structural and functional molecules-carbohydrates, proteins, lipids and nucleic acids**;** classification, structural and functional properties of biomolecules; Biochemistry of cell membranes; **Lipids-**building and storage molecules, classification and significance; **Proteins-** classification, structure-primary,secondary,tertiaryandquaternary structure;propertiesofproteins; **Enzymes-** Nomenclature, nature and properties of enzymes, active sites, co-enzymes, kinetics of enzyme action, catalysis, specificity and inhibition, allosteric enzymes, ribozyme and abzyme.

Unit-2:Solute transport: Transport of solutes across the membranes Transmembrane proteins, Transport of ions, solutes and macro-molecules, Mechanism of translocations in phloem; Role played in signal transduction pathway stomatal physiology; **Phytosynthesis in higher plants** (i) Photophosphorylation - Calvin cycle; **Photorespiration** - C4 – Pathway, CAM in plants; Oxidative Phosphorylations; Glycolysis -TCA – Cycle and terminal oxidation.

Unit-3:Plant Hormones-plant hormones-discovery, biosynthesis, metabolism, transport and physiological effects of plant hormones and their applications; **Nitrogen metabolism** - (i) Molecular mechanism of N2 fixation (ii) Biosynthesis of amino acids (iii) Assimilation of nitrate and ammonium; **Lipid metabolism-** fats and oils biosynthesis and oxidation of lipids; Physiology of seed germination and flowering.

Unit -4: Stress Physiology: Water deficit and its physiological consequences; Drought tolerancemechanisms, Salinity stress and plant responses. Heat stress and heat shock proteins; Metal toxicity in plants. Biotic stress, HR and SAR mechanisms; **Mineral nutrition**- in plants and deficiency diseases; **Plant development-** physiology of flowering; **Phytochrome**-photochemical and biochemical properties of phytochrome; Concept of photoperiodism and vernalization and its influence on flowering;

Practicals-32 Hrs

1) Estimation of protein by Lowry's method
2) Determination of water potential of tissue by plasmolytic method
3) Determination of water potential by Gravimetric method
4) Quantitative estimation of chlorophyll a, chlorophyll b and total chlorophyll in plant tissue
5) Determination of diurnal fluctuation of acid content of CAM plants (TAN)
6) Determination of temperature quotient (Q10) of water uptake
7) Separation of chlorophyll pigments/Anthocyanin by TLC

8) Protein analysis by SDS PAGE method.

9) Estimation of Alpha-amylase activity in germinating seedling.

10) Silver staining of proteins.

11-12) Visit to Molecular Biology Laboratories.

References:

1) Barkla, B.J., and Pantajo, O. 1996. Physiology of ion transport across the tonoplast of higher plants. Ann. Rev. Plant Physiol. 47: 159-184.

2) Clayton, R.K. 1980. Photosynthesis: Physical mechanisms and chemical patterns. Cambridge Uni. Press, Cambridge.

3) Cohn, E.E., and Stumf, P.K. 1992. Outlines of Biochemistry. Wiley Eastern Pvt. Ltd.

4) Kozaki, A., and Takeba, G. 1996. Photorespiration protects C3 plants from photooxidation.Nature 384: 557- 560.

5) Taiz, L., and Zeiger, E. 1998. Plant Physiology. Sinaur Associates Inc. Publishers, Sunderland Massachusetts.

6) Mukherji, S., and GHosh, A.K. 1996. Plant Physiology. New Central Book Agency Pvt. Ltd. Kolkatta, India.

7) Rabinowithc, E., and Jee, G. 1969. Photosynthesis. Willey Press, New York.

8) Rudier, W., and Thummlar, K. 1994. The Phytochrome, Chromophore I. Photomorphogenesis in Plants, II Edition, Netherlands, 51-69.

9) Spanswick, R.M. 1981. Electrogenic ion pumps. Ann. Rev. Plant Physiol. 32: 267-289.

10) Mc Elroy, W.D. 1995. Cell Physiology and Biochemistry. Prantice Hall of India.

11) Walsh, C.T. 1979. Enzymatic reaction mechanisms. Editors: W.H. Freeman, New York.

12) Webb, E. 1984. Enzyme nomenclature. Academic Press, Orlando Fla.

13) Zimmermann, M.H., and Milburn, J.A. Transport in Plants. 1. Phloem transport (Encyclopedia of Plant Physiology. New Series Vol. 1), Springer, New York.

14) Devline and Witham, 1986. Plant Physiology. CBS Publs. and Distributors, New Delhi.

15) Hopkins, W.G. 1995. Introduction to Plant Physiology, John Wiley & Sons. Inc., NewYork, USA.

16) Moore, T.C. 1989. Biochemistry and Physiology of Plant Hormones. Springer Verlag, New York, USA.

17) Singhal *et al*. 1999. Concepts in Photobiology, Photosynthesis and Phytomorphognesis, Narosa Pub. House, New Delhi.

BOTANY: III- SEMESTER - HARD CORE 3.2

MOLECULAR BIOLOGY

Theory-32 Hrs

Unit-1: Organization of chromosomes and genes in prokaryotes and eukaryotes- Operon, interrupted genes, gene families, unique and repetitive DNA, heterochromatin, euchromatin, transposons, mitochondrial and chloroplast genome organization, Transposable elements in prokaryotes and eukaryotes, genetic and evolutionary significance, **DNA replication**- patterns, Messelson and Stahl's and Taylor's experiment, enzymes of replication, mechanism of DNA replication in prokaryotes and Eukaryotes, proof reading and error correction mechanisms.

Unit-2: Molecular mechanism of mutation, repair and recombination:- Mutation- DNA damage by spontaneous mutations, physical and chemical mutagens and their molecular mechanisms, **Repair mechanisms**- direct reversal of damage, base and excision repair, recombinational repair, SOS repair, translation repair synthesis, transcription coupled repair, **Recombination**- homologous recombination, models of recombination, mechanisms, protein machinery of homologous recombination, genetic consequence of homologous recombination, gene conversion, site specific recombination, mechanism and biological significance, non homologous recombination- transposition, molecular mechanisms of transposition- conservative, replicative and retro-transposition.

Unit-3: RNA synthesis, processing and translation: transcription activators and repressors, promoters, RNA polymerases and transcription factors, mechanism of transcription in prokaryotes and eukaryotes, **RNA processing**- capping, polyadenylation, splicing, alternative splicing, RNA editing, exon shuffling and RNA transport, **Translation and processing**- ribosomes, tRNA aminoacylation, aminoacyl tRNA synthetase, genetic code, wobble hypothesis, deciphering of the code, translation mechanism , translation proof reading, translation inhibitors and post translational modifications.

Unit-4: Regulation of gene expression in Prokaryotes: Operon concept, regulation at transcription initiation- lac and trp operon control, regulation of lytic and lysogenic cycles in lambda phage, regulation beyond transcription initiation-premature termination- trp operon, ribosomal proteins as translational repressors, riboswitches, **Regulation of gene expression in eukaryotes**-transcription activators and repressors, regulation after transcription initiation- alternative splicing, translational control in ferretin and tranferrin mRNA, RNA interference, role of chromatin in regulation of gene expression and gene silencing.

Practicals-32 Hrs

1) Isolation of DNA from CTAB method.
2) Isolation of DNA from Onion.
3) Isolation of DNA from mulberry leaves.
4) Estimation of DNA by DPA method.
5) Extraction of RNA by trizol/ phenol-chloroform methods.
6) Estimation of proteins by Biuret method.
7) Estimation of protein by Bradford method.
8) Determination of Tm value of DNA.

   9-12)Photo graphs/ charts related to molecular biology/Molecular Biologists.

References:

1) Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Rafi, Keith Roberts, and Peter Walter. 2008. Molecular biology of the cell, 5th edn., Garland science, Taylor & Francis Group, LLC, 270 Madison Avenue, NewYork ,USA.
2) Alberts, B., Bray, D., Lewis, J , Raff, M., Roberts, K and Watson, J.D. 1999 . Molecular biology of the cell. Garland Publishing, Inc.,New York
3) Kleinsmith, L.J. and Kish, V.M. 1995 .Principles of Cell and Molecular Biology 2nd Edition Harper Collins College Publishers, New York, USA.
4) Lodish, H. Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell,J. 2000. Molecular Cell Biology 4th Edition. W.H. Freeman and Co. New York, USA
5) Malaciniski, G.M. and Freidfelder, D. 1998. Essentials of Molecular Biology 3rd Edition. Jones and Bartlet Publishers, Inc., London.
6) Gunning.B.E.S. and Steer, M.W.1996. Plant Cell Biology; Structure and Function. Jones and Bartlett Publishers, Boston, Massachusetts.
7) Harris,Nand Oparka, K.J. 1994. Plant Cell Biology A Practical Approach. IRL Press, Oxford University Press, U.K.
8) F.M. Ausubel, R.Brent, R.E. Kingston, D.D. Moore, J.G. Seidman, J.A. Smith, K. Struhl, (Current Edition) (2005). Current Protocols in Molecular Biology.
9) B.B. Buchanan, W.Gruissem and R.L. Jones . USA (2000) .Biochemistry and Molecular Biology of Plants. Ed. ASPP Press.
10) T.A. Brown, 2000. Essential of Molecular Biology, Vol-I & 2 Oxford University Press.
11) James D. Watson, Tania,. A. Baker, Stephen, P. Bell, Alexander ,Gannm, Michael Levine.2004. Molecular Biology of the gene. 5th Edition, Pearson Education.Philip M Gilmartin and Chris.
12) Bowle.2002. Molecular Biology of Plants. Vol 1 & 2 Oxford University Press.

BOTANY: III-SEMESTER - HARD CORE 3.3

PLANT BIOTECHNOLOGY

Theory-32 Hrs

Unit-1:Plant Tissue Culture: Scope and importance of plant tissue culture- Media composition and types, hormones and growth regulators, explants for organogenesis; Micro propagation, embryo and endosperm culture, somatic embryogenesis, variation and cell line selection, adrogenesis and microspore culture, significance of haploids, diploidization and bulbosum technique; Cryopreservation, germplasm collection; Somatic Hybrids-Isolation and protoplast culture and somatic hybridization and its significance, Synthetic seed production and somaclonal variations.

Unit-2: Genetic Engineering: Milestones in plant recombinant DNA technology; Importance of gene manipulation in future perspectives; **Tools in Genetic Engineering-** Enzymes in genetic engineering - restriction endonucleases, types and their actions, other DNA modifying enzymes; Cloning vectors- plasmids isolation and purification- Ti Plasmid, pBR322, pUC-series. Phage vectors-M13 phage vectors, Cosmids-types, phasmids or phagemids, shuttle vectors-types; YAC and BAC vectors, Lambda phage vectors, Lamda phage DNA as a vectors; Cloning vectors and expression vectors; Vectors for plant cells; Vectors for animal cells, baculovirus vectors- adenoviruses, retroviruses, transposons as vectors, Synthetic construction of vectors.

Unit 3: The genetic manipulation of herbicide resistance: The use of herbicide in modern agriculture, strategies for engineering herbicide resistance, the environmental impact of herbicide-resistant crops, **The genetic manipulation of pest resistance**-GM strategies for insect resistance, *Bacillus thuringiensis* approach to insect resistance, insect resistant crops and food safety. **The genetic resistance to plant disease resistance- p**lant pathogen interaction, natural disease resistance pathways, Overlap between pests and diseases, biotechnological resistance to disease resistance, Transgenic approaches to viral and bacterial disease resistance.

Unit 4: Engineering for stress tolerance: The nature of abiotic stress, the nature of water deficit stress, targeted approaches towards the manipulation of tolerance to specific water deficit stresses, **Metabolic Engineering of Plants-** plant cell culture for the production of useful chemicals and secondary metabolites (hairy root culture, biotransformation, elicitation), pigments, flavanoids, alkaloids; mechanism and manipulation of Shikimate pathway, therapeutic proteins. **Future prospects for GM crops- t**he current state of transgenic crops, concerns about GM crops, the regulations of GM crops and products.

Practicals-32 Hrs

1) Preparation of plant tissue culture media and types.
2) Organ culture (Shoot tip, nodal and leaf culture) for callus Initiation and regeneration.
3) Anther culture for the production of haploids.
4) Suspension culture and production, separation and estimation of secondary metabolites.
5) Encapsulation of somatic embryos and production of Synthetic seed.
6) Extraction of secondary metabolites using Soxhlet extractor and Identification of In vitro secondary metabolites-alkaloids, steroids and flavonoids.
7) Restriction digestion of plasmid and genomic DNA and gel electrophoresis.
8) Isolationof genomicDNAfrombacteria/plantsandpurificationbyagarose gelelectrophoresis.
9) Restrictionanalysisofplasmids, gelpurificationofDNA,smallandlargescalepurificationof plasmids.
10) Preparationof competent*E.coli*cells.Bacterialtransformationandrecoveryofplasmidclones.
11) Genecloninginplasmids,analysisofrecombinantplasmids.
12) DNAamplificationbyPCR,RT-PCR,RealTimePCR.
13) Analysisof DNAandRNAandProteinbySouthern,NorthernandWesternblotting.
14) Primer design for PCR.

References:

1) Slater, N. Scott and M. Fowler. Plant Biotechnology 2003: The genetic manipulation of plants. Oxford University Press, Oxford.
2) Plant Biotechnology. 2000. J.H. Hammond, P. Mcgarvey, and V. Yusibov (eds). Springer Verlag, Heidelberg.
3) Text Book of Biotechnology. 2004. H.K. Das (ed). Wiley India Pvt. Ltd., New Delhi.
4) Plant Biotechnology -The Genetic Manipulation of Plants, Adrian Slater, Nigel Scott and Mark Flower, Oxford University Press, (2000).
5) Plant Genetic Transformation and Gene Expression by (eds) J.Draper*et.al*. Blackwell Scientific Publications, Oxford (1988).
6)Reinert, J. 1982. Plant Cell and Tissue Culture: A Laboratory Manual. Narosa Publishing House, New Delhi.
7)Chawla H.S., 2009, Plant Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.
8)Bhojwani, S.S. and Razdan, M.K. 2004. Plant Tissue Culture: Theory and practice. Elsevier Science Publishers, New York, USA.
9)PUROHIT S. D., 2012. Introduction To Plant Cell Tissue And Organ Culture PHI Learning Pvt. Ltd., New Delhi
10)Roberta, H. Smith, 2012. Plant Tissue Culture: Techniques and Experiments 3 edition. Academic Press; US.

BOTANY: III- SEMESTER- SOFT CORE 3.1

MOLECULAR GENETICS OF PLANTS

Theory-32 Hrs

Unit-1: Plants as genetic tools in Biology: *Arabidopsis, Rice, Maize, Saccharomyces;* Genome organization in plants; *Arabidopsis thaliana*- an experimental model for understanding plant development and functions; Plant genes and regulation; nucleus and chromatin organization; Histones and histone modifications; DNA packaging, organization and types of DNA sequences; functional and non- functional sequences, organization of plant nuclear genes, plastid genes and mitochondrial genes.

Unit-2: Genes responding to hormones, phytochrome, responses to abiotic stresses; Genes induced by water stress and freezing stress; Genes involved in photosynthesis and nitrogen fixation and their regulation; Molecular development of leaf and flower - ABC and revised model of flower development; Genes involved in fertilization, seed development, embryo development.

Unit-3: Genetics of *Agrobacterium:*Biology and genetics of *Agrobacterium tumefaciens;* The Ti- plasmid, *Vir* genes and expression, Mechanism of T-DNA transfer and integration; Basic features of vectors for plant transformation; Proteomics, genomics and bioinformatics; Structural and functional genomics, comparative genomics- biochemical, evolutionary, physiological and phylogenomics; Tools to study functional genomics.

Unit-4: Proteomics- functional and comparative proteomics; Protein distribution, characterization and identification, differential display proteomics, detection of functional linkages; Pharmacogenomics; Bioinformatics- tools of bioinformatics, data bases and data base management, bioinformatics in taxonomy, biodiversity, agriculture; Bioinformatics in drug design and drug discovery.

Practicals-32 Hrs

1) *Arabidopsis thaliana*- study of plant system and its biology.

2) *Arabidopsis* RNA extraction (total and polysomal) for Northern blotting.

3) Expression of foreign genes in plant cells through *Agrobacterium tumefaciens* (Chart)

4) Production of tobacco transgenic plants and assay for the introduced transgenic (Chart)

5) Co-cultivation of tobacco *Agrobacterium tumefaciens*

6) -12) Learning gene bank formats- EMBL format, FASTA format, Swiss- PROT, Ex PASy

References:

1) Buchmann, B.B., Gruissem, W., and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants. ASPP Press, USA.

2) Ausubel, F.M., Brent, R., Kingston, R.E., Moore, D.D., Seidman, J.G., Smith, J.A., and Struhl, K. 2005. Current protocols in molecular biology. Current Edition.

3) Brown, T.A. 2000. Essentials of Molecular Biology. Vol. I & II, Oxford University Press.

4) Potrykus, I., and Spangenberg, G. 1995. Gene transfer to plants. Springer, Berlin, Heidelberg.

5) Watson, J.D., and Baker, T.A., Bell, S.P. Gannm, A. and Levine, M. 2004. Molecular Biology of Genes. 5th edn., Pearson Education.

6) Gilmartin, P.M., and Bowler, C. 2002. Molecular Biology of Plants. Vol. I & II, Oxford University Press.

7) Karchar, S.J. 1995. Molecular Biology- A Project Approach, Academic Press, New York.

8) Sambrock, J., Fritch, E.F., and Maniatis, T. 1989. Molecular cloning- a laboratory manual.

9) Slater, A., Scott, N., and Flower, M. 2000. Plant Biotechnology- the Genetic Manipulation of Plants, Oxford University Press, Oxford.

10) Lea, P.J., and Leegood, R.C. 1999. Plant Biochemistry and Molecular Biology. John Willey and Sons Press, New York.

11) Draper, J. 1988. Plant Genetic Transformation and Gene Expression. Blackwell Scientific Publications, Oxford.

12) Old, R.W., and Primrose, S.B. 2004. Principles of Gene Manipulation. An introduction to Genetic Engineering. 5th Edition, Blackwell Science Publications.

BOTANY: IV- SEMESTER- SOFT CORE 3.2

MOLECULAR PLANT PATHOLOGY

Theory-32 Hrs

Unit-1: Concepts and scope of physiological and molecular plant pathology; Molecular approaches to plant disease diagnosis; Nucleic acid based probes for detection of plant pathogens including non-culturable organisms; **Pathogenicity and Disease Development**-factors; induced resistance, virulence and pathogenecity factors; Plant-pathogen interactions with emphasis on incompatible interactions and induced resistance.

Unit -2: Pathogenesis: Necrogenic plant pathogenic bacteria with emphasis on hrp and avr genes and virulence factors; Fungal plant pathogens with emphasis on virulence and pathogenicity factors; Plant viruses with emphasis on virus replication, virus transport in plants and control of plant viruses with transgenic plants; **Signal Transuduction-** recognition of the pathogen by the host, transmission of the alarm signal to the host defense providers; Necrotic defense reaction, defense through hypersensitive response; Molecular basis of induced biochemical reaction; Local and systemic acquired resistance (SAR).

Unit-3:Genetics of Plant Diseases and Resistance: Genes and diseases; physiological specialization among plant pathogens; Variability in viruses, bacteria and fungi; Levels of variability in pathogens and loss of virulence in plant pathogens; Genetics of virulence in pathogens and of resistance in host plants; Molecular plant breeding for disease resistance.

Unit-4: Genetics and molecular basis of host-pathogen interaction: Evolution of parasitism; genetics oh host-pathogen interaction; Gene for gene relationship; Criteria for gene for gene type relationship; Molecular basis of host pathogen interaction; Host-parasite-interaction. **Biotechnological methods of plant disease management;** Genetic engineering and crop protection; Cross protection; Gene silencing and disease control-mechanism of gene silencing and control of viral diseases; Engineered resistance to viral, bacterial, fungal and insect diseases of crop plants.

Practicals-32 Hrs

1-2) Testing hypersensitivity reaction on *Nicotiana and Bajra.*

3) Estimation of lypoxygenease in diseased and healthy plants.

4) Estimation of polyphenols in diseased and healthy plants.

5-7) Studying systemic acquired resistance in crop plants.

8) Genetic testing of disease resistance in plants.

9-11) Molecular detection of viruses, Mycoplasma, fungi and bacteria from infected plants.

12) In-vitro testing of pathogen virulence.

Visit to agricultural research station to study diseases on different crop plants.

References:

1) Singh, R. S. (1973). Plant Disease. Oxford and IBH Pub.Co. New Delhi.

2) Agrios, G. N. (1994). Plant Pathology 2nd Edn. Academic Press NY.

3) Johnston A and Both, C. 1983-Plant Pathologists Pocket-book. 2nd Edn. Commonwealth Mycological Institute, Oxford and IBH Pub. Co. Calcutta.

5) Rangaswamy G and Mahadevan A 2002. Diseases of crop plants in India, Prentice Hall of India Pvt.Ltd. New Delhi.

6) Mehrotra, R. S.1983-Plant Pathology Tata Mc. Graw Hill Pub. Co. Ltd., New Delhi.

7) Vidhyasekaran, P. 2004. Encylopedia of Plant Pathology.Viva Books Pvt.Ltd. New Delhi.

BOTANY: III SEMESTER- SOFT CORE 3.3

PLANT PROPAGATION AND PLANT BREEDING

Theory-32 Hrs

Unit-1: **Plant Propagation:** History, scope and importance of plant propagation; Propagation structures with reference to green house equipment and media; Seed propagation andvegetative propagation; Propagation by cuttings;Biology and techniques of grafting;Techniques of budding;Layering and its natural modifications;Propagation by specialized stems and roots;Micro propagation – techniques and applications in forestry and horticulture; Limitations and applications of vegetative propagation; Propagation methods of some selected plants – Citrus, Grape, Mango, Mulberry, Hibiscus, Rose, Croton, Eucalyptus.

Unit-2:Plant Breeding: Historyof plant breeding, objectives of plant breeding, salient achievements of plant breeding; Centres of origin of crop plants, Exploration and collection of plant genetic resources, evaluation of germplasm collection, documentation, conservation of plant genetic resources, utilization of genetic resources; The theory of pure line selection – Genetic basis, sources of genetic variation in pure lines, the land variety (races); Mendelian consequences of planned hybridization in self – pollinated crops - Early experiments on hybridization in plants, planned hybridization; Quantitative Inheritance; Applications of biometrical genetics in plant breeding.

Unit-3:Plant Breeding: Types of plant breeding; Fertility regulating mechanisms - manual or mechanical control, genetic control, incompatibility, male sterility, genetic engineering for male sterility, chemical control, genetic basis of heterosis;Synthetic and composite varieties-genetic basis, procedure for developing synthetic and composite varieties -genetic basis, procedure for developing synthetic varieties; Breeding for resistance to disease and insect pests.

Unit - 4:Mutation Breeding: Significance of induced mutations in plant breeding; Polyploidy in plant breeding- **t**ypes of polyploids, induction of polyploidy, phenotypic effects of polyploidy, significance of polyploids; Tissue culture in crop improvement; Molecular approaches to crop improvement-probes, gel electrophoration, electrofusion, biolistics, gene cloning, transgenic plants (GMO's), molecular markers, construction of genetic maps, application of DNA makers in plant breeding, the role of gene technology in plant breeding; Crop breeding Institutes/Centers, Molecular biology in relation to intellectual property rights.

Practicals-32 Hrs

1) Study of types of vegetative propagation: Cutting, Grafting, budding, layering.

2) Study of propagation by modified stems and modified roots.

3) Preparation of media, explants, culture, initiation of shoot multiplication.

4) Pot and green house implants (demonstration) (5) Studying of floral biology.

6) Hybridization techniques - bagging and emasculation.

7) Pollen viability test : Seed germination test, TTC test.

8) Mode of pollination study in different crops.

9) Visit to crop breeding stations/institutes / centres.

10) Estimation of protein quality, Amino acid Analysis and determination of oil and fatty acids.

11) Observation of colour and conditions of mature anthers in different crops.

12) Identification of and studying of important plant breeders.

References:

1) Abbottt, A.J. and Atkin, R.K. eds. 1987. Improving vegetatively propagated crops. Academic press, New York.

2) Bose, T.K., Sadhu, M.K., & Das, P., 1986. Propagation of Tropical and Subtropical Horticultural crops, Nowya Prakash, Calcutta.

4) Hartmann, H.T., Kester E.D., Davis, F.T., and Geneve, R.L. 1997. Plant propagation. Principles and practices. Prentice Hall of India Private Limited, New Delhi.

5) Krishnamurthy. H.M. 1981. Plant Growth substances including application in Agriculture.

6) Pierik, L.M. 1987. In vitro culture of Higher plants Murtinus Nijhoff pub. Dordrecht.

7) Razdan, M.K. 1994. An Introduction to Plant tissue culture, Oxford and IBH Pub. Co., PVT. Ltd., Bombay and Calcutta.

8. Mac Donald, B. 1987. Practical woody plant propagation for nursery growers. Portland, OR: Timber press.

9. Sadhu, M.K. 1989. Plant propagation Wiley eastern Ltd. N. Delhi.

BOTANY: III SEMESTER SOFT CORE 3.4

PHYTOCHEMISTRY AND HERBAL TECHNOLOGY

Theory-32 Hrs

Unit-1: **Phytochemisrty:** Scope of phytochemistry, plants as source of chemical compounds, primary and secondary metabolites and its applications; Definition, source of herbal raw materials, identification, authentication, standardization of medicinal plants as per WHO guidelines anddifferent herbal pharmacopoeias; Natural pigments, natural products as markers for new drug discovery.

Unit-2: Extraction, isolation and purification of phytochemicals: Selection of plant samples, processing and storage of samples for extraction; Factors influencing the choice of extraction,principles of extraction methods, infusion, decoction, digestion, maceration, percolation, solvent extraction, fluid extraction, ultrasound, microwave assisted extraction, advantage and disadvantage involved in each method; Isolation of selected primary and secondary metabolites – amino acids, proteins and carbohydrate; Phenolics, flavonoids, alkaloids, lipids, oils, terpenes and saponins; Purification techniques for primary and secondary metabolites – solvent-solvent fractionation and chromatography techniques.

Unit-3: Characterisation of Phytochemicals: Preliminary, qualitative and quantitative techniques – paper chromatography, thin layer chromatography, column chromatography-HPLC, GC (qualitative and quantitative), colour reactions for amino acids, sugars, phenolics, flavonoids, alkaloids, terpenes, saponins, oils, lipids; Spectroscopic estimations/gravimetric determination of total sugars, amino acids, proteins, phenolics, flavonoids, alkaloids, terpenes, saponins, oils, lipids; Characterisation using spectroscopic techniques - UV/VIS, FTIR, DSC (differential scanning calorimeter), NMR, MS, MALDI. XRD – single crystal and powder.

Unit-4: Standardisation and Validation of Photochemical: Quality determination of herbal drugs; Role of processing methods and storage conditions on quality of drugs;Standardisation parameters- impurity limit, ash content, extractable matter, moisture content, other phytochemicals, microbial contaminants, pesticides; Validation of drug – guidelines, limit of detection and quantification of impurities, organoleptic properties, physical, chemical, biological characteristics, stability testing, storage conditions and packing system/unit.

Practicals-32 Hrs

1) Survey and collection of medicinal plants for analysis.
2) Selection of plant part, processing and storage of samples for further analysis.
3) Extraction methods - aqueous and sequential solvent extraction of compounds.
4) Preliminary phytochemical analysis of active principles from the extracts.

5) Antibacterial/antifungal activity of crude /active principles

6) Identification of secondary metabolites using TLC- phenolics, flavonoids, alkaloids, terpenes, saponins etc.

7) Column chromatographic separation of active principles.

8) Characterisation of active principle using spectroscopy, HPLC, GCMS, LCMS, FTIR, and MALDI TOF.

9) -12) Submission of report on TEN important curative principles of Indian medicinal plants.

References:

1) Braithwaite, A. and Smith, F.J. 1996. Chromatographic Methods. 5th edn., Blackie Academic & Professional, London.

2) Bourne, U.K. Kokate, Purohit, C.K. and Gokhale S.B. 1983. Pharmacognosy. Nivali Prakashan Publication.

3) Braithwaite, A. and Smith, F. J. 1996. Chromatographic Methods. 5th edn. Blackie Academic & Professional, London.

4) Sadasivam. S. and A. Manickam, 0000. Bio Chemical methods 2nd edn. New Age International Pvt Ltd. New Delhi.

5) Harborne, J.B. 1984. Phytochemical Methods, 2nd edn. Chapman and Hall, London.Harborne J.B., 1973. Phytochemical methods a guide to modern techniques of plants analysis. Chapman and Hall Ltd. London.

BOTANY: III SEMESTER- OPEN ELECTIVE3.1

PLANT PROPAGATION TECHNIQUES

Theory-32 Hrs

Unit-1: History, scope and importance of plant propagation; Propagation structures with reference to green house equipment and media; Seed propagation – the development of seeds, techniques of seed production and handling principles and media.

Unit-2: Vegetative propagation: Techniques of propagation by cuttings; stem cuttings – hard wood, semi hard wood, soft wood and herbaceous, leaf cuttings, leaf bud cuttings, root cuttings; Biology and techniques of grafting: Whip and tongue, wedge and cleft, bark, side grafting, approach.

Unit-3: Techniques of budding: T-budding patch budding, chip budding, ring budding; Layering and its natural modifications- simple layering, tip layering, mound or stool layering, air layering, compound or serpentine layering and trench layering; Propagation by specialized stems and roots.

Unit- 4: Micro propagation – techniques and applications in forestry and horticulture; Advantage, limitations and applications of vegetative propagation, clones, genetic variation in asexually propagated plants, different methods; Propagation methods of some selected plants – Citrus, gape, mango, mulberry, hibiscus, rose, Croton, Eucalyptus.

References:

1) Abbott, A.J. and Atkin, R.K. (eds.) 1987. Improving vegetatively propagated crops. Academic press, New York.

2) Bose, T.K., Sadhu, M.K., and Das, P., 1986. Propagation of Tropical and Subtropical Horticultural crops, Nowya Prakash, Calcutta.

3) Hartmann and Kester, 1983. Plant propagation

4) Hartmann, H.T., Kester E.D., Davis, F.T. and Geneve, R.L. 1997. Plant propagation. Principles and practices. Prentice Hall of India Private Limited, New Delhi.

5) Krishnamurthy. H.M. 1981. Plant Growth substances including application in Agriculture.

6) L.M. Pierik 1987. In vitro culture of Higher plants Murtinus Nijhoff pub. Dordrecht.

7) M.K. Razdan 1994. An Introduction to Plant tissue culture, Oxford and IBH Pub. Co., PVT. Ltd., Bombay and Calcutta.

8) Mac Donald, B. 1987. Practical woody plant propagation for nursery growers. Portland, OR: Timber press.

9) Sadhu, M.K. 1989. Plant propagation Wiley eastern Ltd. N. Delhi.

BOTANY: IV- SEMESTER- HARD CORE 4.1

ECOLOGY, CONSERVATION BIOLOGY AND PHYTOGEOGRAPHY

Theory-32 Hrs

Unit-1:Introduction and scope of Ecology: Plants and the environment- plant adaptation, ecotypes, habitat ecology- fresh water and marine water ecology (ecosystems), wetlands and their characteristics; Ecosystem function; The distribution of biomes; Major Terrestrial Biomes; Forests-Tropical Forests-Temperate Forests, Taiga, Grasslands, Savanna, Temperate Grasslands/Prairies, Tundra, Deser and Chaparral.

Unit-2: Environmental Biology: Global warming: Greenhouse gases - causes and consequences; Ozone depletion- causes and consequences; Air, water and soil pollution - major pollutants, their source, permissible limits - and control methods; Radioactive pollution- Ionising radiation, disposal of radioactive waste, nuclear accidents; Environmental Education Programmes- WWF, UNEP, MAB; Role of plants in solving energy crisis and ameliorating global warming.

Unit-3: Biodiversity and Conservation Biology: Science in the service of Biodiversity, biodiversity and its value, biodiversity issues, concerns, management; Biodiversity hot spots; Biodiversity- threats andcurrent status of biodiversity; IUCN categories, Red Data book and Red lists, invasive alien species as threat to biodiversity; Conservation strategies-past, present, and future; Attitudes about conservation; conservation movements; CITES (Convention on international trade in endangered species), WCU (World Conservation Union); Endangered species Act. 2002(GOI); Protected areas, Network of India- history, size, scale and management; Heritage trees.

Unit-4: Phytogeography: Biogeography of the world, India and Karnataka; Climatic zones, tectonics, continental movements; Types of plant distribution – discontinuous distribution - land bridge theory, continental drift; continuous distribution-cosmopolitan, circumpolar, circumboreal, circumaustral, pantropical; Distribution of plants - islands; Phytochorea of the world, India; Plant dispersal, migrations and isolation; Eendemic plants of Western Ghats and Eastern Himalayas; Origin, distribution and acclimatization of coffee, cardamom, sugarcane, cashew, ragi, maize, wheat, rice and cotton; Remote sensing and GPS, study of vegetation by GIS (Geographical Information system).

Practicals-32 Hrs

1) Study of local vegetation by quadrate method.
2) Water analysis for pollution studies.(Bio-monitoring: TDS, Hardness, Chlorides, CO_2 COD, DO, BOD)
3) Rapid detection of bacteriological quality of water with special reference to feacal coliforms.

4) Morphology and anatomy of plants in relation to habitats - Xerophytes, Mesophytes, Hydrophytes.

5) *In situ* and *Ex situ* method of conservation.

6) Eminent phytogeographers of the world (photos).

7) Continental drift (charts).

8) Application of Remote Sensing, GIS and GPS in Forestry and Wild life management.

9) Biogeography of the world – Oceans, deserts, islands, mountains.

10) Biogeography of India –rivers, mountains, islands.

11) Floristic regions of world – India and Karnataka.

12) Study of endemic plants of India.

13) Origin, acclimatization and distribution of Coffee, Cardamom, Sugarcane, Cashew, Ragi, Maize, Wheat, Rice and Cotton.

References:

1) Polunin, N. 1961. Introduction to plant geography.

2) Good R.D. 1974. Geography of the flowering plants.

3) James H. B. 1998. Biogeography.

4) Cain, S.A. 1944. Foundations of plant Geography.

5) Croiat, 1952. Manual of Phytogeography.

6) Edgar A. 1972. Plants, Man and Life.

7) Valentine, D. H. 1972. Taxonomy, Phytogeography & Evolution.

8) Phil Gibson J. and Gibson Terri, R. 2006. Plant ecology.

9) Primack, R. B. 2006. Essentials of conservation biology.

10) Ricklefs, R. E. 2001. The Economy of Nature.

11)Narasaiah M. L., 2005. Biodiversity and Sustainable Development.

12)Tondon P, Abrol Y. P, Kumaria S., 2007. Biodiversity and its significance.

14) Krishnamurthy K. V. 2007. An Advanced Textbook on Biodiversity: Principles and Practice.

15) Christian Leveque and Jean-Claude Mounolou (2003). Biodiversity.

16) Jeffries Michael J. 2006. Biodiversity and conservation.

BOTANY: IV- SEMESTER- SOFT CORE 4.2

PROJECT WORK

BOTANY: IV- SEMESTER- SOFT CORE 4.1

SEED TECHNOLOGY

Theory-32 Hrs

Unit-1:Seed Technology: Introduction to seed science and technology and its goals; Development of seed technology industry in India; Seed as basic input in agriculture; Seed Biology -Seed development, morphology and anatomy of dicot and monocot seeds; Seed structure and functions; Seed programmes and organizations; Seed village concept, seed production agencies, seed industry and custom seed production in India; International Seed Science and Technology Organizations.

Unit-2:Seed Production: General principles of seed production in self and cross pollinated and vegetatively propagated crops; Hybrid seed production; Maintenance of inbred lines and breeders seeds; Synthetic and composite seeds; Improved seed and their identification; Germplasm banks;**Seed Processing**-Harvesting, seed drying, seed cleaning and grading; Equipments; Seed Storage- types of storage structure; seed factors affecting storage life, effect of storage on relative humidity, temperature and moisture; Seed deterioration; Seed treatment.

Unit-3:Seed Quality Testing: Devices and tools used in seed testing; ISTA and its role in seed testing; Seed sampling- physical purity and heterogeneity test; Seed moisture content-importance and determination and methods; Viability and vigour testing; Genetic purity testing -objective and criteria for genetic purity testing, seed health testing, field and seed standards, designated diseases, objectionable weeds; Significance of seed borne diseases, seed health testing and detection methods for seed borne fungi, bacteria, viruses and nematodes; Preparation and dispatch of seed testing reports, storage of guard samples, application and use of seed standards and tolerances.

Unit- 4:Seed Certification: Principles and philosophy of seed certification, purpose and procedures, national seed programme; National Seed Corporation (NSC) - agencies responsible for achieving self-reliance in seed production and supply of quality of seeds (State Seeds Corporation; National Seed Development Council (NSDC); Central Seed Committee(CSC) ; Seed market surveys, seed industry in relation to global market; Concept of WTO, GATT, IPR, Plant Variety Protection and its significance seed technology; UPOV and its role.

Practicals-32 Hrs

1) Determination of physical purity of seed samples.

2) Determination of density or weight per thousand seeds.

3) Determination of seed Heterogeneity.

4) Visual examination of dry seeds for disease symptoms.

5) Determination of moisture content by hot air oven method.

6) Seed viability test- TTC method.

7) Determination of seed germination by TP/BP/Sand method.

8) Evaluation of seedlings vigour by BP/Sand methods.

9) Seed vigour evaluation by (a) conductivity test (b) Hiltner's test (c) Performance test (d) Accelerated ageing test (e) Cold test.

10) Examination of suspensions obtained from washings of seed.

11) Infection sites studied by planting seed components.

12) Detection of seed-borne fungi and their characters of five seed borne pathogens.

Vist: Visit to seed industries/seed companies/ seed research stations.

References:

1) ACAR.2009. Handbook of Agriculture. Indian Council of Agricultural Research, New Delhi.

2) ACAR.2013. Handbook of Horticulture. Indian Council of Agricultural Research, New Delhi.

3) Agarawal, P. K. 2005. Principles of Seed Technology.2nd edn. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

4) Basra, A. S. 2006. Handbook of Seed Science and Technology, The Haworth Press, USA.

5) Copeland, L. O. and McDonald, M. B. 2001. Principles of Seed Science and Technology. 4th edn. Chapman & Hall.

6) Copeland, L.A. 1995. Principles of Seed Science and Technology- Kluwer Academic Publishers, The Netherlands.

7) Michael, B. and Bewley, D. 2000. Seed technology and its biological basis. Wiley-Blackwell.

8) Neergaard, P. 2005. Seed Pathology, Palgrave, Macmillan, Denmark. Science, Technology and Uses. CABI, UK.

9) Vanangamudi, K., Natarajan, K., Saravanan, T., Natarajan, N., Umarani, R., Bharathi, A. and Srimathi, P. 2006. Advances in Seed Science and Technology: Vol: III: Forest Tree Seed Technology and Management, Agrobios, New Delhi.

BOTANY: IV- SEMESTER- SOFT CORE 4.2

SEED PATHOLOGY

Theory-32 Hrs

Unit-1:Seed Pathology: Introduction, historical development, development of seed health testing; Reduction in crop yields loss in due to seed-borne diseases; Seed-borne pathogens **(**Fungi, Bacteria, Mycoplasma-like Organisms, fastidious Vascular Bacteria, Spiroplasmas, Viruses, Viroids, Nematodes); Location of seed-borne inoculums, histopathology of some seed-borne pathogens; Seed infection, mechanism of seed infection, seed infestation or contamination; Factors affecting seed infection; Longevity of seed-borne pathogens.

Unit-2: Seed transmission and inoculation, factors affecting seed transmission; Cultural practices, epidemiology and inoculum thresholds of seed-borne pathogens; Classification of seed-borne; Role of Seed-borne inoculum in disease development; Economic loss due to seedborne pathogens; Certification program; Seed health tests, Nonparasitic seed disorders; Deterioration of grains; Storage fungi, field and storage fungi; Invasion by storage fungi; effects of seed deterioration.

Unit-3:Detection of Seed-borne Diseases: Examination of dry seeds; Isolation of fungi, Bright-field microscopic examination, observation under UV light, measurement of gases,Determination of FAV, Moldy smell, collection of seed exudates; Immunoassays, ergosterol estimation; Avoiding damage to seeds during harvesting; Processing, threshing, storage conditions, reducing seed moisture to safe limits, seed treatment, resistance.

Unit-4: Mycotoxins - Fungi known to produce mycotoxins, Factors affecting mycotoxin production the effects and control of mycotoxins, storage conditions, sorting of grains, cultural operations, chemical treatment, biological control, detoxification, regulatory measures, use of resistant cultivars; Control of seed-borne pathogens; Selection of seed production areas; Crop management, crop rotation, isolation distances, rouging, biological control, chemical method, mechanical method, physical methods; Certification-certification standards, plant quarantine, national and international regulations.

Practicals-32 Hrs

1-5) Detection of seed-borne fungi and their identification.

6) Detection of Seed-borne bacteria.

6) Detection of seed-borne viruses.

7) Detection of seed-borne insects by egg-plug staining.

8) Detection seed-borne nematodes.

9) Effect of deterioration of grains by Storage Fungi.

10) Detection of seed-borne fungi by PCR.

11) Estimation of ergosterol by UV-visible Spectrophotometer.

12) Detection of mycotoxins by thin Layer chromatography.

References

1) Agarwal, V.K. and Sinclair, J.B. 1996. Principles of Seed Pathology, 2nd edn. CRC Press, Tayler and Francis, USA.

2) Neergaard, P. 1977. Seed Pathology. Vol. I..Macmillan Press, Cornell University, USA.

3) Agrios, G. N. 1994 -Plant Pathology 2nd edn. Academic Press, New York.

4) Mehrotra, R. S. 1983-Plant Pathology Tata Mc. Graw Hill Pub. Co. Ltd., New Delhi.

5) Rangaswamy, G. and Mahadevan, K. 2002. Diseases of Crop plants in India. Prentice Hall of India Private Limited New Delhi.

6) Agarawal,P.K.2005.PrinciplesofSeedTechnology.2ndedn.OxfordandIBHPublishing Co.Pvt.Ltd.NewDelhi.

7) Basra,A.S.2006.HandbookofSeedScienceand Technology,TheHaworthPress,USA.

8) Copeland,L.A. 1995. Principlesof Seed Scienceand Technology-Kluwer Academic Publishers,TheNetherlands.

9) Vanangamudi,K.,Natarajan,K.,Saravanan,T.,Natarajan,N.,Umarani,R.,Bharathi,A. and Srimathi,P. 2006.AdvancesinSeedScienceandTechnology:Vol:III:ForestTree Seed Technology and Management,Agrobios,NewDelhi.

BOTANY: IV- SEMESTER- SOFT CORE 4.3

BIO- ANALYTICAL TECHNIQUES

Theory-32 Hrs

Unit-1: Spectroscopy: Principles of UV-Visible spectroscopy, chromophores and their interaction with UV-visible radiation and their utilization in structural, qualitative and quantitative analysis of drug molecules; Infrared Spectroscopy, Infrared radiation and its interaction with organic molecules, vibrational mode of bonds, instrumentation and applications, interpretation of IR spectra; FTIR and ATR, X-ray diffraction methods.

Unit-2: Nuclear Magnetic Resonance Spectroscopy: Magnetic properties of nuclei, field and precession, instrumentation and applications of NMR; Chromatographic techniques- Principles and applications- types- column, paper, thin layer and gas chromatography, HPLC, HPTLC, size exclusion chromatography, Affinity chromatography, Mass spectrometry, MALDI-TOF.

Unit-3: Electrophoresis: Principle and application of PAGE, SDS PAGE, immunostaining, immuno-electrophoresis, Iso-electric focusing, 2D electrophoresis Centrifugation- Principles, techniques of preparative and analytical centrifugation. Ultracentrifuges, molecular weight determination, sedimentation analysis, RCF. Microscopy- principles and applications of electron microscope (SEM and TEM), CryoEM, Preparations of specimen for electron microscopy- freeze drying, freeze etching, fixing, staining; confocal, fluorescent, flow cytometry -principles and applications.

Unit-4: Molecular Biology Techniques: Primer designing; Principles and applications of PCR; Blotting techniques; Hybridization techniques; Micro-array;Next Generation Sequencing- Nucleic acid sequencing.

Practicals-32 Hrs

1) Calibration of bio-analytical instruments.
2) Principles and instrumentation and applications of imaging techniques:
3) Separation of fatty acids/lipids by TLC/HPTLC.
4) Separation of proteins by PAGE, SDS- PAGE.
5) Agarose gel electrophoresis of DNA/RNA.
6) Immunoelectrophoresis
7) Agar gel diffusion, counter immuno electrophoresis.
8) Verification of Beer Lambert law with the U.V. spectrophotometer.
9) Demonstration of blotting techniques.
10) Performing PCR for amplification of ITS regions of fungi/ bacteria.

References

1) Braithwaite, A. and Smith, F.J. 1996. Chromatographic Methods. 5th edn. Blackie Academic & Professional London.

2) Budzikiewicz, H., Djerassi, C. and Williams, D.H. 1968. Mass Spectrometry of Organic Compounds. Holden-Day, San Francisco, CA

3) Harborne, J.B. 1984. Phytochemical Methods. 2nd edn. Chapman and Hall, London.

4) Harborne J.B. (1973) Phytochemical methods a guide to modern techniques of plants analysis. Chapman and Hall, London Ltd.

BOTANY: II SEMESTER - OPEN ELECTIVE 4.1

PLANT DIVERSITY AND HUMAN WELFARE

Theory-32 Hrs

Unit -1: Plant Diversity and Significance: Role of plant diversity in ameliorating energy crisis and global warming; Types of biodiversity-genetic diversity, species diversity, plant diversity at the ecosystem level; Agro-biodiversity and cultivated plant taxa, wild taxa; **Values and uses of Biodiversity-** Ethical and aesthetic values, precautionary principle, methodologies for valuation, uses of plants and microbes.

Unit -2: Loss of Biodiversity: Major causes of for biodiversity loss; Loss of genetic diversity, Loss of species diversity; Loss of ecosystem diversity; Loss of agro-biodiversity; Projected scenario for biodiversity loss; Management of Plant Biodiversity-Organizations associated with biodiversity management; Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations; Biodiversity information management and communication.

Unit -3: Conservation of Biodiversity: Conservation of genetic diversity, species diversity and ecosystem diversity, *In situ* and *ex situ* conservation, Social approaches to conservation, Biodiversity awareness programmes, Conservation of Heritage Trees.

Unit-4: Role of plants in relation to Human Welfare: Importance of forestry their utilization and commercial aspects, Avenue trees, Ornamental plants of India, Alcoholic beverages through ages, Fruits and nuts- Fruit crops of Karnataka and their commercial importance; Wood and its uses.

References:

1) Krishnamurthy K. V. 2007. An Advanced Textbook on Biodiversity: Principles and Practice. Oxford & IHB Publishing Co. Pvt. Ltd. New Delhi.

2) Christian Leveque and Jean-Claude Mounolou, 2003. Biodiversity. John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ, England.

3) Jeffries Michael J. 2006. Biodiversity and conservation, 2nd edn. Taylor and Francis Group, New York.

The Board:

1. **Dr.Janardhana.G.R**, Professor, Department of Botany, University of Mysore(Nominee by Vice-Chancellor):
2. **Dr.Shivakameshwari,**Associate Professor, Department of Botany, Bangalore University(Nominee by Academic Council):
3. **Dr.Raju Krishna Chalannavar**, Associate Professor, Department of Botany, Mangalore University(Nominee by Academic Council):
4. **Dr. BhagyalakshmiNeelwarne**, Founder and Managing Director, Neelgel Biotech, VinayakaNagara, Mysuru:
1. **Mr. Vishnulal VN**, Clinical Research Co-ordinator, Doctor Alliance, Ramakrishna Nagar, Mysuru:

PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE [AUTONOMOUS]

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

Affiliated to University of Mysore

DEPARTMENT OF STUDIES IN BUSINESS ADMINISRTRATION

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

PROGRAMME CURRICULUM & REGULATIONS GOVERNING

MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE COURSE PROGRAMME

W.E.F 2019

AS PER UGC GUIDELINES ON ADOPTION OF CHOICE BASED CREDIT SYSTEM

REGULATIONS

1. Programme Title

The Programme shall be called 'Master of Business Administration Degree Programme'. The duration of the Programme is two years consisting of four semesters; two semesters in each year. A candidate joining the Programme shall pursue prescribed Programme of studies.

2. Eligibility for Admission

Any graduate or postgraduate in arts, science, commerce, business management, allied sciences, engineering and technology, medical sciences of this University or from any other university considered equivalent thereto shall be eligible for admission to the Programme. Further the applicant shall have a minimum of 50% in the qualifying examination. A relaxation of 5% is available for SC/ST & Cat-I candidates. Selection of candidates to the Programme shall be done as per rules of the University and Government of Karnataka.

3. Programme Content and Instruction

Programme content: The Programme comprises of course of study, internship, project work and field work as prescribed.

Pedagogy includes lectures, case studies, group discussions, quizzes, seminars, computer practicals, summer internship, factory visits etc.

a) **Courses in the programme are of three types: Core (C), Electives (E) and Project (P) :**

Core (C):

Core Course is the course, which is to be compulsorily studied by a student as a core requirement to complete the programme. Business Familiarization Report (BFR) and Project Report are part of the core courses.

Foundation (F): Foundation (F) courses are the courses based upon the contents that lead to knowledge enhancement that are mandatory for all disciplines.

Elective (E): Elective Course is a course, which can be chosen from a group of papers.

d) **Internship and Business Familiarization Report (BFR):** In the beginning of the third semester, the students shall undertake team based internship in a business firm and prepare a Business Familiarization Report under the guidance of a faculty member. The report shall be submitted before the commencement of the third semester examinations.

v) Internship in a year cannot be for a continuous period of more than 4 weeks in a given academic year.

vi) Internship undergone during academic classes shall not be considered

vii) Each students shall maintain internship dairy

viii) Certificates (Color Photocopy) of each internship shall be submitted to the department along with the report

Details to mention on the Certificate:

iv) Students name and registration number

v) Name of the institution/organization and duration of internship with date

vi) Date, seal and signature of the authority.

e) **Project:** Each candidate shall carry out the project work independently as per Scheme of Teaching and Examinations under the guidance of one of the faculty members of the Department in the Institution of study.

The topic and title of the dissertation shall be chosen by the candidate in consultation with the guide. The subject and topic of the dissertation shall be from the major field of studies of the candidate. Modification of only the title but not the field of work may be permitted at the time of final submission of dissertation report during IV semester. If dissertation has to be carried out in any industry/R&D labs/business organizations, outside the campus, permission shall be taken from the HoD to that effect.

4. Attendance and Conduct

The Programme is a full time Programme and students **SHALL NOT** take up any employment/course, part time or full time during their study. Students found violating this rule shall be removed from the Programme. Minimum attendance of 75% of actual working hours is required in each course. A student who does not satisfy the requirements of attendance and conduct shall not be permitted to appear for the examination in the concerned course.

5. Evaluation

Evaluation of each course is divided into continuous assessment (CA) and end term examination with marks allocated as shown in the table. Continuous assessment will be

carried out in two stages: One after the eight weeks of instructions designated as C1, the second, after sixteen weeks of instruction designated as C2. The end of term examination designated as C3 will be held between eighteenth and twentieth week of the semester. Marks will be awarded on the basis of continuous assessment that include announced and surprise tests, term papers / seminars / quizzes / case discussions, viva and practical's.

The breakup of marks will be as follows:

a.	C1 (Covering the first two units)	–	15 Marks
b.	C2 (Covering the next two units)	–	15 Marks
c.	C3 (Covering all the units)	–	70 Marks
	Total	**–**	**100 Marks**

Term end examination (C3) will be of 3 Hours duration for each subject.

Setting questions papers and evaluation of answer scripts.

I. Questions papers in three sets shall be set by the internal examiner for a course. Whenever there are no sufficient internal examiners, the Chairman of BoE shall get the questions papers set by external examiners.

II. The Board of Examiners shall scrutinize and approve the question papers and scheme of valuation.

III. Questions not to be set from practical components area in the C3 examination of the concerned course.

5.1 (i) There shall be valuation for all theory papers by examiner. In case a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course. In case a candidate's class attendance in a course is less than 75% or as stipulated by the University, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

Example

C1+C2= (15+15=30 Marks), 30% of 30Marks =9 Marks (*) (Qualifying Marks)

*Less than 9 Marks in C1+C2 is Drop, More than 9 Marks in C1+C2 is Pass

Teachers offering the courses will place the above details in the Department Council meeting during the last week of the semester, before the commencement of C3, and subsequently a notification pertaining to the above will be brought out by the Chairman of the Department before the commencement of C3 examination. A copy of this notification shall also be sent to the office of the Registrar and Deputy Registrar (Evaluation).

5.2 In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUP option. In case a candidate secures more than or equal to 30% in C3, but his/her grade (G) = 4, then he/she may be declared to have been conditionally successful in this course, provided that such a benefit of conditional clearance based on G=4 shall not be availed for more than 8 credits for the entire programme of Master's Degree of two years. In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKE-UP option.

Example

C3= 70 Marks, Eligible is 30% of 70 Marks is 21 (*)

*Less than 21 is Drop and more than 21 is Pass

The candidate has to exercise his/her option to DROP immediately within 10 days from the date of notification of results.

A MAKE UP examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with a next regular even semester examinations. If a candidate is still unsuccessful, he/she may opt for DROP or again take up MAKE UP examination; however, not exceeding double the duration norm in one stretch from the date of joining the course.

A candidate has to re-register for the DROPPED course when the course is offered again by the department. A candidate who is said to have DROPPED project work has to re-register for the same subsequently within the stipulated period. The details of any dropped course will not appear in the grade card.

The tentative / provisional grade card will be issued by the Controller (Evaluation) at the end of every semester indicating the courses completed successfully. This statement will not contain the list of DROPPED courses.

Upon successful completion of Master's degree a final grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Controller (Evaluation).

6. Evaluation of Business Familiarization Report (BFR) and Final Project Report

6.1 BFR will be evaluated by the concerned guide, for 50 marks through internal valuation.

6.2 Each Final project report will be evaluated for 70 marks by internal and external examiners. The guide ordinarily shall be the internal examiner. A viva-voce on the project report for 30 marks will be conducted by a board of three members constituted by the Chairman, BOE from the approved list of examiners.

7. Calculation of Cumulative Grade point Average (CGPA)

The grade and the grade point earned by the candidate in the course will be as given below

Marks	Grade	Grade Point (GP = V x G)
30 – 39	4	V*4
40 – 49	5	V*5
50 – 59	6	V*6
60 – 64	6.5	V*6.5
65 – 69	7	V*7
70 – 74	7.5	V*7.5
75 – 79	8	V*8
80 – 84	8.5	V*8.5
85 – 89	9	V*9
90 – 94	9.5	V*9.5
95 – 100	10	V*10

Here, P is the percentage of marks, P = [(C1+C2) + C3] secured by a candidate in a course which is rounded to nearest integer. V is the credit value of course. G is the grade and GP is the grade point.

A candidate can withdraw any course within in ten days from the date of notification of final results. Whenever a candidate withdraws a course, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is soft core/open elective. A DROPPED course is automatically considered as a course withdrawn.

Overall cumulative grade point average (CGPA) of a candidate after successful completion the required number of credits (89) is given by

CGPA = Σ GP / Total number of credits

Only such students, who successfully earn 89 credits in 4 semesters, without break, shall be considered for declaration of ranks and or medals.

8. Declaration of results

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	FGP	
	Numerical Index	Qualitative Index
4 < = CGPA < 5	5	SECOND CLASS
5 < = CGPA < 6	6	
6 < = CGPA < 7	7	FIRST CLASS
7 < = CGPA < 8	8	
8 < = CGPA < 9	9	DISTINCTION
9 < = CGPA < =10	10	

Overall percentage = 10*CGPA or is said to be 50% in case CGPA<5

EXAMPLE

Sl.No	Title Of The Course	Grade (G)	Credit Value (V)	Grade Point (GP)	GP = V x G
1.	XXX	30 – 39	3	4	12
2.	XXX	40 – 49	4	5	20
3.	XXX	50 – 59	4	6	24
4.	XXX	60 – 64	4	6.5	24.5
5.	XXX	65 – 69	4	7	28
6.	XXX	70 – 74	3	7.5	21.5
7.	XXX	75 – 79	3	8	24
			25		154

Total no of credits = 25

CGPA = Σ **GP / Total number of credits**

CGPA = **154 / 25 = 6.16 = FIRST CLASS**

(Note: As per the Section 7 & 8)

9. Medium of Instruction

The medium of instruction shall be English. However, a candidate will be permitted to write the examination in English. This rule is not applicable to languages.

10. In case of any discrepancy, the general provisions of CBCS and Continuous Assessment and Grading Pattern (CAGP) of the University of Mysore will be applicable.

DEPARTMENT OF STUDIES IN BUSINESS ADMINISTRATION

CHOICE BASED CREDIT SYSTEM- 2019 – 2020

MBA Programme Structure and Syllabi

Minimum Credits required for MBA Degree

I to IV Semesters	Core Course (C)		Foundation course (F)		Elective Course (E)		Total	
	Numbers	Credits	Numbers	Credits	Number	Credits	Numbers	Credits
	16	62	04	06	07	21	27	89

Minimum Credits to be registered by a student in a normal phase to successfully complete MBA degree in four semesters

Semesters	Core Course (C)		Foundation course (F)		Elective Course (E)		Total	
	Numbers	Credits	Numbers	Credits	Number	Credits	Numbers	Credits
I	06	23	01	01	00	00	07	24
II	05	20	02	04	00	00	07	24
III	03	10	01	01	03	09	07	20
IV	02	09	00	00	04	12	06	21
Total	16	62	04	06	07	21	27	89

Semester - I

Sl.No	**Title of the Course**	**Core/ Foundation**	**L:T:P**	**Credit**	**Teaching hour per week**
01	Principles and Practices of Management	Core	3 : 0 : 1	4	5
02	Organizational Behaviour	Core	3: 0 : 1	4	5
03	Corporate Economics	Core	3 : 0 : 1	4	5
04	Accounting for Managers	Core	3 : 1 : 0	4	5
05	Business Communication	Core	2 : 0 : 1	3	4
06	Statistics for Management	Core	3 : 0 : 1	4	5
07	Computer Applications in Management	F	0 : 0 : 1	1	2
08	Skill Development Program-1	F	0 : 0 : 1	1	

A Student shall choose any one Foundation Course

Semester - II

Sl.No	Title of the Course	Core/ Foundation	L:T:P	CREDIT	Teaching hour per week
01	Marketing Management	Core	3:0:1	4	5
02	Human Resource Management	Core	3:0:1	4	4
03	Corporate Finance	Core	3:0:1	4	5
04	Business Research Methods	Core	3:0:1	4	5
05	Production and Operation Management	Core	3:0:1	4	5
06	Legal aspects of Business	F	2:0:1	3	4
07	Skill Development Program-2	F	0:0:1	1	

Semester - III

Sl.No	Title of the Course	Core/ Foundation/ Elective	L:T:P	Credit	Teaching hour per week
01	Strategic Management	Core	3:0:1	4	5
02	Total Quality Management	Core	2:0:2	4	6
03	Elective 1	E	2:0:1	3	4
04	Elective 2	E	2:0:1	3	4
05	Elective 3	E	2:0:1	3	4
06	Business Familiarization Report	Core	0:0:2	2	
07	Skill Development Program-3	F	0:0:1	1	

Electives: Group - I

Sl.No	Title of the Course	Elective	L:T:P	Credit	Teaching hour per week
01	Consumer Behavior	Elective – I	2:0:1	3	4
02	Sales and Logistics Management	Elective – II	2:0:1	3	4
03	Advertising and Sales Promotion Management	Elective – III	2:0:1	3	4

Electives: Group - II

Sl.No	Title of the Course	Elective	L:T:P	Credit	Teaching hour per week
01	Strategic Financial Management	Elective – I	2:0:1	3	4
02	Financial Markets and Service	Elective – II	2:0:1	3	4
03	Investment Analysis and Portfolio Management	Elective - III	2:0:1	3	4

Electives: Group - III

Sl no.	Title of the Course	Elective	L : T : P	Credit	Teaching hour per week
1	Personal Growth & Interpersonal Effectiveness	Elective – I	2 : 0 : 1	3	4
2	Organizational Change & Development	Elective – II	2 : 0 : 1	3	4
3	Training & Development	Elective - III	2 : 0 : 1	3	4

Semester - IV

Sl.No	Title of the Course	Core/Elective	L:T:P	Credit	Teaching hour per week
01	Event Management	Core	1:0:2	3	5
02	Elective 4	E	2:0:1	3	4
03	Elective 5	E	2:0:1	3	4
04	Elective 6	E	2:0:1	3	4
05	Elective 7	E	2:0:1	3	4
06	Project	C	0:0:6	6	

Electives: Group - IV

Sl.No	Title of the Course	Elective	L:T:P	Credit	Teaching hour per week
01	Brand Management	Elective - IV	2:0:1	3	4
02	Industrial Marketing	Elective - V	2:0:1	3	4
03	Services Marketing	Elective - VI	2:0:1	3	4
04	International Marketing	Elective - VII	2:0:1	3	4

Electives: Group - V

Sl.No	Title of the Course	Elective	L:T:P	Credit	Teaching hour per week
01	Merger and Acquisition	Elective - IV	2:0:1	3	4
02	Derivatives	Elective - V	2:0:1	3	4
03	International Finance	Elective - VI	2:0:1	3	4
04	Taxation	Elective - VII	2:0:1	3	4

Electives: Group - VI

Sl no.	Title of the Course	Elective	L : T : P	Credit	Teaching hour per week
01	Strategic Human Resource Management	Elective - IV	3 : 0 : 0	3	3
02	Industrial Labour Legislation	Elective - V	2 : 0 : 1	3	4
03	Industrial Relations	Elective - VI	2 : 0 : 1	3	4
04	Managing Knowledge Workers	Elective - VII	3 : 0 : 0	3	3

***L = Lecture – 1 hour of lecture per week in a semester = 1 Credit**

S/T/FW = Seminars/Tutorials/Field Work – 2 Hours of seminars/tutorial /field work per week in a semester = 1 Credit

P = Practicals – 2 hours of practicals per week in a semester = 1 Credit

**** Elective Groups:**

Any one *group* from the available Elective Groups shall be selected by a student at the commencement of III Semester. Once a group has been selected, no change in the selected group will be allowed later in the fourth semester. The Department will announce at the end of the second semester, any one or more Elective Groups which will be offered during III and IV semesters depending upon the availability of faculty members and the demand for elective groups. An Elective Group can be offered if there are minimum ten students opting for that group.

***A student shall register for Business Familiarization Report in third semester which carries 2 credits. In the fourth semester project work must be carried out for preparing the final project work report which carries 6 credits.

Principles & Practices of Management

Nature	Area	Semester	
Core	General Management	I	
Course Code	**Course Name**	**Credit/Distributions**	
	Principles & Practices of Management	(L-3:T-0:P-1) Credit = 04	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives:

- To realize the functions of Management
- To understand the theories of Management
- To enumerate the Importance of various structural forms in organizations
- To understand the importance of various dimensions of controls employed in organizations

Unit – I: Management **16 Hours**

Definition of Management, Nature and Scope of Management, Basic functions of Management, Management as a process. Evolution of management theory and practice from Taylor, Fayol, Drucker to the present day. Professional code of conduct and Ethics in management. Growth of professional management in India

Unit – II: Corporate Planning **10 Hours**

Planning Process, The purpose of Managerial Planning, Types of Plans, Hierarchy of Plans, Planning Premises, Certainty, risk and uncertainty

Unit – III: Decision Making **10 Hours**

Decision Making, Models of Rational Decision Making Process, limitations, Heuristics, Bounded Rationality in Decision Making Process and Models, Steps in Rational Decision Making

Unit – IV: Role of Organization Structure **10 Hours**

Basis of Departmentation, Specialization, Division of work, Differentiation and Integration, Various forms of Organization, Span of Management principles of Coordination. Power, Authority, Delegation and Decentralization. Informal organizations and grapevine

Unit – V: Management Control **10 Hours**

Managerial Control, Relationship between Planning and Control, Limitations of Control, Feedback, Types of Control Systems and Techniques, Management by Exception, Budgetary Control, Functional and Dysfunctional aspects of Budgetary Control, Internal Control Systems, Internal Audit and Management Audit.

Practical Components:

- Study 5 companies and enumerate different types of organizational structures
- Visit 5 companies and study their system of delegation of responsibilities
- Visit 5 companies to study the control systems employed to enhance organizational performance.

Reference Books

- Essentials of Management-Koontz and O'Donnell. E-McGraw Hill,
- Introduction to Management-Fred Luthans-McGraw
- The Practice of Management-Peter.F.Drucker
- Management- Stoner, Freemen and Gilbert
- Management- Griffin
- Management- Holt
- Management- Tasks and Responsibilities- Peter. F. Drucker
- Professional management- Theo Haimann
- Organization Theory and Design – Richard L.Draft
- Management - Richard L.Draft
- People and Performance by Peter F.Drucker

Organizational Behavior

Nature	**Area**	**Semester**	
Core	Human Resource	**I**	
Course Code	**Course Name**	**Credit/Distributions**	
	Organizational Behavior	(L-3:T-0:P-1) Credit = 04	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives

- To Analyze the behavior of Individuals and Groups in organization in terms of the Key Factors that influence Organizational behavior

- To Assess the potential effect of organizational factors (Structure, Culture, Change) on OB
- To Critically examine the potential effects of important developments in external environments on OB
- To Analyze the organizational behavior issues in the context of Organizational Behavioral theories, Models and Concepts

Unit I - Organizational behavior 08 Hours

Definition, Key elements of OB, Nature, scope and challenges of OB, Models of organizational Behavior, Contributions of other disciplines to OB, Emerging issues in Organizational Behavior, Impact of globalization and IT on OB

Unit II - Personality, perception and attitudes 15 Hours

Personality: Meaning, Determinants of Personality – Heredity, Environment and Situation, Types of personality – Introvert, Extravert, Type A, Type B, Judging and perceptive personality, Theories of personality – Trait theory, Type theory, Socio Learning theory, Self theory, Psychoanalytical theory, Other personality factors influencing OB – Locus of control, Machiavellianism, Self esteem, self monitoring, Risk taking.

Perception: Meaning, difference between perception and sensation, perceptual Process – Receiving the stimuli, selecting the stimuli, Organization of stimuli, Interpretation, Factors influencing perception – Internal factors and External factors, How to improve perception, Perception and its application in OB (Employment Interview, Performance appraisal, Performance expectation, employee effort, employee loyalty)

Attitude: Meaning of Attitude, Formation of attitude (Direct experience, Social learning), Types of attitude: Job satisfaction, Job Involvement and Organizational commitment. Components of Attitude: Cognitive component, affective component and behavioral component, How to change attitude (Cognitive dissonance theory, Reinforcement theory, balance theory, comprehensive theory).

Unit III - Group dynamics: 10 Hours

Meaning, Definition and characteristics, why do people form and join groups, Types of Groups: Formal and informal groups, Stages of group development, Group Behavior, Group Norms, Group Cohesiveness, group role, Inter group behavior, Inter group conflicts, Group Decision making, JOHARI window and Transactional analysis.

Teams: Meaning, Difference between team and Group, Types of teams – Lead teams, Problem solving teams, self managed teams, cross functional teams, virtual teams, Causes for team failure, How to make teams successful?

Unit IV - Motivation **13 Hours**

Meaning, Nature of motivation, Need for motivation, Theories of motivation – Content theories and Process theories,

Unit V – Leadership **10 Hours**

Meaning, Differences between leadership and Management, functions of leadership, Leadership styles – Autocratic, Democratic, Laissez faire. Leadership theories: Trait theory, Behavioral theories, Fiedler's contingency model, Path goal leadership theory, Situational leadership theory, Managerial grid, Transactional and Transformational leadership, Making leadership effective.

Practical Component

- Preparing the leadership profiles of five business leaders and studying their leadership qualities and behaviors.
- Identifying any five job profiles and listing the personality traits / attributes required for the jobs identified.
- Dividing the students into small groups and conducting collage activity to exhibit the group cohesiveness.

Text Book

- Dr.S.S. Khanka; Organizational Behavior, 4th Ed, S.Chand & Company pvt ltd, 2003.

Reference Books

- Fred Luthans – Organizational Behavior, Mc Grawhill, 11th Ed, 2001
- Stephen Robbins – Organizational Behavior, Pearsons 11th Ed, 2008

Corporate Economics

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Core</td><td>General Management</td><td colspan="2">I</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Corporate Economics</td><td colspan="2">(L-3:T-0:P-1) Credit = 04</td></tr>
<tr><td>C1 + C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives:

- To integrate the basic concepts of economics with the tools of mathematics and statistics in order to analyze and make optimal business decisions

Unit – I: Introduction **08 Hours**

Definition, nature and scope of managerial economics, Theory of the firm- goals of the firm, indifference curve analysis, and Equilibrium Analysis

Unit – II: Demand Analysis **08 Hours**

Concept of demand, determinants of demand, Law of demand, Exceptions to the law of demand, Elasticity of demand, types and measurement

Unit – III: Production and Cost Analysis **14 Hours**

Concepts, production function with one variable input - Law of Variable Proportions. Production functions with 2 variable inputs and Laws of returns to scale. Cost analysis: Concepts, Types of cost, Cost curves, Cost – Output Relationship in the short run and in the long run, LAC curve.

Unit – IV: Market Structures **12 Hours**

Market Structures: Perfect Competition, Features, and Determination of price under perfect competition Monopoly: Features, Pricing under monopoly. Price Discrimination

Monopolistic Competition: Features, Pricing Under monopolistic competition, Product differentiation. Oligopoly: Features, Kinked demand Curve, Cartels, Price leadership

Unit – V: Regression model for managerial decisions **14 Hours**

Regression model for managerial decisions: Introduction to Regression Analysis, Estimating and Testing Regression Equation, Problems in the Use of Regression Analysis, Two-Variable and Multiple Variable Regression Analysis.

Practical Components:

- Assessment of Impact of advertisement or sales promotion on the demand of a product (Preferably FMCG goods)
- Study of demand elasticity for a product when there is a price increase or price decrease.
- Market surveys/ consumer intention survey for an existing or a new product/service.

- Opinion polls to understand the buyer behavior for a product or a service.
- Demand forecasting – Mini project may be given to students to assess the demand for a product or a service using any method.
- Preparing a project proposal for a new business venture to understand the BEP using real time data.
- Exploring application and usage of econometric models by using appropriate software packages

Reference Books

- C K Renukarya ; Managerial Economics, Chethana Book House, Mysore, 1996
- Thomas ,Christopher R & S Maurice ,Charles ;Managerial Economics – Concepts and Applications New Delhi: Tata McGraw-Hill Irwin, 2008.
- Hershey, Mark; Managerial Economics- An Integrative Approach Cengage Learning India Pvt. Ltd., Publications 2009
- Maddala ,G S & Miller, Ellen; Micro Economics – Theory & Applications, Tata McGraw Hill Publications
- Dominick Salvatore; Managerial Economics, Oxford University Press
- Mankiw, Gregory; Principles of Economics, Thomson South-Western
- Pindyck&Rubinfeld ; Microeconomics, Pearson 5th edition
- G. S. Gupta, Managerial Economics, Tata Mc Graw Hill Latest Edition
- Dwivedi, Managerial Economics, Vikas Pub., House Pvt., Ltd., 2002
- Das, Satya P, Micro Economics for Business, Sage Publishers, 2007
- Mulhearn, Chris , Howard R Vane , Economics for business, James Eden NewYork,Palgrave,2011
- W Bruce Allen, Managerial economics theory application and cases, Viva Books, New Delhi,2010

Web Reference:

- http://pearsoned.co.in/prc/book/paul-g-keat-managerial-economics-economic-tools-todays-decision-makers- 6e-6/9788131733530
- http://pearsoned.co.in/prc/book/h-craig-petersen-managerial-economics-4e-4/9788177583861
- http://www.onlinevideolecture.com/mba-programs/kmpetrov/managerial-economics/?course_id=4207
- http://ocw.mit.edu/courses/economics/

Accounting for Managers

Nature	Area	Semester	
Core	Accounts	I	
Course Code	**Course Name**	**Credit/Distributions**	
	Accounting for Managers	(L-3:T-1:P-0) Credit = 04	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives:

- To acquaint students with the fundamentals principles of financial, cost and management accounting
- To enable the students to prepare, analyze and interpret financial statements and to enable the students to take decisions using management accounting tools.

UNIT I – Introduction **08 Hours**

Meaning and Scope of Accounting; Accounting Concepts; Accounting Principles, Conventions and Standards – Concepts, Objectives, Benefits; Accounting Policies; Accounting as a Measurement Discipline – Valuation Principles, Accounting Estimates: Documents & Books of Accounts: Invoice, Vouchers, Debit & Credit Notes, Day books.

UNIT II – Preparation of books of Accounts **10 Hours**

Journals, Ledgers and Trial Balance (Problems); Depreciation – Causes – Methods of Calculating Depreciation – Straight Line Method, Diminishing Balance Method and Sinking fund method;

UNIT III – Preparation of Final Accounts **12 Hours**

Preparation of final accounts of sole traders in horizontal form, Preparation of final accounts of companies in vertical form as per Companies Act of 2013 (Basic problems of Final Accounts), Window dressing

UNIT IV – Analysis of Financial Statements **12 Hours**

Ratio Analysis – Uses and Limitations – Classification of Ratios – Liquidity, Profitability, Financial and Turnover Ratios, Preparation of financial statements using ratios, Preparation of Cash flow Statement

UNIT V – Introduction to IFRS and Taxation **14 Hours**

IFRS: Introduction to IFRS, IFRS- 3(Business Combination) IFRS-7(cash flow) IFRS-16 (Property Plan and Equipment) & IFRS-33(EPS)

Taxation: Basic definition, Basic charges, Residential status, Heads of Income (Theory Only), Introduction to GST (Theory only)

Practical Components:

- Analyzing the companies' cash flow statements and presenting the same in the class.
- Collecting Annual reports of the companies and analyzing the financial statements using different techniques and presenting the same in the class.
- Exposing the students to usage of accounting software's (Preferably Tally).
- Filling up of ITR forms.
- Identify the sustainability report of a company and study the contents

Reference Books:

- Financial Accounting: A Managerial Perspective, Narayanaswamy R, 5/e, PHI, 2014.
- A Text book of Accounting For Management, Maheswari S. N,Maheswari Sharad K. Maheswari , 2/e, Vikas Publishing house (P) Ltd.
- Financial Accounting, Tulsian P. C, 1/e, Pearson Education.
- Taxation: T N Manohar, Snowman Publication

Reference Books:

- Financial Accounting for Management: An Analytical Perspective, Ambrish Gupta, 4/e, Pearson Education.
- Introduction to Financial Statement Analysis, Ashish K Bhattacharya, Elsevier India.
- Financial Accounting – Raman B. S,Vol I & Vol II, 1/e, United Publishers, 2009.

Business Communication

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Core</td><td>General Management</td><td colspan="2">I</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Business Communication</td><td colspan="2">(L-2:T-0:P-1) Credit = 03</td></tr>
<tr><td>C1 + C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives:

- To familiarize students with the mechanics of writing
- To enable students to communicate (Written and Oral) in English precisely and effectively

Unit - I **10 Hours**

Introduction: Meaning & Definition, Role, Classification – Purpose of communication – Communication Process – Characteristics of successful communication – Importance of communication in management – Communication structure in organization – Communication in conflict resolution - Communication in crisis.

Unit - II **10 Hours**

Oral communication: Meaning – Principles of successful oral communication – Barriers to communication – Conversation control – Reflection and Empathy: two sides of effective oral communication

Listening as a Communication Skill

Non – verbal communication

Demonstrate the effect of noise as a barrier to communication

Make students enact and analyze the non-verbal cues

Unit – III **10 Hours**

Written communication: Purpose of writing – Clarity in writing – Principles of effective writing – Approaching the writing process systematically: The 3X3 writing process for business communication: Pre writing – Writing – Revising – Specific writing features – Coherence – Electronic writing process.

Give exercises for clarity and conciseness in written communication.

Unit – IV **12 Hours**

Business letters and reports: Introduction to business letters – Types of Business Letters - Writing routine and persuasive letters – Positive and Negative messages Writing Reports: Purpose, Kinds and Objectives of reports – Organization & Preparing reports Writing Proposals: Structure & preparation.

Writing memos

Group Activity: Form Student groups and ask them to write a persuasive letter and proposal for an innovative product or service. Circulate the work from each group among all other groups and ask them to evaluate the letter and proposal in line with possible responses to a letter (pleased, displeased, neither pleased nor displeased but interested, not interested)

Unit – V **14 Hours**

Case method of learning: Understanding the case method of learning – Different types of cases – Difficulties and overcoming the difficulties of the case method – Reading a case properly (previewing, skimming, reading, scanning) – Case analysis approaches (Systems, Behavioural, Decision, Strategy) – Analyzing the case – Dos and don'ts for case preparation – Discussing and Presenting a Case Study

A suitable case is to be selected and administered in the class sticking to all the guidelines of case administering and analysis.

Reference Books:

1. Business Communication : Concepts, Cases And Applications – P D Chaturvedi, Mukesh Chaturvedi – Pearson Education, 2/e, 2011 (Module 1, 2, 4, 5, & 7)
2. Business Communication, Process And Product – Mary Ellen Guffey – Thomson Learning , 3/E, 2002 (Module 3)
3. Business Communication – Lesikar, Flatley, Rentz & Pande – TMH 11/E, 2009 (Module 1, 2, 4, 5, & 7)
4. Advanced Business Communication – Penrose, Rasberry, Myers – Cengage Learning, 5/e, 2004 (Module 1, 5, 6 & 8)
5. BCOM – Lehman, DuFrene, Sinha – Cengage Learning, 2011 (Module 1, 2, 4, 6, 7, 8)

Reference Books:

1. Effective Technical Communication By M Ashraf Rizvi – TMH, 2005.
2. Business Communication, M.K. Sehgal & V. Khetrapal – Excel Books.
3. Business Communication – Krizan, Merrier, Jones – Thomson Learning, 6/e, 2005.

Statistics for Management

Nature	Area	Semester	
Core	Statistics	I	
Course Code	**Course Name**	**Credit/Distributions**	
	Statistics for Management	(L-3:T-0:P-1) Credit = 04	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives:

- To provide an understanding on the basic concepts of statistics
- To acquaint the students to the role that statistics plays in business decisions

UNIT- I : Introduction 10 Hours

Quantitative data interpretation in managerial decision making: collection – classification – tabulation – frequency distribution – charts and graphs, measures of central tendencies and dispersion

UNIT -II: Correlation and regression 12 Hours

Types of correlation scatter diagram, Karl Pearson coefficient of correlation, Spearman rank correlation coefficient – repeated ranks. Regression coefficients, lines of regression, estimation of dependent variable based on independent variable

UNIT-III: Probability Theory 12 Hours

Basic probability concepts – conditional probability – Bayes theorem Probability distributions: binominal, Poisson and normal distributions

UNIT- IV: Sampling 08 Hours

Census vs sampling, Sampling Techniques, sample size, random sampling. Non-sampling and sampling errors. Estimation-point and interval- definition

UNIT V 14 Hours

Statistical Decision Theory: hypothesis testing for means and proportions and for difference of means and proportions - Chi-Square test and analysis of variance-one way and two way ANOVA.

Practical components:

- Analysis of cash deposit pattern in commercial banks
- A regression analysis on the impact of smoking, level of exercise, weight on medical cost (A case study of any medical center)

Reference Books:

- Dr.C.K Renukarya-Business Statistics, chethan Book House, Mysore
- Statistics for Managers – using Microsoft excel – Levine, Stephan & others
- Statistics for Management – Richard Levin and Rubin[excel version]
- Statistics – Murray Spiegel, Schaum Series
- Quantitative Business Analysis – Text & Cases – Samul Bodiley & others
- Basic Business Statistics – Bereuram and Levine
- Quantitative Methods – Anderson, Sweeny & William

Computer Applications in Management

Nature	**Area**	**Semester**	
Foundation	General Management	I	
Course Code	**Course Name**	**Credit/Distributions**	
	Computer Applications in Management	(L-0:T-0:P-1) Credit = 01	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives:

- To provide students with the essential skills needed to create, edit and print professional looking documents using text, tables, lists and pictures as well as covering simple mail merge.
- To equip students with the skills required to create & edit spreadsheets, use functions & formulas and to work with various tools to analyze and present data in spreadsheets, such as sorting, filtering, applying conditional formatting and charting the data.
- To provide students with the essentials skills needed to create, edit and present professional looking presentations using text, tables, diagrams, charts and pictures as well as providing presentations tips.

Unit I **04 Hours**

Information System Resources: Computer basics (H/w & S/w), Internet & office automation, Word processing with MS word - starting MS word - MS Environment - working with word documents - working with text - working with tables - checking spelling and grammar - printing document - creating mailing lists- mail and merge.

Unit II **08 Hours**

Concept of spread sheet and MS Excel - starting MS Excel - MS Excel Environment- working with Excel – workbook- Preparation of charts and graph with excel – Sorting & Filtering - Working with functions – Summary statistics – printing in Excel.

Unit III **04 Hours**

Making presentation with Ms Power point - starting Ms Power point - Ms Power point Environment - working with power point - working with different views - designing presentations - printing in power point

Practical Component

- Hands on sessions to create, edit and print word documents using text, tables, lists and pictures as well as covering simple mail merge.
- Hands on sessions to create & edit spreadsheets, use functions & formulas and to work with various tools to analyse and present data in spreadsheets, such as sorting, filtering, applying conditional formatting and charting the data.
- Hands on sessions to create and edit PowerPoint slides using text, tables, diagrams, charts and pictures and presenting the slides.

Text Books:

- Kumar Bittu, Mastering Ms Office, V & S Publisher
- Sanjay Saxsena- MS Office 2000- Vikas Publishing House,

Reference Books:

- Sanjay Saxsena-A First Course in Computer- Vikas Publishing House.
- Mohan. P- Computer Applications in Management- HPH Pvt. Ltd.
- Pathak, and Nirupma- Computer Application in Management- HPH Pvt. Ltd.

Skill Development – 1

Nature	Area	Semester	
Foundation	General Management	I	
Course Code	**Course Name**	**Credit/Distributions**	
	Skill Development-1	(L-0:T-0:P-1) Credit = 01	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives:

- To provide an analytical and practical overview of the basic skills needed for a manager
- To comprehend the art of presentation, e-mail etiquette and data interpretation

Unit I : Presentation Skills 03 Hours

Technical aids used for presentation; Chalk and Board, Over head Projectors, Paper Handouts, Flip Chart, Artefacts or Props, basic Understanding of PowerPoint

Unit II : Advanced Presentation Skills 03 Hours

Rules and Guidelines for creating a good Presentation, The beginning, Actual content and closing of a Speech, Holding audience attention and Handling Questions

Unit III : Email Netiquettes 04 Hours

Subject & Body of an email, Rules of emails: No Spamming, Disclaimer etc.,

Guidelines of an email: Reply, Reply all, Forward etc., Mass Mail service providers like Mail Chimp etc.

Unit IV: E-Mail Analytics 03 Hours

Analytics like Click through Rate, Open rate, Opt out Rates etc., Email Threats like Phishing and Spamming

Unit V : Data Interpretation 03 Hours

Basic interpretation of graphical representation of data, Basic Interpretation of Percentage based data

Second Semester

Marketing Management

Nature	Area	Semester	
Core	General Management	II	
Course Code	**Course Name**	**Credit/Distributions**	
	Marketing Management	(L-3:T-0:P-1) Credit = 04	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives:

- To be able to analyze various Marketing Concepts
- To Identify the criteria of Consumer Behaviour Process
- To evaluate the difference between Consumer Marketing and Business Marketing
- To appreciate the Brand Concept inevitability

UNIT I – Introduction to Marketing Management 12 Hours

Introduction to Marketing Management: Differences between Selling and Marketing, Scope & nature of Marketing Management, Classification of various products/services. Various Marketing concepts, Different types of Marketing environment, elements of Marketing Mix.

UNIT II – Nature of Consumer Behavior 10 Hours

Nature of Consumer Behavior: Various steps in consumer & Buyer Behavior Process, Models of Consumer Behavior. Fundamentals of Marketing Research, Marketing Information System.

UNIT III – Test Marketing, Concept of Segmentation, Targeting & Positioning

10 Hours

Test Marketing, Concept of Segmentation, Targeting & Positioning: Basis for Segmentation. Differences between Consumer Marketing and Business Marketing.

UNIT IV – Product Mix and Product Line 12 Hours

Product Mix and Product Line, Product Portfolio, Product Life Cycle strategies. Branding, types of Brands, Brand Building, measuring Brand Equity. Packaging and Labeling. Pricing, General Pricing approaches, new Product Pricing strategies, Public Policy and pricing.

UNIT V – Product Mix and Product Line **12 Hours**

Elements of Promotion Mix, Marketing Communication Process, Internet Marketing, E-tailing, Levels and Strategies of Distribution Channels, Scope of Logistics Management.

Practical Components:

- Consider the products of your favorite like, smart phones, Cars and apprerals etc to analyze the Buying Behaviour.
- Analyze the various restaurants in city – how are they segmented? If you were to start a new restaurant, how would you position it? What would your parameters?
- Analyze the product life cycle of a few common products like jeans, Laptops, Computers etc.
- Visit a supermarket and study the pricing, packaging and advertising strategy of some FMCG companies like HUL, ITC, Britannia, Parle, and others in some products like Incense Stick, Soaps, Biscuits etc.

Reference Books:

- Marketing Management – Philip Kotler, Prentice Hall India, (New edition)
- Basic Marketing – Perault
- Fundamentals of Marketing – William Stanton
- Principles of Marketing – Philip Kotler and Garry Armstrong
- Marketing Management – Rajan Saxena
- Marketing Management – Zickmund
- Marketing – Ramesh Kumar

Human Resource Management

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Core</td><td>Human Resource</td><td colspan="2">II</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Human Resource Management</td><td colspan="2">(L-3:T-0:P-1) Credit = 04</td></tr>
<tr><td>C1 + C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course objectives

- To Demonstrate the Knowledge and Skills needed to effectively manage Human Resource in organization
- To Describing the Trends in the Labor force composition and how they affect HRM
- To describe the fundamental concepts, Rules of Law that apply to business activities, employment functions and labor
- To Demonstrate Knowledge of Human Behavior in organization and role of Management Strategies, including Motivation theory to influence Behavior
- To compare the common methods for recruiting and selecting Human Resource
- To Integrate Teamwork, Leadership and Motivational skills to organizational scenarios

UNIT I: Introduction 10 Hours

Introduction: Evolution and Development of HRM, Meaning of HRM, Definition, Nature and scope of HRM, personnel v/s HR, features of HRM, role of HRM, managerial functions and operative functions, objectives of HRM, HRM policies procedures and programmes, organization of HRM: line and staff relationship, HR manager, qualities of HR / personnel manager, Recent trends in HRM.

UNIT II: HR Planning, Recruitment and Selection 15 Hours

HR Planning, Recruitment and Selection: Job analysis – Need for Job analysis, process of Job analysis, Techniques of data collection for job analysis, Job Description and Job specification, Components of job description and job specification, Benefits of job analysis, HRP: Meaning, Objectives, and Benefits of Human Resource Planning. Factors affecting HRP – External Factor, Internal Factors, Process of Human Resource Planning, Recruitment – Definitions and Objectives, process of recruitment, Recruitment policy, Centralized versus Decentralized recruitment, sources of Recruitment – Internal and external sources of recruitment. Selection: Meaning, Steps in Selection Process – Preliminary screening, Application Blank, Selection Tests, Selection Interview, Reference Checks, Physical examinations, Final selection. Placement – meaning and definition, Induction – Meaning, objectives and benefits, Contents of induction program – Formal and informal induction, Differences between induction and orientation programs.

UNIT III – Training and Development 10 Hours

Training and Development: Meaning and definition of training, Objectives of Training, Need for training, benefits of training, Differences between training and development, Training methods – on the job and off the job training methods, Training procedure - identification of training needs, Training Design and delivery, Training evaluation – Reaction, Learning, Behaviour and Results.

UNIT IV – Performance Management 10 Hours

Performance management: Introduction, Meaning and Definition, Objectives of performance Appraisal, Methods of Performance Appraisal – Traditional methods and Modern methods, 360 degree performance appraisal, Uses and Limitations of Performance Appraisal, Potential appraisal, Differences between performance and potential appraisal.

UNIT V - Compensation Planning 11 Hours

Compensation planning: Meaning, Objectives of Wage and salary administration, Components of wage and salary administration, Methods of wage payment, perks, Fringe benefits, Benefits: Types of benefits, Incentives: Types of incentive schemes – Individual incentives and Group incentives, Making Incentives and Benefits more effective.

Practical Component

- Give a job analysis case and ask the students to prepare job description and job specification.
- Plan an advertising layout for the recruitment of the position of sales manager.
- Ask the students to prepare an appointment letter for the post of sales manager of a company.

Text Books

- Dr. S Khanka Human resource management, S Chand 2013
- Personal And Human Resource Management – P Subba Rao – Himalaya Publication, 4/e

Reference Books

- K Ashwathappa Human resource management, Himalaya Publications
- VSP Rao, Human Resourse Management EB
- Keith Davis HR and personnel management, Tata Mc Grawhill, 1985
- Flippo Personnel management Mc Grawhill, 1980

Corporate Finance

Nature	Area	Semester	
Core	Finance	II	
Course Code	**Course Name**	**Credit/Distributions**	
	Corporate Finance	(L-3:T-0:P-1) Credit = 04	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives:

- To familiarize the students with basic concepts of financial management.
- To understand time value of money and cost of capital.
- To analyze capital structure, capital budgeting and dividend decision.
- To understand the short term and long term financing and working capital management.

UNIT I – Financial Management 08 Hours

Introduction to financial management, objectives of financial management – profit maximization and wealth maximization; Nature of basic managerial finance functions – investing, financing and dividend; Agency problems(Issues and Conflicts) ; Time value of money, the concepts of compounding, discounting and present value, annuities(Problems)

UNIT II – Valuation of long term Securities 10 Hours

Distinction among valuation concepts; Bond valuation-bond yields (Current yield, YTM)-Bond market; Valuation of preference stock, Equity valuation -Dividend discount model-P/E ratio approach

UNIT III - Investment Decisions 16 Hours

Cost of Capital Cost of capital – basic concepts. Cost of debenture capital, cost of preferential capital, cost of equity capital (Dividend discounting and CAPM model) - Cost of retained earnings - Determination of Weighted average cost of capital (WACC) and Marginal cost of capital

Capital Budgeting – Capital budgeting process, Investment evaluation techniques – Net present value, Internal rate of return, Modified internal rate of return, Profitability index, discounted payback period, Payback period, accounting rate of return

UNIT IV Dividend policy – Theories of dividend policy 12 Hours

Relevance and irrelevance dividend decision, Walter's & Gordon's model, Modigliani & Miller approach. Dividend policies – stable dividend, stable payout and growth, Bonus shares and stock split corporate dividend behavior. (Theory and Problems)

Unit V - Working Capital Management 10 Hours

Factors influencing working capital requirements - Current asset policy and current asset finance policy- Determination of operating cycle and cash cycle - Estimation of working capital requirements of a firm (Does not include Cash, Inventory & Receivables Management)

Practical Components:

- Identifying the small or medium sized companies and understanding the Investment evaluation techniques used by them.
- Using the annual reports of selected companies, students can study the working capital management employed by them. Students can also compare the working capital management of companies in the same sector.
- Students can choose the companies that have gone for stock split and Bonus issue in the last few years and study the impact of the same on the stock price.

Text books:

- Financial Management, Khan M. Y.& Jain P. K, 6/e, TMH, 2011.
- Financial Management – Prasanna Chandra, 8/e, TMH, 2011

Reference Books:

- Financial Management , Shashi K Gupta and R K Sharma, 8th Revised Edition, Kalyani Publishers, -2014
- Financial Management, Rajiv Srivastava and Anil Misra, Second edition, Oxford University Press,2011
- Financial Management, I M Pandey , 10th Edition, Vikas Publishing House -2014
- Financial Managements & Policy-Vanhorne, James C., 12/e, Pearson, 2002
- Financial Management, Pralhad Rathod, Babitha & S.Harish Babu, Himalaya Publishing House, 2015

Business Research Methods

Nature	Area	Semester	
Core	General Management	II	
Course Code	**Course Name**	**Credit/Distributions**	
	Business Research Methods	(L-3:T-0:P-1) Credit = 04	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives:

The primary objective of this course is to develop a research orientation among the scholars and to acquaint them with fundamentals of research methods. Specifically, the course aims to introduce the basic concepts used in research, the scientific social research methods and their approaches.

Some other objectives of the courses are:

- To develop an understanding of the basic framework of research process.
- To develop an insight into various research designs and techniques.
- To understand some basic concepts of research and its methodologies
- To be able to write research report and thesis independently

UNIT I – Introduction 08 Hours

Research in Business: Overview and role of business research, Information systems and knowledge management, Theory building, Ethical issues in business research.

UNIT II – Problem definition 10 Hours

Problem definition and research proposal, Basic research designs– Exploratory, descriptive and causal designs. Secondary data research designs. Qualitative analysis, Secondary data

UNIT III - Survey 12 Hours

Survey: Basic concepts in survey research, Methods of communication with respondents, Questionnaire, Interview, etc., Observation method, Experimental research. Measurement and scaling concepts, Attitude measurement, Principles of questionnaire design.

UNIT IV - Sampling Design and Methods **08 Hours**

Sampling design and methods: Sample design and sample procedures, Determination of sample size

UNIT V - Data Analysis and Presentation **18 Hours**

Data Analysis and Presentation: Editing and coding for transformation of raw data into information, Basic data analysis – descriptive statistics, Univariate analysis-z-test, t-test. Bivariate analysis: Measures of association.

Presentation of research findings- report writing

Practical components

- Students shall independently develop questionnaire to find out the brand effectiveness of a popular detergent from an FMCG
- Understand and analyse the project report prepare by senior students and discuss

Reference Books:

- Business Research Methods – Zikmund
- Marketing Research – Malhotra N.K.
- Marketing Research – Parashuraman
- Business Research Methods – Donald R. Coopers and Schindler
- Foundations of Behavioural Research – F.N. Kerlinger
- MLA Handbook for Researchers – MLA Association

Production and Operations Management

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Core</td><td>General Management</td><td colspan="2">II</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Production and Operations Management</td><td colspan="2">(L-3:T-0:P-1) Credit = 04</td></tr>
<tr><td>C1 + C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives:

- To develop an understanding of the contemporary techniques involved in operations management
- To highlight the significance of TQM and supply chain management in the success of overall operation management process

UNIT I - Production Strategies 08 Hours

Production Strategies: product strategies – Product life cycle – Productive system types – Impact of technology on organization and operations functions.

UNIT II - Plant Location and Types of Plant Layout 10 Hours

Plant Location and Types of Plant Layout: production planning and control –Inventory planning and control – Just in Time - Materials requirements planning – Planning production in aggregate terms.

UNIT III - Job Designing 12 Hours

Job designing: work study and time study – Statistical quality control methods. Japanese manufacturing systems – Flexible manufacturing system

UNIT IV - Total Quality Management
12 Hours

Total Quality Management: trends in quality management, benchmarking, business process reengineering, Kaizen , Six Sigma Motorola systems, Quality criteria based on Deming prize, Malcolm Baldrige Award. Quality Management Systems, ISO Standards.

UNIT V - Supply Chain Management 14 Hours

Supply Chain Management: concept of SCM. Managing the external and internal supply chain, Global SCM and sourcing.

Practical components:

- Students shall choose a manufacturing company in the beginning of the semester
- Make a detail study of TQM practice in the company and the positive changes.

Reference Books

- Modern Production Management – Buffa Elwood. S, and Rakesh K. Saren, John Wiley and Sons, 2003.
- Production and Operation Analysis – Steven Nahmas
- Cases in Production / Operations Management – K.N. Krishnaswamy
- Total Quality Management – Dale H. Besterfield and others – Pearson Education, New Delhi, 2003.
- Total Quality Management – Poornima Choudhary – Pearson Education – New Delhi, 2002.
- Total Quality Management – Sridhar Bhatt.
- Supply chain Management theory and practices – Mohanty and Deshmukh, Biztantra 2005

Legal Aspects of Business

Nature	Area	Semester	
Foundation	Human Resource	II	
Course Code	**Course Name**	**Credit/Distributions**	
	Legal Aspects of Business	(L-2:T-0:P-1) Credit = 03	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives

- To gain an understanding of the legal environment.
- To comprehend about various laws pertaining to companies from incorporation to winding up.
- To get acquainted with the laws pertaining to consumer protection, FEMA, SEBI, IDRA.

UNIT I: Introduction **10 Hours**

Industries Development and Regulation Act (IDRA), Competition Act. Foreign exchange management act (FEMA)

UNIT II: Company Law **15 Hours**

Company Law, provisions of Indian Companies Act 1956 relating to incorporation, management and administration. Filing of returns, Remedies against mismanagement and oppression. Powers of investigation by the Government, Issues relating to good corporate governance.

UNIT III: IPR and Related aspect **10 Hours**

Intellectual property rights, Patents and Trademarks Act, copy rights act, geographical appellation.

UNIT IV: Stock Market Operation and Regulation **10 Hours**

Outlines: Security Market Laws, Security and Exchange Board of India Act (SEBI), Securities contract act, Laws pertaining to stock exchanges, SARFESI Act.

UNIT V: IT Act **11 Hours**

Outlines: consumer protection act and Information technology act.

Text Books:

- A Manual of Business Laws – S.N. Maheshwari and S.K. Maheshwari

Reference Books:

- Business Law for Management – K.R. Bulchandani
- Business Environment: Texts and Cases – Francis Cherunilam
- Business and Corporate Laws – S.S. Gulshan and G.K. Kapoor
- Bare Acts of respective legislations.

Skill Development – 2

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Foundation</td><td>General Management</td><td colspan="2">II</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Skill Development-2</td><td colspan="2">(L-0:T-0:P-1) Credit = 01</td></tr>
<tr><td>C1 + C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives

- The present course is designed to provide an effective communication required for a successful manager
- To encourage the students to ideate entrepreneurial thoughts

Unit-I **03 Hours**

Advance Goal Setting, Effective Communication Skills (Empathetic Communication), Power of Positive Thinking, Emotional Intelligence

Unit-II **03 Hours**

Problem Solving techniques, Power of Preparedness, Entrepreneurship (How to ideate and start a business and Stress Management tools

Unit-III **04 Hours**

Team work, Team building exercise, Leadership Skills, Self Confidence

Unit-IV **03 Hours**

Listening skill exercises, Creativity, Body language

Unit-V **03 Hours**

Training on relevant Courses before Graduation, Grooming, Cleanliness, Decorum, Table Manners

Third Semester

Strategic Management

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Core</td><td>General Management</td><td colspan="2">III</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Strategic Management</td><td colspan="2">(L-3:T-0:P-1) Credit = 04</td></tr>
<tr><td>C1 + C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives

- To be able to comprehend vision, mission and goals of the company
- To be able to analyze and deal with the competition using strategic management tools

UNIT I: Introduction **08 Hours**

Origin of strategy, strategy vs tactics, vision, mission and objectives, elements of business strategies, Strategic Management process

UNIT II: Competitive Analysis **10 Hours**

Strategically relevant components of internal and external environment, Industry and competitive analysis, analysis of resources and competitive capabilities, environmental scanning techniques

UNIT III: Strategy Models **12 Hours**

Strategy Models - BCG matrix, GE nine cell planning grid, Chandlers thesis, levels of strategy making, Mackinsey 7 s model, Porters five forces model, Value Chain Analysis, Strategic intent and the concept of strategic pyramid, corporate ethics and corporate social responsibility(CSR).

UNIT IV: Generic competitive strategies **12 Hours**

Generic competitive strategies – stability, expansion, retrenchment, conglomerate and their variants. Strategic and competitive advantage

UNIT V: Strategy Implementation **14 Hours**

Balanced Scorecard, Benchmarking, building core competencies and competitive capabilities, developing policies and procedures for implementation. Designing and installing supporting and rewarding systems. Evaluating and monitoring implementation.

Practical Components:

- Do an Internet search of 3 companies, analyze and write down the strategy and execution efficiency.
- Make a study on an unprofitable company and find out the reasons for failures in the market and their strategies.
- Conduct SWOT analysis of a company and submit the report

Recommended Books:

- Strategy and Structure – Alfred C.Chandler
- Strategic Management – Alex Miller and Irwin
- Competitive Advantages: Creating and Sustaining, Superior Performance –Michael E. Porter
- Competing for the future – Prahlad and Hammel
- The Future of Competition – Prahlad and Venkataraman
- Crafting and executing Strategy – Aurthor A. Thompson and others
- The Art of Strategy – Avinash K.Dixit and Barry J.Nalebuff

Total Quality Management

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Core</td><td>General Management</td><td colspan="2">III</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Total Quality Management</td><td colspan="2">(L-2:T-0:P-2) Credit = 04</td></tr>
<tr><td>C1 + C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course objectives

- To explore the theories and practices of the term quality
- To understand and familiarize the customer needs
- To impart hands on experience in various quality systems

UNIT I Introduction **10 Hours**

Introduction to TQM, Meaning of the terms quality, quality control and quality assurance, importance of quality, quality dimensions of products and services, quality and competitive advantage, cost of quality, TQM, Evolution of TQM, Basic principles of TQM, TQM VS Traditional management, advantages of TQM

UNIT II Gurus of TQM **10 Hours**

Philosophical Framework to TQM Contribution of various gurus of TQM, Deming-Deming's chain reaction, Deming's principles, deadly sins, PDCA cycle, Juran's Quality

triology, Juran's breakthrough sequence, Philips crosby- Quality is free, Taguchi's Quality loss function, Ishikawa's contributions and Quality Circles.

UNIT III Benchmarking 12 Hours

Benchmarking Definition, reasons for benchmarking, types of benchmarking, process of benchmarking what to benchmark, understanding current performance, planning, studying others, using findings, Xerox model of benchmarking, Advantages and pitfalls of benchmarking Concept of Kaizen and its applications

UNIT IV Business Process Re-engineering 12 Hours

Business Process Re-engineering(BPR) Introduction, Need for BPR, Implementing BPR, Steps in BPR, Re-engineering Vs. TQM, BPR Vs. Kaizen, Re-engineering the structure, change management and BPR, BPR and IT, Advantages and Limitations, Indian examples of BPR

UNIT V Quality Systems 12 Hours

Quality Management Systems(QMS) Introduction, meaning of QMS, ISO 9000, Benefits of ISO, ISO 9000-2008 series, implementation of ISO 9000, Problems related to ISO 9000, QS 9000, Need for QS 9000, QS 9000 series ENVIRONMENTAL MANAGEMENT SYSTEM (EMS), ISO 14000 series, Benefits of ISO 14000, Integrating ISO 9000 & 14000, SEI-CMM level 5,

Practical Component:

- Students have to study any Indian organization which has won Deming prize and identify the quality initiatives of that organization
- Students are expected to study various quality awards given in India like CII Business excellence award , Rajiv Ghandi national quality award and Tata groups Excellence Award and compare with international awards
- Students can identify any 2 products and 2 services and develop Quality attributes for thesame.
- Students can identify industry from any sector and conduct a benchmark study with respect to best in the class.

Recommended Text Books:

- Total Quality Management Text and Cases, G. Nagalingappa & Manjunath VS, Excel books.
- Management and Control of Quality, James R. Evans, 8/e 2012, Cengage Learning
- Total Quality Management, Dale.H. Besterfield, 3rd Edition, Pearson Education
- Total Quality Management, Shridhar Bhat, Himalaya Publication

Reference Books:

- Total Quality Management by Poornima M.Charantimath, Pearson Education.
- Quality Control Handbook by JURAN, Mc.Graw Hill Publication

Electives: Group - I

Consumer Behavior

Nature	Area	Semester	
Elective - I	Marketing	III	
Course Code	**Course Name**	**Credit/Distributions**	
	Consumer Behavior	(L-2:T-0:P-1) Credit = 03	
		C1 + C2	30 Marks
		C3	70 Marks

Course objectives

- To get acquainted with various Motivational Factors
- To Identifying the factors influencing Consumer Behaviour
- To appreciate the concept of Customer Satisfaction as the key factor

UNIT I Introduction 12 Hours

Differences between Motives Motivating and Motivation, Dynamic characteristics of Motivation, Personality, Values of Perception, Attitudes, Basis of Segmentation, Life Style influences.

UNIT II Models of Consumer Behavior 12 Hours

Introduction, Factors influencing Consumer Behaviour, Personality, Psychographics, Family, Society, Different models of Consumer Behaviour – Economic, Learning, Psychoanalytical, Sociological, Howard Shett, Nicosia, Webster and Wind, Engel, Blackwell and Minard models.

UNIT III Consumer Decision Making 12 Hours

Consumer Decision Making, buying roles, Stages of the Decision Process – High and low effort decisions, Post purchase decisions, Consumer Adaptation Process.

UNIT IV Consumer Satisfaction 10 Hours

Consumer Satisfaction; Satisfaction versus Service, Quality Level and Customer Loyalty, Handling Customer dis-satisfaction and complaints, Customerisation, Implications of shaping expectations.

UNIT V Consumer Behavior Trends 12 Hours

The future of consumer behavior in India, Issues and Challenges of Social Class, Challenges in cross-cultural influences, Reasons behind rise of consumerism, Consumer protection act in India.

Practical Components:

- Students shall visit malls and unorganized retail outlets and observe the behaviour of customers of different outlets while buying different category of goods and present the findings / observations followed with a group discussion.
- Students need to prepare a questionnaire and do a survey on consumer buying behaviour and present the findings in the class.
- Students are encouraged to discover the need for motives in three to four advertisements
- Conduct a survey using Interview Method to find out the important factors in their purchase of Watches, Laptops, Backpacks etc.

Recommended Books:

- Marketing Research – R.Nargundkar
- Consumer Behaviour – Schiffman and Kanuk
- Marketing Research – Tull, Green and Hawkins
- Business Research Methods – Zikmund
- Marketing Research – N.K. Malhotra
- Marketing Research – Parashuraman, Grewal
- Consumer Behaviour – Hoyer Mac Innis
- Consumer Behaviour in Indian Perspective – Suja R. Nair

Sales and Logistics Management

Nature	**Area**	**Semester**	
Elective - II	Marketing	III	
Course Code	**Course Name**	**Credit/Distributions**	
	Sales & Logistics Management	(L-2:T-0:P-1) Credit = 03	
		C1 + C2	30 Marks
		C3	70 Marks

Course objectives

- Analyze the various dimensions of Selling Concepts
- To appreciate the sales process through emerging electronic channels
- To Outline the logistics involved for an effective sales management

UNIT I Sales Management **12 Hours**

Objectives of Sales Management, Personal Selling, Salesmanship, Personal Selling Process, Types of Sales Organizations – Determining the kind of Sales Force and Size of the Sales Force. Qualities of Sales Professionals.

UNIT II: Managing the Sales force **12 Hours**

Effective Recruiting of the Sales Force, Selecting and Training the Sales Force, Elements of Time and Territory Management, Sales Territories and Sales Quotas – Compensating the Sales Force, Motivating the Sales Force – Controlling & Evaluating the Sales Force.

UNIT III: Trends in Retailing and Wholesaling **10 Hours**

E-commerce: E-tailing, Marketing on the net, Non-store retailing, Emerging trends of Retailing &Wholesaling in India.

UNIT IV: Distribution and Logistics Management **12 Hours**

Objectives of Logistics Management: Modes of Transportation, Design of Distribution Channel, Strategies of Distribution Channel, Components of Logistics – Inbound and Outbound Logistics, Third party Logistics, Freight Forwarders, Communication Order Processing, Packaging, Warehousing.

UNIT V Logistics Strategies **10 Hours**

Elements of Supply Chain Management, Logistics Information System, Computer packages used in Logistics, Sales and Logistics for rural markets,

Practical Components:

- To Study the Important features of Apps which appeal most related to customers of Food suppliers by conducting an survey using Interview method
- Conduct a survey in rural areas and study the implications associated with imitation (me too) products.
- To analyze the designs of packaging and list out the advantages and disadvantages associated with it.

Reference Books:

- Sales Management – Decisions, Strategies and Cases – Richard R. Still, Edward W. Cundiff and Noman A.P. Govani
- Professional Sales Management – R.E. Anderson, Joseph F. Har, Alan J. Bash
- Marketing Channels – Louis W. Stern, Adel I. ER – Ansary, T. Coughlan
- Fundamentals of Logistics Management – M. Lambert, James R. Stock, M. Eliram
- Logistics Management – Donald J.B. and D.J. Closs
- Logistics and Supply Chain Management – Martin Christopher
- Sales Management – Analysis and Decisions Making – Thomas N. Ingram
- Managing Supply Chain – J.L. Gattorn and D.W. Waldis

Advertising and Sales Promotion Management

Nature	Area	Semester	
Elective - III	Marketing	III	
Course Code	**Course Name**	**Credit/Distributions**	
	Advertising and Sales Promotion Management	(L-2:T-0:P-1) Credit = 03	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives

- Discuss the increasing importance of promotion and how it differs from advertising
- What functions do advertising objectives serve
- Recognize various methods of evaluating adverting effectiveness

UNIT I: Promotion Mix **12 Hours**

Elements in Promotion Mix, Types of Advertising, Impact of Publicity on society, Personal Selling Strategies, Public Relations and Sales Promotion.

UNIT II: Advertising **10 Hours**

Advertise ability and Advertising aids, Advertising Planning and Decision Making, Media Frequency Plan.

UNIT III : Advertising Campaign Planning **14 Hours**

Advertising Effectiveness, Assessment and Criticism of DAGMAR Approach, Creative approaches for making a effective Advertising, Copywriting, pre-testing and post-testing, Designing a Advertising Copy, Marketing Communications, Different types of Advertising appeals and themes, Drafting an advertisement copy.

UNIT IV : Advertising Media **10 Hours**

Types of media, Conventional media, Traditional media and media planning and Scheduling, Advertisement Budgets, Advertising Strategies for rural markets.

UNIT V : Advertising Agencies **10 Hours**

Ethics in Advertisement, Advertising Agencies in India and abroad, Rural Advertising, Social Advertising, Ethics followed in advertising, Characteristics of Advertising Standards Council of India (ASCI).

Practical Components:

- Analyze the advantages and limitations of sales promotion of 5 FMCG MNC's in India
- Outline the methods and tools of sales promotion by visiting the malls

- Analyze the room for the improvement of technological innovation in advertisement in a major textile company

Recommended Books:

- Advertisement and Promotion – Belch and Belch
- Advertising – Aaker and Bathra
- Advertising Management – Chunawalla
- Advertising Management – Write and Ziegler
- Contemporary Advertising – Williams Arens
- Advertising Management – Rajeev Batra, John G.Myer, David Aker
- Advertising Planning & Implementation – Sangeeta Sharma & Raghuvir Singh
- Advertising Principles and Practice – Wells, Moriatry, Burnett
- Advertising Management – Jaishri Jethwanry, Shruthi Jain

Electives: Group - II

Strategic Financial Management

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Elective - I</td><td>FINANCE</td><td colspan="2">III</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Strategic Financial Management</td><td colspan="2">(L-2:T-0:P-1) Credit=03</td></tr>
<tr><td>C1 + C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives:

- To analyze the financial implications or aspects of various business strategies and the strategic management of finance
- To understand conceptual framework i.e., the act of putting together financial assumptions, ideas and perceptions into a strategic design

Unit I - Conceptual framework of Strategic Financial Management 10 Hours

Strategic Financial Decision making framework, function of Strategic Financial Management; Strategy at different hierarchy level; Financial Planning-Process-Types of Financial Plan – Financial Model-Types of Financial Model- process of Financial Model Development (Theory only)

Unit II - Capital Structure Decisions 12 Hours

Capital structure & market value of a firm. Theories of capital structure – NI approach, NOI approach, Modigliani Miller approach, Traditional approach. Planning the capital structure: EBIT and EPS analysis, ROI & ROE analysis (Theory and Problems)

Unit III– Investment Decisions under Risk and Uncertainty 14 Hours

Investments Decisions under Risk and Uncertainty–Techniques of Investment Decision–Risk Adjusted Discount Rate, Certainty Equivalent Factor, Statistical Method (Probability distribution Approach, Normal Distribution Approach) Sensitivity Analysis and Simulation Method, Decision tree. (Problems)

UNIT IV – Leasing 12 Hours

Leasing–Importance, Types, Tax Considerations, and Accounting Considerations–Evaluation of Lease from the point of view of Lessor and Lessee–Lease versus Buy Decision–Venture Capital–Concept and Developments in India–Process and Methods of Financing–Fiscal Incentives

Unit V- Financial Re-Engineering 08 Hours

Meaning of Financial Re-Engineering- interpretations of Various Stakeholders-approach to innovative Financial Engineering, Funding Structure-Fund rising Instruments; Programs and Policies to reward various Shareholders

Practical Components:

Students should be able to distinguish below activities

- How can you distinguish between strategies and policies?
- Are strategies and policies as important in a non business enterprise (such as a labor union, the State Department, a hospital, or a city fire department) as they are in a business? Why and how?
- Why are contingency strategies important?
- Choose an organization you know and identify its strengths and weaknesses. What are its special opportunities and threats in the external environment?
- How would you make an organizational appraisal of your college or university? What kind of ―business‖ is the school in?
- How can strategies be implemented effectively?

Recommended Books:

- Strategic Financial Management, 2/e Girish P Jakhotiya Vikas Publishing

Financial Market and Services

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Elective - II</td><td>Finance</td><td colspan="2">III</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Financial Market and Services</td><td colspan="2">(L-2 :T-0: P-1) Credit=03</td></tr>
<tr><td>C 1+ C 2</td><td>30 Marks</td></tr>
<tr><td>C 3</td><td>70 Marks</td></tr>
</table>

Course objective

- To provide the students, basic knowledge about the Finance concepts, markets and various services provided in those markets.
- To provide adequate information about the roles of intermediaries and its regulating bodies.
- To provide information about the prevailing financial system in India.

Unit I Overview of Indian Financial System 12 Hours

Indian Capital Market and Money Market, Foreign Institutional Investors (FIIs)-Portfolio Management Schemes of Indian Institutional Investors, Global Capital Flows - Hedge Funds, Private Equity. ADR and GDR.

Unit II Indian Capital Market 10 Hours

Primary and Secondary Capital Markets in India-Market for Stocks and Bonds, Market for Derivative Instruments (Financial and Commodities), Over the Counter Markets (OCTEI), NCDEX, MCX. Markets for Government Securities, Mock Exercises in Online Stock Market Operations on Sensex and Nifty.

Unit III Banking in India **10 Hour**

Meaning of Bank, types of banks, Current problems of public sector banks, capital adequacy norms, Basel norms, NPA problem, corporate debt restructuring, and securitization of debt and asset reconstruction companies, the new Insolvency and bankruptcy code

Unit IV Merchant Banking and Credit Rating 12 Hours

Introduction to merchant banking, merchant bankers/lead managers, registration, obligation and responsibilities, underwriters, bankers to an issue, brokers to an issue. Issue management activities and procedure pricing of issue, issue of debt instruments, book building green shoe option, services of merchant banks, Credit Rating - SEBI guidelines, limitations of rating.

Unit V Regulatory Mechanisms 12 Hours

The role of SEBI in regulating the Capital Market and Stock Exchanges-Outlines of the SEBI Act and Powers of SEBI- Important Cases dealt with by SEBI-Sahara, NSEL, Insider Trading Cases etc. Investigation into Corporate Frauds under Companies Act 2013, NFRA and IBBI

Practical component:

- Prepare a report on capital market scams. And visit stock broking firms.
- Visit any 5 retailers and collect the information about cashless transaction (merchant banking)

Reference Books:

- Vasanth Desai, Financial Markets & Financial Services, HPH, Mumbai
- Punithavathy Pandian, Financial Markets and Services, Vikas Publishing House, New Delhi
- Gorden E & Natarajan, Financial Services, HPH, Mumbai

Investment Analysis and Portfolio Management

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Elective - III</td><td>Finance</td><td colspan="2">III</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Investment Analysis & Portfolio Management</td><td colspan="2">(L-2:T-0:P-1)
Credit=03</td></tr>
<tr><td>C1+C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives

- To have understanding on investment and avenues of investment
- To have exposure on analysis techniques of capital market and
- To understand various theories of portfolio management

Unit I - Investment Background 08 Hours

Concepts of Investment- Investment Avenues - Objectives of Investment- Investment, Speculation and Gambling - Trading and investing - Portfolio Management process - Sources of Investment Information - Investing Internationally - The asset allocation decision -Organization and functioning of securities market

Unit II - Analysis of Risk & Return 14 Hours

Return - Measuring Return- Risk - Measuring Risk - S.D and Variance-Return and Risk of a Single Security and Portfolio - Calculation of Risk using Variance Covariance Matrix - Reduction of Risk through Diversification - Concept and Types of Risks - Total Risk, Systematic and Unsystematic Risk - Other Risks - Beta and its Computation - Uses and Limitations of Beta.

Unit III - Valuation of Securities: 12 Hours

Bond- Bond features, Types of Bonds, Determinants of interest rates, Bond Management Strategies, Bond Valuation, Bond Duration. Preference Shares- Concept, Features, Equity shares- Concept, Valuation, Dividend Valuation models. (Theory & Problems).

Unit IV - Fundamental Analysts and Technical Analysis 08 Hours

Economy - Industry-Company Framework- Economic Analysis and Forecasting – Technical Analysis- Assumptions of Technical Analysis - Technical Indicators - Dow Theory - Important Tools of Technical Analysis - Limitations of Technical Analysis - behavior of stock prices- Market Efficiency - Forms of Market Efficiency- Behavioral Finance - Standard Finance Versus Behavioral Finance

Unit V - Active Portfolio Management: 14 Hours

Markowitz (MPT) ,Sharpe, Treynor, Jensen's Alpha measures of mutual fund performance – measuring investment return, conventional theory of performance evaluation, Performance attribution procedures, style analysis and morning star's, risk adjusted rating. Active portfolio construction using Treynor – Black model, Sharpe Optimal Portfolio Construction

Practical Components:

- Students should study the stock market pages from business press and calculate the risk and return of selected companies.
- Each student will be given a virtual cash of Rs.5 Lakhs and they will be asked to invest in equity shares based on fundamental analysis throughout the semester. At the end the best investment will be awarded based on the final net worth. Virtual on line trading account can be opened for the student and every week 2 Hours can be allotted to invest, monitor and evaluate.
- Students should study the stock market pages from business press and calculate the risk and return of selected companies.
- Students can do a macro economy using GDP growth.
- Students' are expected to do Industry analysis for specific sectors.
- Students can do Company analysis for select companies using profitability and liquidity ratios.
- Practice technical analysis using Japanese candle sticks.

Recommended Books:

- Investment Analysis and Portfolio management – Prasanna Chandra,3/e,TMH, 2010.
- Investments – ZviBodie, Kane, Marcus &Mohanty, 8/e, TMH,2010.
- Security Analysis & Portfolio Management- J Kevin, TMH

Reference Books:

- Analysis of Investments & Management – Reilly & Brown, Cengage, 10e/2017
- Security Analysis & Portfolio Management – Punithavathy Pandian,2/e, Vikas, 2005.

Electives: Group - III

Personal Growth and Interpersonal Effectiveness

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Elective - I</td><td>Human Resource</td><td colspan="2">III</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Personal Growth and Interpersonal Effectiveness</td><td colspan="2">(L-2:T-0:P-1) Credit=03</td></tr>
<tr><td>C1+C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives

- To Develop and nurture a deep understanding of self.
- To Understand and practice personal and professional responsibilities.
- To Nurturing comprehensive skill sets for life knowledge such as learning, personality improvement, and effective interpersonal relation, resolving conflict for better intrapersonal and interpersonal relationship.

UNIT I Personal Growth **10 Hours**

Meaning and concepts of personal growth, Self esteem: Know yourself, accept yourself, Self improvement: Plan to improve, actively working to improve yourself. Life positions, Personal life style choices.

UNIT II Individuals and Organizations **12 Hours**

Values - Meaning, Types of values – Societal values, Organizational values and work values. Attitudes: Nature and Dimensions of attitude – Components of attitudes, Functions of attitudes, Changing attitudes, and antecedents of work related attitudes. Job satisfaction – Meaning, influences on job satisfaction, outcomes of job satisfaction. Job involvement, Organizational commitment – Meaning, Outcomes of organizational commitment, Guidelines to enhance organizational commitment.

UNIT III Learning and personality theories **12 Hours**

Meaning, Learning principles, Learning Theories – Classical conditioning theory, Operant conditioning, Cognitive theories, Social Learning theory, Learning styles. Personality theories: The Big Five personality Traits, Myers Briggs Type Indicator (MBTI), Carl Jung's theory of personality types.

UNIT IV Interpersonal Behavior and conflicts **10 Hours**

Nature of conflict, Levels of conflict, Sources of conflict, Effects of conflict, Intraindividual conflict – Conflict due to frustration, Goal conflict, Role conflict and

ambiguity, Interactive conflict – Interpersonal conflict, Inter group behavior and conflict, Assertive behavior, Transactional analysis, Types of Transaction, Life positions.

UNIT V Stress management and Emotional Intelligence 12 Hours

The emergence of stress, causes of stress – Extra organizational stressors, Organizational stressors, group stressors and individual stressors. Consequences of stress – Physiological symptoms, psychological symptoms and behavioral symptoms. Coping strategies for stress – Individual approaches and organizational approaches. Emotional Intelligence: Role of emotions, Types of emotions, Meaning of Emotional Intelligence, components of emotional Intelligence.

Practical Component

- Students are expected to conduct an in depth study about various personality traits and TA and submit a detailed report.
- Ask the individual students to seek multisource feedback about their interpersonal effectiveness from peers, teachers and parents.
- Conduct mock stress interview for students to enhance their employability skills.

Recommended Books:

- Understanding OB - Udai Pareek, Oxford University Press.
- Organizational Behaviour: Human Behavior at work – John W. Newstrom and Keith Davis, 11/e, Tata McGraw Hill, 2003.

Reference Books

- Organizational Behavior – concepts, controversies and applications – Stephen P Robbins – Prentice hall International, 11/e
- Organizational Behavior – Fred Luthans, TMH, 10/e, 2005
- Wallace & masters personal development for live and work, Thomson Learning, 8/e, 2004

Organizational Change and Development

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Elective - II</td><td>Human Resource</td><td colspan="2">III</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Organizational Change and Development</td><td colspan="2">(L-2:T-0:P-1) Credit=03</td></tr>
<tr><td>C1+C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives:

- To gain a general understanding of organizational change and development concepts
- To develop an understanding of change models and theories
- To reflect on different interventional strategies and their importance in a change process
- To apply change concepts to a real case example

UNIT I: Organizational Change 10 Hours

Introduction to change, Nature of Change, Types of change, Reasons for change, Reasons for resistance to change, Overcoming resistance to change, Differences between planned and unplanned organizational Change, Change agents, Skills and competencies of change agents.

UNIT II: Organization Development 10 Hours

Introduction and concepts of Organization Development, Characteristics of OD, History of Organization Development: Laboratory Training Stem, Survey Research and Feedback Stem, Action Research Stem, Sociotechnical and Socioclinical Stem. Values, Assumptions and Beliefs in organization development: Early statements of OD values and Assumptions, Implications of OD values and Assumptions.

UNIT III: Theory and Management of Organization Development 12 Hours

Foundations of organization development: Models and Theories of planned change - Kurt Lewin's Three stage model, Force Field Analysis, Burke Litwin Model of Organizational Change, Systems Theory. Participation and Empowerment, Teams and Teamwork, Parallel Learning Structure, Normative Re educative strategy of Change. Managing the organization development process: Diagnosis, Six box model, Action Component, Program management component. Action research and organization development: Action Research A Process and an Approach, Genesis of OD in the company. The OD Process – A Diagnostic Study.

UNIT IV: Organization Development Intervention 14 Hours

Team interventions: Teams and work Groups Strategic Units of Organizations, Broad Team Building Interventions, The Formal Group Diagnostic Meeting, The Formal Group Team Building Meeting, Process Consultation Interventions, A Gestalt Approach to Team Building, Techniques and exercises used in Team building. Inter-group and third party peacemaking intervention: Inter group team building Interventions, Third party peacemaking Interventions, Organization mirror Interventions, Partnering. Comprehensive intervention: Beckhard's Confrontation meeting, Strategic Management activities, Real time strategic change, Stream Analysis, Survey feedback, Grid OD, Transorganizational

Development. Structural interventions: Sociotechnical systems, Self managed teams problems in implementation, MBO and Appraisal, Quality Circles, Quality of worklife projects, Physical settings and OD, Total Quality Management, Self design strategy, Large scale systems change and Organizational Transformation. Training experiences: T Groups, Behavioural modeling, Life and career planning, Coaching and mentoring, Instrumented Training.

UNIT V: Key Considerations and Issue **10 Hours**

Issues in consultant-Client relationships: Entry and Contracting, defining the client system, The trust issue, The nature of consultant's expertise, Diagnosis and appropriate interventions, Depth of Intervention, The consultant as a model, The consultant team as a microcosm, Dependency issue and terminating the relationship, The role of the Human Resource specialist in OD activities. Power, politics and organization development: Theories about the sources of social power, Organizational politics defined, Frameworks for analyzing power and politics, The role of power and politics in the practice of OD.

Practical Component

- Students are expected to submit a report on Changes that have taken place in various industries.
- Individual students are expected to conduct force field analysis and identify the driving and restraining forces for trimester scheme.

Recommended Books:

- French and Bell; Organization Development,6th Ed, Pearson, 2006.
- Dr.S.S.Khanka; Organizational Behavior, 4th Ed, S.Chand & Company pvt ltd, 2003.

Reference Books

- Cummings T. G, & Worley C.G Organization Development and Change 8th Ed, 2007, Thomson
- Fred Luthans Organization Behaviour , Mc Grawhillm, International Edition 2005
- Keith Davis Human Behaviour at Work,11th Ed 2002, Tata Mc Grawhill;

Training in Organizations

Nature	**Area**	**Semester**	
Elective - III	Human Resource	III	
Course Code	**Course Name**	**Credit/Distributions**	
	Training in organizations	(L-2:T-0:P-1) Credit=03	
		C1+C2	30 Marks
		C3	70 Marks

Course Objectives

- To develop an understanding on Training and Learning environment.
- To comprehend on how need analysis is done for training.
- To getting acquainted with the trainer's skills and designing a training program.
- To conceptualize on the evaluation of training program.

UNIT I: Introduction **10 Hours**

Introduction to the concept of Training, Importance of training, Advantages of training, Training challenges, Changing workplace and workforce, Training as a sub system of HRD

Learning principles, learning environment, Instructional design, Learning outcomes, Feedback, Conditions of transfer, Converting training objectives to training plan.

UNIT II: Training Needs Assessment (TNA) **12 Hours**

Introduction to Needs Assessment, Why conduct Training Need Analysis? When to conduct a Training Need Analysis?, Needs Assessment Process - Organizational support for TNA, Organizational analysis, Requirement Analysis, Task and KSA Analysis, Person Analysis, Input design and evaluation of Training programs. Needs Assessment Techniques, Advantages and Disadvantages of Needs Assessment Techniques, Training enhancement, Trainee characteristics – Trainee readiness and Trainee Motivation.

UNIT III: Trainer's skills **10 Hours**

Communication Skill, Questioning Skill, Body Language Gesture, Handling difficult situation, Creativity skills, Technical skills, Interpersonal skills, Self Development and awareness, Managerial skills, Designing skills, Humour, Integrity, Credibility, Transparent, resilience, Rapport building, Confidence, Feedback sensitivity.

UNIT IV: Training Delivery **12 Hours**

Differences between Traditional and Modern methods, Traditional Training Approaches – Classroom instruction, Lecture and Discussion, Case study, Role play, Self Directed Learning Program (SDLP), Simulated work settings, Modern Training Approaches - Distance Learning Program (DLP), CD ROM and Interactive Multimedia, Web-based instructions, Intelligent Tutoring System (ITS), Virtual Reality Training (VRT).

UNIT V: Training Evaluation **12 Hours**

Need for evaluation, Evaluation criteria, Evaluation objectives, Types of evaluation instruments – Questionnaires / survey, Interview, Tests, Focus group, Observation of participant, Performance record, Training Evaluation Models – Kirk Patrick's model, Philip's Model, CIRO model of Training Evaluation.

Practical Component

- Students are expected to conduct a mock training session including need identification and a set of students to evaluate the effectiveness of the same.
- Give a training need analysis case and ask the students to find out the training needs.
- 10 minutes of role play by individual students to exhibit their skills as a trainer.

Recommended Books:

- Irwin L. Goldstein, J. Kevin Ford, Training in Organization, 2005, 4th Ed, Wordsworth.
- Dr.B.Janakiraman, Training and Development, Biztantra / Wiley Dreamtech, 2005

Reference Books

- P Nick Blanchard James W Thacker Effective Training: System Strategies & Practices, Wiley publications 2001.
- Training For Organizational Transformation – Rolf P Lynton Udai Pareek.
- The Trainers portable mentor – Gargulo & Others

Skill Development – 3

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Foundation</td><td>General Management</td><td colspan="2">III</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Skill Development-3</td><td colspan="2">(L-0:T-0:P-1) Credit = 01</td></tr>
<tr><td>C1 + C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives

- To think logically and appreciate the reasoning capability
- To Involve the students in group discussion and mock interview exercises to enhance their employability

Unit- I **02 Hours**

Language enhancement tips, written communication skills, public speaking skills

Unit- II **02 Hours**

Exercises to develop right attitude, Self-Development, time management

Unit- III **04 Hours**

Quantitative Aptitude & Logical Reasoning

Unit- IV **04 Hours**

GD & Mock GD

Unit- V **04 Hours**

Resume Writing, HR Interview, FAQs & Mock Interview

Fourth Semester

Event Management

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Core</td><td>General Management</td><td colspan="2">III</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Event Management</td><td colspan="2">(L-1:T-0:P-2) Credit=03</td></tr>
<tr><td>C1+C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives

The purpose of this course is to enable the students to acquire a general knowledge about the "event management" and to become familiar with management techniques and strategies required for successful planning, promotion, implementation and evaluation of special events with a special focus on case studies of the events.

- To acquire an understanding of the role and purpose(s) of special events in the organizations.
- To acquire an understanding of the techniques and strategies required to plan successful special events.
- To acquire the knowledge and competencies required to promote, implement and conduct special events.
- To acquire the knowledge and competencies required to assess the quality and success of special events.

UNIT I: Introduction **08 Hours**

Introduction -Nature, scope, significance and components of event, relationship between business and events, Responsibility of event planners, identifying suitable venue, layout.

Types of events and skills for Event management -Seminars & Conferences, Trade Shows, Sporting events, Product launch, Press conference. Skills for Event Management-

UNIT II: Planning **10 Hours**

Concept, Nature and Practices in Event Management: Organizing and planning events, Customer relationship management, Staring and managing events business, Event coordination

Crisis planning - prevention - preparation - provision - action phase - handling negative publicity -Different types of sponsorship - definition - objectives - target market - budget

UNIT III: Preparing a proposal **12 Hours**

Conducting market research - SWOT analysis - estimating attendance - media coverage - advertising - budget. Organizing the event - Purpose - venue - timing - guest list - invitations - food & beverages - room dressing - equipment - guest of honor - speakers - media - photographers - podium – exhibition and check lists,

UNIT IV: Introduction to Event Marketing **12 Hours**

Nature, need and importance – Marketing for event – Special feature of event marketing – Event Marketing Mix: Product, Price, Promotion, Distribution, Partnership, Segmentation and Targeting of the market for events–Types of advertising - promotions - website and text messaging, Social media platform and other digital media promotions used to market an event. Media invitations - photo-calls - press releases - TV opportunities - radio interviews. Special emphasis on 5 W's of event marketing.

UNIT V: Preparing Human Resources for Event **14 Hours**

Man power planning- training of employees – training needs identification – training methods Evaluation-Budget - cost of event - return on investment - media coverage - attendance – feedback

Reference Books:

- Lynn Van Der Wagen & Brenda R. Carlos, Event Management for Tourism, Cultural, Business and Sporting Events, Pearson Prentice Hall, 2005
- Event Management-Purnima Kumari
- Event Management and Marketing: Theory, Practical Approaches and Plan-Anukrati Sharma, Shruti Arora
- Event Management -Sandhya A Kale
- Event Management: A Professional and Development Approach – Ashutosh Chaturvedi

Electives: Group - IV

Brand Management

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Elective - IV</td><td>Marketing</td><td colspan="2">IV</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Brand Management</td><td colspan="2">(L-2:T-0:P-1) Credit=03</td></tr>
<tr><td>C1+C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives

- To analyze the importance of branding by visiting the various dimensions of brand promotion
- To Study the factors that are associated with brand success and failure
- To outline the importance of market planning and segmenting, targeting and positioning to make the product successful

UNIT I: Introduction **12 Hours**

Introduction to Product & Brand Management, Product mix and Product line, Brand Image, Brand Equity, Brand Association, Brand Awareness, Brand Recall, Brand Positioning, Brand Narration, Brand Experience, Brand loyalty, Brand pull, Brand Promise.

UNIT II: New Product Development Process **12 Hours**

Product Launch, , Launch Strategy, Reasons for New Product failures, Steps in Consumer Adoption Process, Product Life Cycle concepts. (12 Hours)

UNIT III: Market Planning **12 Hours**

Planning Process, Components of Marketing Plan – Analysis of competition, Product Portfolio Analysis, Customer Analysis, Segmenting – Targeting – Positioning (STP), Techniques of good positioning, Various Pricing strategies, Distribution strategies.

UNIT IV: Designing and Implementing **10 Hours**

Marketing Programs to build Brand Equity, Important elements to build Brand Equity, Measuring the effectiveness of Brand Equity, Branding Strategies.

UNIT V: Ethics in Brand Building **10 Hours**

Brand Marketing practices in India, Issues and Challenges of Indian Brands, Branding in rural India.

Practical Components:

- Identify 5 major brands of India and analyze their branding efforts to bring about uniqueness to make the product successful
- Do a mini project on social media that has been used to create a powerful brand image of a new entrant in car market
- Interview 5 marketers and list out their brand positioning strategies to exploit the rural market

Reference Books

- Product Management – Donald R. Lehman, Russel S. Winner and
- Strategic Brand Management - Kevin L.Keller
- The Brand Management Checklist – Brab Vanauken and Managing Indian Brands – Ramesh Kumar
- Application Exercises in Marketing – Ramesh Kumar
- Brands & Branding by The Economist .
- Strategic Brand Management by Jean Noel Kapferer
- Building, Measuring, and Managing Brand Equity by Kevin L.Keller
- Handbook of new product management – Christopher H.Luch
- Brand Management Practices – Issues and Trends by K. Sasikumar, K.S. Chandrasekar

Industrial Marketing

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Elective - V</td><td>Marketing</td><td colspan="2">IV</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Industrial Marketing</td><td colspan="2">(L-2:T-0:P-1) Credit=03</td></tr>
<tr><td>C1+C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives

- To Study the factors that are associated with business and consumer marketing
- To acquaint with buying motivation and process involved in organizational customer
- To study the product lifecycle of Industrial Marketing in the context of managing the business marketing

UNIT I: Introduction **12 Hours**

The Nature and uniqueness of Industrial Marketing, Classification of Industrial Products, Classification of e-commerce, Difference between Business and Consumer Marketing, Classification of Business Consumers.

UNIT II: Business Buying Behavior **12 Hours**

Identifying the Buying Behavior of Industrial, Buying Process and Buying Stages, Buying Center Roles, evaluation of unregistered suppliers and registered suppliers for identification, Marketing Information System for Industrial Marketing.

UNIT III: Segmenting, Targeting and Positioning **12 Hours**

Industrial Marketing Planning Process, Demand and Supply Analysis, Segmenting, Targeting and Positioning, Industrial Product Strategy and Product Policy, Product Portfolio, New Product Development, Product Life Cycles of Industrial Products. (12 Hours)

UNIT IV: Industrial Marketing Channels **10 Hours**

E-channels, Concept of Logistics and Supply Chain Management in Industrial Marketing. Pricing strategy for Business Markets, Competitive Bidding Technique, Types of Leasing, Personal Selling Process in Industrial marketing (10 Hours)

UNIT V: Key Account Management **10 Hours**

ABC Analysis, Selling through Internet, Issues and Challenges relating to transaction using software. (6 Hours)

Practical Components:

- Pay a visit to Government as well as a private manufacturing company and study the differences in their purchasing procedures, pricing, payment terms
- Visit an industrial unit which sells directly as against using an intermediary or distributor and list out the advantages and drawbacks of selling directly
- Imagine you are marketing a product like Air conditioners which can be sold to the large buyers (Business Marketing) like KSTDC as well as in the retail market and list out the differences in terms of Product, Price, Place and Promotion

Reference Books

- Business Marketing Management – Michael Hutt and Thomas Speh, 8th Edition, Thomson Learning
- Industrial Marketing – Reeder and Reeder (PHI)
- Industrial Marketing – Richard Hill (AITBS)
- Supply Chain Management – Sunil Chopra and Peter Meindl (1st Indian reprint, Pearson Education)
- Business Marketing – Haynes
- Business Marketing – Rangan

Services Marketing

Nature	Area	Semester	
Elective - VI	Marketing	IV	
Course Code	**Course Name**	**Credit/Distributions**	
	Services Marketing	(L-2:T-0:P-1) Credit=03	
		C1+C2	30 Marks
		C3	70 Marks

Course Objectives

- To analyze the growing importance of Services marketing post LPG
- To Study the factors affecting the customer expectation and satisfaction
- To list the roles of effective service delivery to bring about the sales performance

UNIT I: Introduction **10 Hours**

Definition and uniqueness of Services, Emerging trends in Services Marketing, Service Marketing mix, recent trends in Services Marketing, Growing potential of Service Industry post Liberalization.

UNIT II Consumer Behaviors in Services **14 Hours**

Gap Analysis and Consumer Behavior, Gap Analysis and Strategies, Customer Perception and expectations, Factors influencing Customer Expectations, Services Design and Development, inevitability of Service Standards post globalization.

UNIT III: Management of Service Performance **10 Hours**

Service Delivery and Performance, Employees role in Service Delivery - Boundary-spanning roles, Customer roles in Service Delivery, Delivering Services through Intermediaries and Electronic Channels.

UNIT IV: Management of Marketing channels **12 Hours**

Managing Demand, Managing Service Promises, Integrated Service Marketing Communications, Pricing of Services, The integrated gap models for Service Quality

UNIT V: Marketing of Services **10 Hours**

Health Care, Hospitality Services, Transport Services, Telecommunication Services, Consultation Services, Financial Services. (10 Hours)

Practical Components:

- Identify 5 major companies in service sectors that have generated employment opportunities in India

- Visit 2 Car dealers and gather information on expectations and satisfaction from customers about recently introduced car
- Visit a major Hospital and gather data to analyze the service gap experience by the patients

Reference Books

- Services Marketing – Integrated Customer Focus Across The Firm – Valarie A. Zeithaml and M. J. Bitner
- Services Marketing – People, Technology and Strategy – Lovelock
- Services Marketing – Ravishankar
- Marketing of Services – Jha
- Marketing of Services – G.S. Bhatia
- Marketing of Services – Sahu and Sinha

International Marketing

Nature	**Area**	**Semester**	
Elective - VII	Marketing	IV	
Course Code	**Course Name**	**Credit/Distributions**	
	International Marketing	(L-2:T-0:P-1) Credit=03	
		C1+C2	30 Marks
		C3	70 Marks

Course Objectives

- To explore the theories, trade and its barriers of India's foreign trade
- To acquaint with International market entry strategies
- To learn the factors affecting International marketing
- To be acquainted with International economic Institutions and fourms

UNIT I: Introduction **10 Hours**

Introduction and Importance of International Marketing, Concepts in International Trade, Theories of International Trade, Trade Barriers, Panoramic view of India's Foreign trade since Independence.

UNIT II: International Marketing Environment **10 Hours**

Economic, Political, Legal, Socio-cultural and Demographic environment. Market entry strategies – MNC's, Global marketers etc.

UNIT III: International Marketing Mix **12 Hours**

Factors affecting International Marketing, International Marketing mix Strategy, Distribution Strategies and Types of Intermediaries in International Marketing.

UNIT IV: Export Planning **12 Hours**

Export Finance, Letter of Credit, Export Licensing, Export Houses, Export risk and Insurance, Export Promotion and Incentives provided by the Government of India. Import-Export policies of the Government of India.

UNIT V: International Economic Institutions and Forums **12 Hours**

GATT, WTO, EFTA, LAFTA, EU, SAARC, BRICS, World Bank, IMF and other trading blocks and common marketing for International Business.

Practical Components:

- Pay a visit to the web sites of companies like PEPSI, Huyndai, Addidas etc., and study their practices in India as well as their home country in the areas of technology, pricing, service, warranty, advertising etc.
- A Khadi apparel manufacturer in Mysore wants to export his apparel to Sri Lanka and Australia. Based on internet research. What would be your advice to overcome trade barriers
- Visit a company involved in export business. Learn and record the difficulties faced by them when they began to export

Reference Books

- International Marketing – Sak Onkvisit and John J. Shaw
- International Marketing – Philip Cateora and John Graham
- International Marketing – C.A. Francis

Electives: Group - V

Merger and Acquisition

Nature	Area	Semester	
Elective – IV	Finance	IV	
Course Code	**Course Name**	**Credit/Distributions**	
	Merger & Acquisition	(L-2:T-0:P-1) Credit=03	
		C1 + C2	30 Marks
		C3	70 Marks

Course Objectives

- To understand the role of mergers and acquisitions in firm's strategy,
- To Know the main concepts related to managing mergers and acquisitions, and
- To apply common frameworks and tools related to mergers and acquisitions.

UNIT I – Introduction to M & A **08 Hours**

Types of merger– theories of mergers- operating, financial and managerial synergy of mergers – value creation in horizontal, vertical and conglomerate mergers – internal and external change forces contributing to M & A activities- Impact of M & A on stakeholders. Reasons for failures of M & A-synergy-types of synergy–value creation in M&A-SWOT analysis- BCG matrix (Theory)

Unit – II Merger Process **10 Hours**

Procedure for effecting M & A-Five-stage model–Due diligence–Types, process and challenges of due diligence-HR aspects of M & A–Tips for successful mergers-Process of merger integration (Theory)

Unit – III Financial Evaluation of M& A **10 Hours**

Merger as a capital budgeting-Business valuation approaches-asset based, market based and income based Approaches-Exchange Ratio (Swap Ratio)-Methods of determining exchange rate. (Theory and Problems)

Unit-IV Accounting aspects of Amalgamation **14 Hours**

Types of amalgamations (Amalgamation in the nature of merger and amalgamation in the nature of purchase)-Methods of Accounting-Pooling of interest method and Purchase method)–Calculation of purchase consideration-Journal entries in the books of transferor & transferee company-Ledger accounts in the books of transferor and transferee companies (Theory and Problems).

Unit – V Takeovers **14 Hours**

Takeovers, types, and takeover strategies, - Takeover defenses – financial defensive measures – methods of resistance – anti-takeover amendments – poison pills Legal aspects of Mergers/amalgamations and acquisitions/takeovers- Combination and Competition Act-Competition Commission of India (CCI), The SEBI Substantial Acquisition of Shares and Takeover code

Practical Component:

- Pick up any latest M&A deal.
- Generate the details of the deal and then study the deal in the light of the following.
- Nature of the deal: merger, acquisition, or takeover. If it is a merger, what type of merger is it?
- Synergies likely to emerge to the combining and the combined firm(s) from the deal
- The valuation for the merger
- The basis for exchange rate determination

Recommended Books:

- Mergers Acquisitions & Corporate Restructuring - Strategies & Practices, Rabi Narayan Kar and Minakshi, Taxmanns.
- Mergers and Acquisitions, Sheeba Kapil and Kanwal N. Kapil, Wiley.
- Mergers, Acquisitions and Takeovers, Machiraju H.R., New Age International (P) Ltd., New Delhi 2003.

Reference Books:

- Mergers etal.-Issues, Implications, and Case Law in Corporate Restructuring, Ramanujam S., Tata McGraw Hill Publishing House,2000.
- Takeovers, Restructuring and Corporate Governance, Weston, Mitchell and Mulherin, 4th Edition, Pearson Education, 2003.

Derivatives

Nature	Area	Semester	
Elective - V	Finance	IV	
Course Code	**Course Name**	**Credit/Distributions**	
	Derivatives	(L-2:T-0:P-1) Credit=03	
		C1+C2	30 Marks
		C3	70 Marks

Course Objectives:

- To understand the features of financial derivatives.
- To hedge risk and practice risk management using derivatives.
- To explain the use of options and futures contracts for tactical portfolio strategies purpose
- To provide an understanding of pricing financial derivatives, including familiarity with some central techniques, like the binomial model, and the Black-Scholes model
- To explain the fundamentals of credit risk management and Value at Risk

UNIT I: Introduction to Derivatives 10 Hours

Forwards, Futures, Options, Swaps, trading mechanisms, Exchanges, Clearing house (structure and operations, regulatory framework), Floor brokers, Initiating trade, and Liquidating or Future position, Initial margins, Variation margins, Marking to Market (MTM) ,Types and orders. Future commission merchant

UNIT II: Forward and Future Contracts 10 Hours

Forward contracts, futures contracts, Financial futures, Valuation of forward and future prices of index futures, Valuation of stock futures, Hedging using futures contracts, Hedging using stock & index future contracts, Adjusting Beta of a portfolio using future contract. Interest rate futures and currency futures.

UNIT III: Valuation of options 12 Hours

Options-Types of options, option pricing, factors affecting option pricing – call and put options on dividend and non-dividend paying stocks, - mechanics of options - stock options - options on stock index - options on futures – interest rate options. Concept of exotic option. Hedging & valuation of option: basic model, Black and Scholes Model, Option Greeks. Arbitrage profits in options.

UNIT IV: Options Contracts and Trading Strategies 12 Hours

Put-call parity; Trading strategies (Butterfly, Bull, Bear, Box Strangle) involving options

UNIT V: Commodity Market in India 12 Hours

Commodity futures and options, outlines of SEBI guidelines, working of NCDX, MCX.

Practice Component

- Preparation of working structure of various stock exchange/broking firms in India.
- NISM Exam
- Mock trading using Money control

Recommended books:

- Options Futures & Other Derivatives, John C. Hull, Pearson Education.
- Derivatives and Risk Management, Rajiv Srivastava, Oxford University Press, 2010.
- Options & Futures- Vohra & Bagri, 2/e, TMH.

Reference Books:

- Derivatives, Principles and Practice, Sundaram& Das, Mc Graw Hill.
- Options & Futures –Edwards & Ma, 1/e, McGraw Hill.

International Finance

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Elective - VI</td><td>Finance</td><td colspan="2">IV</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">International Finance</td><td colspan="2">(L-2:T-0:P-1) Credit=03</td></tr>
<tr><td>C1+C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives:

- To understand the International Financial Environment and the Foreign Exchange market.
- To learn hedging and Forex risk management.
- To learn the Firm’s Exposure to risk in International environment and various theories associated with it.

Unit I: International Financial Environment: 08 Hours

Role of International Financial Management in Corporate Financial Management, Dynamics of Global Capital Flows, India's Balance of Payment, trends, direction and composition.CAD (current account deficit) problems. Economic and Monetary Union

Unit II: Foreign Exchange Market 14 Hours

Function and Structure of the Forex markets, Foreign exchange market participants, Types of transactions and Settlements Dates, Exchange rate quotations, Determination of Exchange rates in Spot markets. Exchange rates determinations in Forward markets. Exchange rate behavior-Cross Rates- - Bid – Ask – Spread (Theory & Problems).

Unit III Foreign Exchange Risk Management 12 Hours

Hedging against foreign exchange exposure – Forward Market- Futures Market- Options Market- Currency Swaps-Interest Rate Swap- problems on both two way and three way

Swaps (Theory & Problems).

Unit IV International Parity Relationships & Forecasting Foreign Exchange

14 Hours

Measuring exchange rate movements-Exchange rate equilibrium–Factors effecting foreign exchange rate- Forecasting foreign exchange rates, Interest Rate Parity, Purchasing Power Parity &International Fisher effects, Arbitrage, Types of Arbitrage – Locational, Triangular and Covered Interest Arbitrage (Theory & Problems)

Unit V International Investment Decision 08 Hours

Risk Factors, country Risk, cost and Benefits International Capital Budgeting- Evaluation Criteria

Recommended Book:

- Madhu Vij-International Financial Management, 2nd Edition, 2003

Reference Books:

- Buckley, Adrian – Multinational Finance, New York, Prentice Hall Inc.m 1996
- Kim, Suk and Kim, Seung – Global Corporate Finance: Text and Cases, 2nd ed. Miami Florida, Kolb, 1993
- Shapiro, Alan.C – Multinational Financial Management, New Delhi, Prentice Hall of India, 1995
- International Financial Management by P.G.Apte, Mc Graw Hill.
- International Financial Management by Jeff Madura

Taxation

Nature	Area	Semester	
Elective - VII	Finance	IV	
Course Code	**Course Name**	**Credit/Distributions**	
	Taxation	(L-2:T-0:P-1) Credit=03	
		C1+C2	30 Marks
		C3	70 Marks

Course Objectives:

- To provide the students with a comprehensive understanding of residential status in tax laws
- To acclimatize the students with process of computing tax liability of Individuals
- To understand corporate taxation system in the country
- To know the deductions and exemptions available in the tax laws
- To Provide Insight into GST

Unit I: Introduction to Direct Tax **12 Hours**

Basic concepts: assessment year, previous year, person, assessee, Income, charges on income, gross total income, capital and revenue receipts, residential status, receipt and accrual of income, connotation of income deemed to accrue or arise in India. Tax Planning, Tax Evasion and Tax Management. (Problems on residential Status of Individual assessee) .

Unit II Heads of Income **10 Hours**

Explanation under various heads of income . Income from salary (Basic problems), Income from House Property (Theory Only) Income under the head Profit and Gains of Business or Professions and its computation scheme of business deductions (Problems on computation of income from business/ profession of Individual assessee) .

Unit III Income under Capital Gain **10 Hours**

Income under capital gain, basis of charge, transfer of capital asset, inclusion & exclusion from capital asset, capital gain, computation of capital gain(theory & problems), deductions from capital gains. Income from Other Sources (Theory Only) Permissible deductions under section 80C to 80U . Setoff and carry forward of losses .

Unit IV Computation of Tax Liability **10 Hours**

Computation of tax liability of a firm and partners. Computation of taxable income of a company with special reference to MAT. Corporate dividend Tax.

Unit V Goods and Service Tax **14 Hours**

Introduction, Overview and Evolution of GST, Indirect tax structure in India , Introduction to Goods and Service Tax (GST) - Key Concepts , Phases of GST, GST Council , Taxes under GST, Cess , Registration under GST - Threshold for Registration, Regular Tax Payer, Composition Tax Payer, Unique Identification Number, Registration Number Format. Types of GST returns and their due dates, late filing, late fee and interest.

Practical Components:

- Preparation of Income tax returns of Individual assesses.
- Studying the online submission of Income tax returns

Reference Books:

- Systematic Approach to Indirect Tax- Kumar, Sanjeev
- Text Book of Indirect Tax – Sinha P.K
- Dr. Vinod Singhania, Taxman Publication, New Delhi
- Girish Ahuja & Ravi Gupta, Bharat Law House, New Delhi

Electives: Group - VI

Strategic Human Resource Management

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Elective - IV</td><td>Human Resource</td><td colspan="2">IV</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Strategic Human Resource Management</td><td colspan="2">(L-3:T-0:P-0) Credit=03</td></tr>
<tr><td>C1+C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course Objectives

- To learn the fundamentals of SHRM framework and analyze the overall role of SHRM in business.
- To improve the ability to think how SHRM should be used as a tool to achieve competitive advantage.
- To understand the key element of SHRM and unite with organizational culture.
- To magnify the numerous issues that crop in while implementing SHRM and find suitable remedies for the same.

UNIT 1: Context of Strategic HRM **12 Hours**

Introduction, An investment perspective of HRM – Adopting an investment perspective, Valuation of assets, Understanding and measuring human capital, Human resource metrics, factors influencing investment oriented organizations, Impact of changes in technology - Telecommuting, Employee surveillance and monitoring, e-HR, Social networking, Workforce demographics & diversity on HRM – Generational diversity, Sexual orientation, individuals with disabilities, other dimensions of diversity.

UNIT II: Strategic Role of HRM & Planning **12 Hours**

strategic HR Vs Traditional HR – Roles assumed by the HR function, HR roles in a knowledge based economy, SHRM critical HR competencies, Lepak and Snell's Employment models, Barriers to strategic HR, Strategic HR planning – Objectives of HR planning, Types of planning - aggregate & succession planning.

UNIT III: Strategic Perspectives on Recruitment, Training & Development

12 Hours

Temporary Vs Permanent employees, Internal Vs External recruiting, methods of recruiting, Selection - Interviewing, testing, references; International Assignment, Diversity, Strategizing training & development – Needs assessment, objectives, Design and delivery, Evaluation.

UNIT IV: Strategic Perspectives on Performance Management **10 Hours**

Feedback & Compensation Use of the System, who evaluates, what to evaluate & how to evaluate, measures of evaluation, Compensation – Equity, Internal equity, external equity, and Individual equity.

UNIT V: Employee Separation **10 Hours**

Reduction in force, turnover, retirement, Global Human Resource Management - International Vs Domestic HRM, Strategic HR Issues in International Assignment, Repatriation.

Text Books

- Jeffery Mello Strategic HRM –, Thompson Publication, New Delhi, 2nd Ed, 2007
- Dr.S.S.Khanka; Organizational Behavior, 4th Ed, S.Chand & Company pvt ltd, 2003.

Reference Books

- Luis R. Gomez-Mejia, David B.Balkin, Robert L. Cardy, Managing Human Resources, PHI, 2001. – (Unit 1)

- S.K.Bhatia – Strategic Human resources Management, Deep & Deep Publication Pvt. Ltd., 2007..
- Charles R, Greer, Strategic Human Resource Management, Pearson Education, 2003.
- Kandula S.R. (2001). Strategic Human Resource Development. Eastern Economy Edition, Prentice Hall India.
- Boxell& Purcell, J. (2003). Strategy And Human Respource Management. Palgrave Mcmillan
- Strategic HRM – Michael Armstrong, Kogan page, London
- Strategic HRM – Agarwal, Oxford University Press, New Delhi.

Industrial Labour Legislation

Nature	**Area**	**Semester**	
Elective - V	Human Resource	IV	
Course Code	**Course Name**	**Credit/Distributions**	
	Industrial Labour Legislation	(L-2:T-0:P-1) Credit=03	
		C1+C2	30 Marks
		C3	70 Marks

Course Objectives

- To know the development and the Judicial setup of Labour Laws
- To learn the salient features of Welfare and Wage Legislation
- To learn the Laws relating to IR, Social Security and Working Conditions

UNIT I: Industrial Disputes Act 1947 12 Hours

Emphasis on Sec 2 (all definitions), 9A, 10 , 12 , 17 , 18 , 22 , 23 , 24 , 25 , Chapter V B, Up t o S e c 2 5 (S) a n d Sec33. Karnataka ID Rules, Industrial Employment (Standing Orders) Act, Karnataka Standing Orders Rules.

UNIT II: Indian Factories Act 1948 12 Hours

Karnataka Factory Rules, Contract Labour (Regulation and Abolition) Act 1971, Karnataka Contract Labour Rules.

UNIT III: Payment of Gratuity Act 1982 10 Hours

Payment of bonus act 1965, Karnataka Industrial Establishments (National Festival Holidays) Act

UNIT IV: ESI Act 1948 **12 Hours**

employees' provident fund and miscellaneous provisions act 1952, workmen's compensation act 1932. Payment of wages act 1936.

UNIT V: Code of Discipline in Industries **10 Hours**

Report of the second national labour commission 2002. Latest ILO deliberations on labour legislation in developing countries.

Practical Component

- Students are taken to Labour Court to get practical exposure on labour proceedings
- Arrange a debate on Constitutional provisions of Labour Law

Reference Books

- P.L.Malik Industrial Laws, Eastern Book Publishing, 15th Ed, 2013
- R. J Reddy, Industrial Law, APH Publishing, 2004
- S.N Mishra, Industrial and Labour Law, Central Law Publications, 27th Ed, 2014

Industrial Relations

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Elective - VI</td><td>Human Resource</td><td colspan="2">IV</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Industrial Relations</td><td colspan="2">(L-2:T-0:P-1) Credit=03</td></tr>
<tr><td>C1+C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course objectives

- To understand the importance of Human Relations at work
- To distinguish the procedures concerning Worker Participation and Participatory Institutions and Instruments of Trade Union
- To distinguish Employee Rights & Obligations according to the scope of employment
- To analyze the field of Labor Relations in an Interdisciplinary Manner
- To Synthesize the proposals for Legislative Initiatives

UNIT I Industrial Relations **12 Hours**

Historical background, concept, Meaning and scope of IR, stake holders of IR, various factors influencing IR, Perspectives/Approaches to IR- Unitary, Pluralist, Radical, Psychological approach, Sociological approach, Human Relations approach, Socio ethical approach, Gandhian/ Trusteeship approach, Systems approach, Essentials of sound IR policy, IR strategies, Legal frame work: The Industrial Disputes Act 1947, Industrial conflict Disputes – Causes and Consequences of Industrial Conflicts in India, Conflict resolution.

UNIT II Trade Unions and Related aspect **10 Hours**

Trade union movement and growth of TU in India, national level federations, trade union problems, trade union organization, leadership and management of Trade union, trade union act 1926, registration of trade union, employers association – objectives, origin and growth, legal status, problems of trade unions.

UNIT III Grievances and Disciplines **12 Hours**

Grievances, redressal, discipline, standing orders, acts of misconduct, show cause notice, suspension, Enquiry procedure, Principles of natural justice, Punishments, Demotion suspension, Termination, Removal and dismissals, Conflicts – Industrial disputes –Lay off, Termination simplicitor, Retrenchment, closures, VRS.

Unit IV Collective Bargaining **10 Hours**

Concept, its relevance in IR, CB as an institution, ILO perception of CB, Objectives of CB, Structure, Functions, process, negotiations, bargaining approaches & techniques, patterns of bargaining.

Unit V Settlements **12 Hours**

Types of settlement wage settlement, bonus settlement, productivity settlement, VRS settlement, Union issues settlement, Reorganization settlement, transfer, Layoff, retrenchment and closure settlements.

Practical Component

- Give a case of collective bargaining and ask the students to role play
- Arrange a debate in the classroom about rights and duties of trade union of workers

Text Books

- Dynamics of Industrial Relations: Industrial – Mamoria, Mamoria, Gankar, – Himalaya Publishing House
- Industrial Relations – C S Venkata Ratnam – Oxford University Press

Reference Books

Industrial Relation – Ramaswamy

- Industrial Relation – Sarma
- Industrial Relation – Venkatarathnam
- Industrial Relation – Arun Monnappa
- Industrial Relation – T V Rao

Managing Knowledge Workers

<table>
<tr><th>Nature</th><th>Area</th><th colspan="2">Semester</th></tr>
<tr><td>Elective - VI</td><td>Human Resource</td><td colspan="2">IV</td></tr>
<tr><th>Course Code</th><th>Course Name</th><th colspan="2">Credit/Distributions</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Managing Knowledge Workers</td><td colspan="2">(L-3:T-0:P-0) Credit=03</td></tr>
<tr><td>C1+C2</td><td>30 Marks</td></tr>
<tr><td>C3</td><td>70 Marks</td></tr>
</table>

Course objectives

- To analyze and define the links between Knowledge Management, Organizational Learning
- To analyze the fundamental elements pertaining to Knowledge Management
- To examine and Evaluate the Role of Leadership in Facilitating Human Infrastructure to enable best practices
- To Identify the Drivers and Inhibitors of Effective KM Practices to promote Innovation and improving projects and management practices at a large

UNIT I Knowledge Management 12 Hours

The changing nature of organizations – workforce composition, evolving work roles and responsibilities, Team work, Relationship building, Communication, Leadership, Decision making, Change management, worker motivation, Infrastructure, concept of Knowledge management, Drivers of knowledge management, Knowledge as an asset – Explicit knowledge and Tacit knowledge, Organizational knowledge, Knowledge management as an emerging concept - leadership and knowledge management, Developing a knowledge culture, learning & developmental organization, Asset based corporate development, Applying knowledge to work practices, Knowledge Systems, Developing a Knowledge Service, The challenge for Strategic Knowledge Leadership.

UNIT II Strategic Knowledge Management 12 Hours

Models of knowledge management, Knowledge management Life cycle, knowledge workers, Skills and competencies of knowledge workers, phases of knowledge development – Knowledge sourcing, Knowledge Abstraction, Knowledge Conversion, Knowledge Diffusion, Knowledge development and refinement, Knowledge management infrastructure – Managerial infrastructure, Technological infrastructure, Social infrastructure, harnessing organizational knowledge, Enabling Knowledge Transference, The five P's of strategic management, Building knowledge management into the Strategic Framework.

UNIT III Knowledge Leader 10 Hours

Contributory Disciplines to Knowledge Leadership - Librarianship, Information Technology, Human Resource Management, Business management, The generic Attributes of a knowledge leader – Strategic visionary, Motivator, Communicator, Change agent, Coach Mentor and model, Learning facilitator, Knowledge Executor, Specific knowledge Leadership Roles – Strategic knowledge leader, Core leaders, Leading Knowledge Teams – Self managed knowledge teams, Virtual knowledge teams, Leading a Knowledge network, Recruiting and Selecting Knowledge Leaders.

UNIT IV Developing and sustaining a Knowledge Culture 10 Hours

Knowledge Culture Enablers – Core values, Structural support, Enacted values, Interaction with colleagues, maintaining the Knowledge Culture during Change, Reviewing the existing knowledge culture, implementing knowledge culture enhancement programs, maintaining the Knowledge Culture.

UNIT V Knowledge Management & HRM Practices 12 Hours

Structural Support for knowledge management, Impact of Organizational Structure on Knowledge Management – Functional structure, Divisional structure, Matrix model, Staffing – workforce planning, Defining core competencies, Selection and Recruitment, Induction orientation and acculturation, work context management, Performance Management – Performance standards, performance management process, providing feedback, Rewarding high achieving Knowledge Workers, Learning & Development – Individual learning, succession planning, Learning transfer, Organizational Evaluation and Review – Exit interviews, Performance measures, Organizational development

Text Books

- Knowledge Management – Shelda Debowski – John Wiley India edition
- Knowledge Management – Elias M.Awad & Hassan M.Ghaziri – Pearson Education.

Reference Books

- Knowledge Management – Carl Davidson & Philip Voss – Vision Books

Guidelines for Business Familiarization Report (BFR)

Nature	Area	Semester
Core	Business Familiarization Report(BFR)	**III**
Course Code	**Course Name**	**Credit/Distributions**
	Business Familiarization Report(BFR)	(L-0:T-0:P-2) Credit = 02

OBJECTIVE

To expose the students to the working culture of the organization and apply theoretical concepts of real life situation at the work place for various functions of the organization.

GENERAL GUIDELINES

Internship and Business Familiarization Report (BFR): In the beginning of the third semester, the students shall undertake team based internship in a business firm and prepare a Business Familiarization Report under the guidance of a faculty member. The report shall be submitted before the commencement of the third semester examinations failing which the student shall not be permitted to appear for the third semester examination. Business Familiarization guidance to twenty students is considered as equivalent to teaching of a course of two credits.

ix) Internship conducted in a year cannot be for a continuous period of more than 4 weeks in a given academic year.

x) Internship undergone during academic classes shall not be considered

xi) Each students shall maintain internship dairy

xii) Certificates (Color Photocopy) of each internship shall be submitted to the department along with the report

Details to mention on the Certificate:

vii) Students name and registration number

viii) Name of the institution/organization and duration of internship with date

EVALUATION: BFR will evaluated by the concerned guide for 50 marks through internal valuation.

Viva-Voce / PRESENTATION: A viva-voce examination shall be conducted at the respective institution where a student is expected to give a presentation of his/ her work. The viva –voce examination will be conducted by the respective HOD or Senior Professor or internal Guide of the department and an external evaluator drawn from industry. In case

of non availability of industry professional, a senior professor or a faculty may be invited to conduct the viva-voce examination.

CONTENTS OF THE ORGANISATION STUDY REPORT

- Cover page
- Certificate from the Organization (scanned copy)
- Certificate from the guide, HOD and Head of the Institution (scanned copy) indicating bonafide performance of Organisation study by the student.
- Declaration by the student (scanned copy)
- Acknowledgement
- Table of contents
- List of tables and graphs

EXECUTIVE SUMMARY

Chapter 1: Introduction about the Organisation & Industry.

Chapter 2: Organization Profile

Back ground,

Nature of business,

Vision ,Mission, Quality Policy

Workflow model

Product/service profile

Ownership pattern

Achievements/awards if any

Future growth and prospects

Chapter 3: Mckensy's 7S framework and Porter's Five Force Model with special reference to Organization under study.

Chapter 4: SWOT Analysis

Chapter 5: Analysis of financial statements

Chapter 6: Learning experience.

BIBLIOGRAPHY

Annexure relevant to the Organization study such as figures, graphs, photographs, Financial statements etc.,

FORMAT OF THE ORGANIZATION STUDY: Report shall be prepared using the word processor viz., MS Word, Times New Roman font sized 12, on a page layout of A4 size with 1" margin all sides (1.5" on left side due to binding) and 1.5line spacing. The Organization study report shall not exceed 60 pages.

OUTLAY OF THE REPORT

The chapters, sections and subsections may be numbered in the decimal form for e.g. Chapter2, sections as 2.1,2.2 etc., and subsections as 2.1.1,2.2.1 etc.,

Guidelines for 6 Week Project

Nature	**Area**	**Semester**
Core	Project	**IV**
Course Code	**Course Name**	**Credit/Distributions**
	Project	(L-0:T-0:P-6) Credit = 06

OBJECTIVE

To expose the students to understand the working of the organization/company /industry and take up an in-depth study of an issue / problem in the area of specialization

CONTENTS OF THE PROJECT REPORT

- Cover Title Page (Format Enclosed)
- Inner Title page (same as title page)
- Certificate from the guide, HOD and Head of the Institution (scanned copy) indicating bonafide performance of Project by the student
- Certificate from the Organization (scanned copy if applicable)
- Declaration by the student (scanned copy)
- Acknowledgement
- Table of contents
- List of tables and graphs
- Abbreviations/Operational definitions used.
- Executive summary

EVALUATION: Each Final project report will be evaluated for 70 marks by internal and external examiners. The guide ordinarily shall be the internal examiner. A viva-voce on the project report for 30 marks will be conducted by a board of three members constituted by the Chairman, BOE from the approved list of examiners.

CHAPTER

Chapter 1: Introduction

Introduction, Industry profile and company profile: Promoters, vision, Mission & Quality Policy. Products / services profile areas of operation, infrastructure facilities,

competitors' information, SWOT Analysis, Future growth and prospects and Financial Statement

Chapter 2: Conceptual background and Literature review

Theoretical background of the study, Literature review with research gap (with minimum 20 literature reviews)

Chapter 3: Research Design

Statement of the problem, Need for the study, Objectives, Scope of the study, Research methodology, Hypotheses, Limitations, Chapter scheme

Chapter 4: Analysis and Interpretation

Analysis and interpretation of the data- collected with relevant tables and graphs. Results obtained by the using statistical tools must be included

Chapter 5: Findings, Conclusion and Suggestions

Summary of findings, Conclusion and Suggestions / Recommendations

Bibliography

Annexure relevant to the project such as figures, graphs, photographs etc.,

Appendix

This will include printed secondary data (only if it is very critical) and any questionnaires used for the study.

FORMATS FOR PROJECT REPORT AND EVALUATION

Format of Cover Page

Format of certificate by College/Institution or from both

Format of Declaration Page

Format of Contents

Format of List of Tables and Charts

Format of Bibliography

Format for Internal Evaluation, External Evaluation and Viva voce

FORMAT OF THE ORGANIZATION STUDY:

Report shall be prepared using the word processor viz., MS Word, Times New Roman font sized 12, on a page layout of A4 size with 1" margin all sides (1.5" on left side due to binding) and 1.5line spacing. The Organization study report shall not exceed 60 pages.

OUTLAY OF THE REPORT

The chapters, sections and subsections may be numbered in the decimal form for e.g. Chapter2, sections as 2.1,2.2 etc., and subsections as 2.1.1,2.2.1 etc.,

(Specimen)

COVER TITLE PAGE (FORMAT ENCLOSED)

Evaluation of Mutual Fund Performance

A case study of Equity Fund of UTI

by

(Student Name)

IV SEMESTER MBA

(Registration Number)

(Guide Name)

Project report submitted to

Pooja Bhagavat Memorial Mahajana Education Centre

In partial fulfillment of the requirements of the IV semester MBA degree examinations- 2019

Pooja Bhagavat Memorial Mahajana Education Centre

Department of Studies in Business Administration

K.R.S. Road, Metagalli, Mysore - 570016

CERTIFICATE

This is to certify that (Name of the Student) bearing Register Number (xxxx), is a bonafide student of Master of Business Administration Programme of Pooja Bhagavat Memorial Mahajana Education Centre (Batch), Mysore. Project report on "(Title of Report)"is prepared by Him/her under the guidance of (Name of the Guide), in partial fulfillment of the requirements for the award of the degree of Master of Business Administration from Mysore University, Mysore. Karnataka

Signature of Internal Guide

Signature of External Guide

Signature of HOD

DECLARATION

I, (Student Name), hereby declare that the Project report entitled "(Title)" with reference to "(Organisation with place)" prepared by me under the guidance of (Guide Name), faculty of DoS in Business Admininistration, Pooja Bhagavat Memorial Mahajana Education Centre (Batch), Mysore and external assistance by (External Guide Name, Designation and Organisation). I also declare that this Project work is towards the partial fulfillment of the Pooja Bhagavat Memorial Mahajana Education Centre (Batch), Mysore

Regulations for the award of degree of Master of Business Administration by Mysore University, Mysore I have undergone a Project for a period of Six weeks. I further declare that this Project is based on the original study undertaken by me and has not been submitted for the award of any degree from any other University / Institution.

Place: **Signature of the Student**

Date:

TABLE OF CONTENTS

LIST OF TABLES

PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE [AUTONOMOUS]

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

Affiliated to University of Mysore

DEPARTMENT OF STUDIES IN CHEMISTRY

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

REGULATIONS FOR CHOICE BASED CREDIT SYSTEM (CBCS) AND CONTINUOUS ASSESSMENT GRADING PATTERN (CAGP) FOR MASTER OF SCIENCE IN CHEMISTRY PROGRAMME WITH EFFECT FROM 2019-2020

PREAMBLE:

The University Grants Commission (UGC) has stressed on speedy and substantive academic and administrative reforms in higher education for promotion of quality and excellence. The Action Plan proposed by UGC outlines the need to consider and adopt Semester System, Choice Based Credit System (CBCS), and Flexibility in Curriculum Development and Examination Reforms in terms of adopting Continuous Evaluation Pattern by reducing the burden on the semester end examination so that students enjoy a de-stressed learning environment. Further, UGC expects that institutions of higher learning draw a roadmap in time bound manner to accomplish the above.

The Post-graduate wing of SBRR Mahajana First Grade College (Pooja Bhagavat Memorial Mahajana PG Centre) is an advanced learning centre of Mahajana Education Society. It was started in 1999, affiliated to the University of Mysore to offer Post Graduate Programmes and diploma courses of direct relevance in 16 disciplines and is poised to start new courses in the years to come. The postgraduate wing is a member of well known professional bodies like CSI (Computer Society of India), ISTE (Indian Society for Technical Education), NIPM (National institute of Personal Management) and CII (Confederation of Indian Industry) so that the students are exposed to recent trends in the industry by attending programmes conducted by the above professional organizations.

OBJECTIVE:

The Department of Studies in Chemistry came into existence in the year 2012. The Department is striving to be recognized as a leader for offering societal relevant innovative Post Graduate education. It endeavors to build and enhance the capabilities of the future generation by providing quality education. The curriculum exposes the young graduates to the recent and applied knowledge of interdisciplinary branches of Chemistry.

1. Title and Commencement

These Regulations shall be called the Regulations of Post-Graduate Programmes of SBRR Mahajana First Grade College for Choice Based Credit System **(CBCS)** and Continuous Assessment Grading Pattern (**CAGP**). These Regulations shall come into force from the academic year 2019- 2020.

2. Programme offered: MASTER OF SCIENCE IN CHEMISTRY

3. Definitions

Course

Every course offered will have three components associated with the teaching-learning process of the course, namely

(i) Lecture – L (ii) Tutorial- T (iii) Practical - P, where

L stands Lecture session. **T** stands Tutorial session consisting participatory discussion / self study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands Practice session and it consists of Hands on experience / Laboratory Experiments / Field Studies / Case studies that equip students to acquire the much required skill component.

In terms of credits, every one hour session of L amounts to 1 credit per semester and a minimum of two hour session of T or P amounts to 1 credit per semester, over a period of one semester of 16 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components. That means a course may have only lecture component, or only practical component or combination of any two or all the three components.

The total credits earned by a student at the end of the semester upon successfully completing the course are L + T + P. The credit pattern of the course is indicated as

L: T: P.

If a course is of 4 credits then the different credit distribution patterns in L: T: P format could be

4 : 0 : 0,	1 : 2 : 1,	1 : 1 : 2,	1 : 0 : 3,	1 : 3 : 0,
2 : 1 : 1,	2 : 2 : 0,	2 : 0 : 2,	3 : 1 : 0,	3 : 0 : 1,
0 : 2 : 2,	0 : 4 : 0,	0 : 0 : 4,	0 : 1 : 3,	0 : 3 : 1,

The concerned BoS will choose the convenient credit pattern for every course based on the requirement.

Different courses of study are labeled and defined as follows:

Core Course

A course which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

A Core course may be a **Soft Core** if there is a choice or an option for the candidate to choose a course from a pool of courses from the main discipline /course of study or from a sister/related discipline / course which supports the main discipline / course. In contrast to the phrase Soft Core, a compulsory core course is called a **Hard Core** Course.

Elective Course

Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline / course of study or which provides an extended scope or which enables an exposure to some other discipline / course/domain or nurtures the candidate's proficiency/ skill is called an Elective Course. Elective courses may be offered by the main discipline/ course of study or by sister / related discipline / course of study. A Soft Core course may also be considered as an elective.

An elective course chosen generally from an unrelated discipline / course, with an intention to seek exposure is called an **Open Elective**.

A core course offered in a discipline / course may be treated as an elective by other discipline / course and vice versa.

Project work/Dissertation work is a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A project work up to 4 credits is called Minor Project work. A project work of 6 to 8 credits is called Major Project Work. Dissertation work can be of 10-12 credits. A Project/Dissertation work may be a hard core or a soft core as decided by the concerned BoS.

4. Eligibility for Admission

B.Sc. with Chemistry as one of the Major/ Optional subject, provided the candidate has studied Mathematics as one of the optional subject in the Two Year P.U.C. or equivalent

5. Scheme of Instructions

5.1 A Masters Degree program is of 4 semesters-two year duration for regular candidates. A regular candidate can avail a maximum of 8 semesters – 4 years (in one stretch) to complete Masters' Degree (including blank semesters, if any). Whenever, a candidate opts for blank semester(s)/DROP in a course or in courses or is compelled to DROP a course or courses as per the provision of the regulation,

he/she has to study the prevailing courses offered by the department as per the prevailing scheme, when he/she continues his/her study.

5.2 A candidate has to earn a minimum of 76 credits, for successful completion of Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	**Credits**
Hard Core	A minimum of 42, but not exceeding 52
Soft Core	A minimum of 16
Open Elective	A minimum of 4

5.3 A candidate can enrol for a maximum of 24 credits per semester with the approval of the concerned department.

Only such candidates who register for a minimum of 18 credits per semester in the first two semesters and complete successfully 76 credits in total of the 4 semesters shall be considered for declaration of ranks, medals and are eligible to apply for student fellowship, scholarship, free ships and hostel facilities.

5.5 In excess to the minimum of 76 credits for masters degree in the concerned discipline / course of study, a candidate can opt to complete a minimum of 18 extra credits to acquire **add on proficiency diploma** in that particular discipline /course along with the masters' degree. In such of the cases wherein, a candidate opts to earn at least 4 extra credits in different discipline / courses in addition to a minimum of 76 credits at masters level as said above then an **add on proficiency certification** will be issued to the candidate by listing the courses studied and grades earned.

5.6 A candidate admitted to Masters Program can exercise an option to exit with Bachelor Honors Degree / PG diploma after earning 40 credits successfully.

6. Continuous Assessment, Earning of Credits and Award of Grades

6.1. SCHEME OF EXAMINATION FOR C1, C2 AND C3 COMPONENTS

In view of the CBCS syllabus, following is the model distribution of marks for C1, C2 and C3 Components. At a glance, the model includes both HC/SC/OE as well as Composite and Non-composite courses' assessment of marks.

The following is the scheme which will be followed for the assessment of marks for HC/SC/OE as well as Composite and Non-composite courses irrespective of the credits associated with each course. 30% of the marks will be assessed for the internals (C1 and C2) and remaining 70% will be for the Semester End Examinations (C3). Each course carries 100 marks and hence 30 marks will be allotted to internals and remaining 70 marks

will be for Semester End Examinations. Out of 30 marks for internals, 15 marks will be allotted to each C1 and C2 components. The distribution of marks for C1 and C2 varies with HC and SC courses.

Each course (HC/SC/OE) consists of three components namely C1, C2 and C3. C1 and C2 are designated as Internal Assessment (IA) and C3 as Semester End Examination. Each course (HC/SC/OE) carries 100 Marks and hence the allotment of marks to C1, C2 and C3 Components will be 15, 15 and 70 marks respectively. i.e.,

C1 Component:	15 Marks	Internal Assessment Marks
C2 Component:	15 Marks	Internal Assessment Marks
C3 Component:	70 Marks	Semester End Examination
Total :	100 Marks	

The above will be followed in common for all the HC/ SC (Composite/ Non-composite)/ OE courses in all the four semesters.

6.2. HARD CORE (03 CREDIT COURSES)/ OPEN ELECTIVE (04 CREDIT COURSES)

6.2.1. DISTRIBUTION OF MARKS FOR C1 AND C2 COMPONENTS:

IA consists of 15 marks; it will be divided into three parts viz., Internal Test, Home Assignment and Seminar. Internal tests will be conducted during the 8th week of the semester for C1 and 16th week of the semester for C2. Home Assignment will be concerned for C1 Component and Seminar for C2 Component only. Hence, a teacher may give only one assignment (or in their personal interest one more may be given). Since each course has three units, the marks shall be divided equally. Allotment of marks for C1 and C2 is as follows: Out of 15 Marks for IA for C1, Internal test will be conducted for 30 Marks (10 Marks from each unit and reduced to 10 Marks) and Home Assignment will be given for 05 Marks (Each Home Assignment from every unit will be assessed for 05 Marks and finally reduced to 05 Marks). IA for C2 will be distributed as follows: Internal test will be conducted for 30 Marks (10 Marks from each unit and reduced to 10 Marks) and Seminar will be assigned for 05 Marks for the favor of IA. Please note that actual Seminar will be assessed for 20 Marks and finally 05 Marks will be distributed to each theory HC course. i.e.,

C1		C2	
Internal Test	30 Marks (10+10+10) Reduced to 10 Marks	Internal Test	30 Marks (10+10+10) Reduced to 10 Marks
Home Assignment	15 Marks (05+05+05) Reduced to 05 Marks	Seminar	20Marks (05+05+05+05) Distributed 05 Marks to each HC course
Total	15 Marks	Total	15 Marks

6.2.2. DISTRIBUTION OF MARKS FOR C3 COMPONENT (SEMESTER END EXAMINATION)

The question paper is of 3 hr duration with Max. Marks 70. The following question paper pattern will be followed for all the theory courses (HC/SC/OE). Question paper will have FIVE main questions. All the questions will cover all the units of the course with equal marks distribution. Q. No. 1 is of Medium/ Short Answer Type questions which will have nine questions and each question carries two marks. A student has to answer any seven questions. Q. No. 2 to 5 carries 14 marks each and a student has to answer all the four questions (No Choice). Each main question will have three sub-sections a, b, c. An examiner may set the questions like (4+4+6) or (5+5+4) or as his/her wish. However, sub-section 'c' will have an internal choice. i.e.,

6.2.3. HARD CORE/ SOFT CORE (04 CREDIT COURSES)

Those course which have 04 credits under HC or SC are called by 'Composite Course' which means that a course which contains both Theory as well as Practical components. However, evaluation will be done on the following basis. Both Theory and Practical will be assessed for 100 marks separately (which includes C1+C2+C3) and an average from these two will be taken for the result declaration. The assessment pattern discussed above in 1 holds good here also. For the Practical assessment please refer '4. Practicals' below.

6.3. SOFT CORE (02 CREDIT COURSES)

6.3.1. DISTRIBUTION OF MARKS FOR C1 AND C2 COMPONENTS

IA consists of 25 marks; it will be divided into two parts viz., Internal Test and Home Assignment. Internal tests will be conducted during the 8th week of the semester for C1 and 16th week of the semester for C2. As far as Home Assignment is concerned, the concerned teacher will assign one or two Home Assignments to each student. Since each course has two units, the marks will be divided equally. Allotment of marks for C1 and C2 is as follows: Out of 15 Marks for IA, Internal tests will be conducted for 20 marks and reduced to 10 marks, whereas Home Assignment is for 05 Marks. i.e.,

C1		C2	
Internal Test	20 Marks (10+10) Reduced to 10 Marks	Internal Test	Marks (10+10) Reduced to 10 Marks
Home Assignment	10 Marks (05+05) Reduced to 05 Marks	Home Assignment	10 Marks (05+05) Reduced to 05 Marks
Total	15 Marks	Total	15 Marks

Distribution of Marks for C3 Component (Semester End Examination) The above discussed pattern (1.2) holds good in this case also.

6.4. PRACTICALS

The following scheme will be applicable for both HC and SC in all the four semesters (SC for chemistry students only).

Each practical (HC/SC) consists of three components namely C1, C2 and C3. C1 and C2 are designated as Internal Assessment (IA) and C3 as Semester End Examination. Each practical (HC/SC) carries 100 Marks and hence the allotment of marks to C1, C2 and C3 Components will be 15, 15 and 70 marks respectively. i.e.,

C1 Component:	15 Marks	Internal Assessment Marks
C2 Component:	15 Marks	Internal Assessment Marks
C3 Component:	70 Marks	Semester End Examination
Total	100 Marks	

6.4.1. DISTRIBUTION OF MARKS FOR C1 AND C2 COMPONENTS

IA consists of 15 Marks; it will be divided into three parts viz., Internal Test, Continuous Assessment and Record. Continuous assessment refers to the daily assessment of each student based on his/her attendance, skill, results obtained etc. Thus, 05 marks are allotted for Continuous Assessment. Internal tests will be conducted for 05 Marks during the 8th week of the semester for C1 and 16th week of the semester for C2. Finally, remaining 05 Marks will be for the record. i.e.,

C1		C2	
Internal Test	05 Marks	Internal Test	05 Marks
Continuous Assessment	05 Marks	Continuous Assessment	05 Marks
Record	05 Marks	Record	05 Marks
Total	15 Marks	Total	15 Marks

6.4.2. DISTRIBUTION OF MARKS FOR C3 COMPONENT (SEMESTER END EXAMINATION)

The end examination will be conducted for 70 Marks/course with a maximum duration of 6 hours. Two experiments will be given to each student which carries 30 Marks each. Each student will be subjected to Viva-Voce Examination for which 10 Marks is allotted. i.e.,

Two Experiments	30+30 Marks
Viva-Voce	10 Marks
Total	70 Marks

6.5. DISSERTATION/ PROJECT WORK (04 CREDIT COURSE)

Each student is expected to undergo Dissertation/ Project Work under the guidance of the faculty of the department during the IV Semester.

6.5.1. DISTRIBUTION OF MARKS FOR C1 AND C2 COMPONENTS

IA consists of 15 Marks; it will be divided into three parts viz., Attendance, Continuous Assessment and Work Progress. Continuous assessment refers to the daily assessment of each student based on his or her skill, results obtained, literature survey etc. C1 will be assessed during the 8th week of the semester and C2 during the 16th week of the semester. Hence, the concerned guide will prepare the marks list based on the above said parameters for both C1 and C2 Components.

6.5.2 DISTRIBUTION OF MARKS FOR C3 COMPONENT (SEMESTER END EXAMINATION)

The end examination will be conducted for 70 Marks. Every student is supposed to prepare a hard copy of the findings of the work in the form of dissertation and submit for evaluation. This part will be assessed for 50 Marks. Each student will be subjected to Viva-Voce Examination for which 20 Marks is allotted. i.e.,

Evaluation of Dissertation	50 Marks
Viva-Voce	20 Marks
Total	70 Marks

6.6. Setting question papers and evaluation of answer scripts:

XVII. Question papers in two sets shall be set by the internal examiner and one set by external examiner for a course. Whenever there are no sufficient internal examiners, The Chairman, BoE shall get the question papers set by external examiners.

Whenever there are no external examiners, The Chairman, BoE shall get the question papers set by internal examiner.

XVIII. The Board of Examiners shall scrutinize and approve the question papers and scheme of evaluation.

XIX. (i) There shall be single evaluation for all theory papers by internal examiner and 25% of the total scripts will be reviewed by an external examiner.

(ii) The average of first valuation and the review evaluation will be considered as the final marks of the candidate.

(iii) If there is difference of marks in maiden and reviewed evaluation is greater than 15 marks then the script will go for third evaluation by the external examiner and marks awarded in the third evaluation will be final.

(iv) The examination for Practical work/ Project work will be conducted jointly by one internal and one external examiner.

(v) If a course is fully of (L=0): T: (P=0) type, then the examination for C3 Component will be as decided by the BOS concerned.

XX. Challenge Evaluation

A student who desires to apply for challenge evaluation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Controller of Examinations within 15 days after the announcement of the results. This challenge evaluation is only for C3 component.

The answer scripts, for which challenge evaluation is sought for, shall be sent to external examiner. The marks awarded in the challenge evaluation will be final.

6.7. In case of a course with only practical component a practical examination will be **conducted with two examiners (one Internal and one external)**

A candidate will be assessed on the basis of

a) Knowledge of relevant processes

b) Skills and operations involved

c) Results / products including calculation and reporting.

If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the Departmental council.

6.8. If **X** is the marks scored by the candidate out of 70 in C3 in theory examination, if **Y** is the marks scored by the candidate out of 70 in C3 in Practical examination, and if **Z** is the marks scored by the candidate out of 70 in C3 for a course of (L=0):T:(P=0) type that is entirely tutorial based course, then the final marks (M) in C3 is decided as per the following table.

L.T.P distribution	Formula to compute Mark (M) in C3
L:T:P	$\frac{[(L+T)*X]+[(T+P)*Y]}{L+2T+P}$
L:(T=0):P	$\frac{(L*X)+(P*Y)}{L+P}$
L:T:(P=0)	X
L:(T=0):(P=0)	X
(L=0):T :P	Y
(L=0): (T=0):P	Y
(L=0): T:(P=0)	Z

6.9. In case a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

In case a candidate's class attendance in a course is less than 75%, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

Teachers offering the courses will place the above details in the Department Council meeting during the last week of the semester, before the commencement of C3, and subsequently a notification pertaining to the above will be brought out by the Chairman of the Department before the commencement of C3 examination. A copy of this notification shall also be sent to the office of the Director & the Controller of Examinations.

6.10 In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUP option.

In case a candidate secures more than or equal to 30% in C3, but his/her grade (G) = 4, as per section 6.9 below, then he/she may be declared to have been conditionally successful in this course, provided such a benefit of conditional clearance based on G=4 shall not be availed for more than 8 credits for the entire program of Master's Degree of two years.

In case a candidate secures more than 30% in C3, he/she may choose DROP/MAKE-UP option.

The candidate has to exercise his/her option immediately within 10 days from the date of notification of results.

A MAKE UP examination for C3 shall be conducted in all the semesters. Candidates can register for the MAKE UP examination within 10 days from the date of notification of results. The MAKE UP examination will be conducted within one month of the notification of the results.

If a candidate is still unsuccessful, A MAKE UP Examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with next regular even semester examinations; however, not exceeding double the duration norm in one stretch from the date of joining the course.

6.11. A candidate has to re-register for the DROPPED course when the course is offered again by the department if it is a hard core course. The candidate may choose the same or an alternate core/elective in case the dropped course is soft core / elective course. A candidate who is said to have DROPPED project work has to re-register for the same subsequently within the stipulated period. **The details of any dropped course will not appear in the grade card.**

6.12 The tentative / provisional grade card will be issued by the Controller of Examinations at the end of every semester indicating the courses completed successfully. This statement will not contain the list of DROPPED courses.

6.13 Upon successful completion of Bachelors Honors/Master's Degree, a final grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Controller of Examinations.

6.14 The grade and the grade point earned by the candidate in the course will be as given below.

Marks(M)	**Grade**	**Grade Point (GP = V x G)**
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

Here, **P** is the Percentage of marks (P = [(C1+C2) + M] secured by a candidate in a course which is rounded to nearest integer. **V** is the credit value of course. **G** is the Grade and **GP** is the Grade Point.

6.15 A candidate can withdraw any course within ten days from the date of notification of final results. Whenever a candidate withdraws a paper, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is soft core/open elective.

A DROPPED course is automatically considered as a course withdrawn.

6.16 Overall Cumulative Grade Point Average (CGPA) of a candidate after successfully completing the required number of credits (76) is given by:

CGPA = ΣGP / Total Number of Credits

7. Classification of Results

The Final Grade Point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	Numerical Index	Qualitative Index
4<= CGPA <5	5	Second Class
5<= CGPA <6	6	
6<= CGPA <7	7	First Class
7<= CGPA <8	8	
8<= CGPA <9	9	Distinction
9<= CGPA <10	10	

Overall Percentage = 10* CGPA or is said to be 50% in case CGPA<5

8. Medium of Instruction

The medium of instruction shall be English. However, a candidate will be permitted to write the examinations either in English or Kannada. This rule is not applicable to languages.

9. Attendance and Conduct

Students SHALL NOT take up any employment/course, part time or full time during their study. Students found violating this rule shall be removed from the course. Minimum attendance of 75% of actual working hours in all the courses is required. A student who does not satisfy the requirements of attendance and conduct shall not be permitted to write examination.

In the case of a candidate who represents his institution/University/Karnataka State/Nation in Sports/NCC/NSS/Cultural or any official activities, shortage of attendance up to

maximum of 15 days in a Semester per course may be condoned, based on the recommendation and prior permission of the Head of the Institution concerned.

The Head of the Department shall notify the list of all students who have less than 75% attendance in each course at the beginning of the 16th week of the semester. A copy of the same should be sent to the Controller of Examination of the college.

10. Transfer within University and from other Universities

- Transfer to a different institution within the University is permitted only at the beginning of the academic year.
- A Candidate seeking transfer to a different institution within University of Mysore should have completed all the courses/papers of the previous semesters.
- A Candidate from any other university can join a program of this college only at the beginning of the academic year.
- A Candidate from other university seeking admission by transfer to the college should have completed all the courses of the previous semesters.

11. Provision for Appeal

If a candidate is not satisfied with the evaluation of C1 and C2 components, he / she can approach the grievance cell with the written submission together with all facts, the assignments, and test papers etc., which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty as prescribed by the college on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she found guilty. The decision taken by the grievance cell is final.

For every program there will be one grievance cell. The composition of the grievance cell is as follows.

1. The Controller of Examinations-ex-officio Chairman / Convener

2. One senior faculty member (other than those concerned with the evaluation of the course concerned) drawn from the department/discipline and/or from the sister departments/sister disciplines.

3. One senior faculty member / course expert drawn from outside the department.

12. Discipline

Every student is required to maintain discipline and decorum both inside and outside the campus in accordance with the instructions of the college and also as per the instructions issued by the University of Mysore/Government of Karnataka/UGC from time to time regarding Student Conduct Rules.

Any act of indiscipline of a student is first to be considered by the Disciplinary committee of the college for necessary action. If the issue demands more serious consideration, the act of indiscipline will be reported to the concerned authority who will initiate appropriate action.

Concerned authority may take necessary actions depending upon the prima facie evidence.

13. Any other issue not envisaged above, shall be resolved by the competent authority of the autonomous college, which shall be final and binding.

Any matter which is not covered under this regulation shall be resolved as per the Mysore University Regulations in this regard.

GENERAL SCHEME WITH RESPECT TO ASSESSMENT OF CREDITS

Semester	Hard Core		Soft Core			Open Elective
I Semester	I	2 + 0 + 2 = 4	A	2 + 0 + 2 = 4[a]		
	O	2 + 0 + 2 = 4	I	2 + 0 + 0 = 2		
	P	2 + 0 + 2 = 4	O	2 + 0 + 0 = 2		
	G	3 + 0 + 0 = 3	P	2 + 0 + 0 = 2		
II Semester	I	2 + 0 + 2 = 4	A	2 + 0 + 2 = 4[a]		
	O	2 + 0 + 2 = 4	I	2 + 0 + 0 = 2		
	P	2 + 0 + 2 = 4	O	2 + 0 + 0 = 2		3 + 1 + 0 = 4[b]
	G	3 + 0 + 0 = 3	P	2 + 0 + 0 = 2		3 + 1 + 0 = 4[b]
III Semester	I	3 + 0 + 0 = 3	A[c]	2 + 0 + 2 = 4[d]	2 + 0 + 0 = 2[d]	3 + 1 + 0 = 4[b]
	O	3 + 0 + 0 = 3	I[c]	2 + 0 + 2 = 4[d]	2 + 0 + 0 = 2[d]	3 + 1 + 0 = 4[b]
	P	3 + 0 + 0 = 3	O[c]	2 + 0 + 2 = 4[d]	2 + 0 + 0 = 2[d]	
			P[c]	2 + 0 + 2 = 4[d]	2 + 0 + 0 = 2[d]	
IV Semester	I	3 + 0 + 0 = 3	A[c]	2 + 0 + 2 = 4[d]	2 + 0 + 0 = 2[d]	
	O	3 + 0 + 0 = 3	I[c]	2 + 0 + 2 = 4[d]	2 + 0 + 0 = 2[d]	
	P	3 + 0 + 0 = 3	O[c]	2 + 0 + 2 = 4[d]	2 + 0 + 0 = 2[d]	
	Diss.	4 + 0 + 0 = 4	P[c]	2 + 0 + 2 = 4[d]	2 + 0 + 0 = 2[d]	
Total Credits	52		20(46)			04(08)

Note:

A – Analytical; I – Inorganic; O – Organic; P – Physical; G - General Chemistry; Diss. – Dissertation/Project work e.g., X + Y + Z: Theory + Tutorial + Practical

[a] All students have to opt composite paper (Theory + Practical) in Soft Core compulsorily in both I and II Semesters

[b] Courses are common for both II and III Semesters and it is only for non-chemistry students

[c] Among the strength in class, each 25% is allowed to opt one composite paper (Theory + Practical) in both III and IV Semesters since it is very difficult to accommodate all the students in any one branch

[d] Courses are common for both III and IV Semester

Scheme of Study and Examination
First Semester
Hard Core

A: Courses; B: Title; C: Contact Hours/week; D: Credit;
E: Max. Marks; F: Internal Assessment Marks; G: Semester End Exams (C_3)

A	B	C	D	E	F		G	
					C_1	C_2	Duration	Max. Marks
CHI HCT: 1.1.	Concepts and Models of Inorganic Chemistry + Inorganic Chemistry Practicals-I	02+04	04	100	15	15	03	70
CHO HCT: 1.2.	Reaction Mechanism + Organic Chemistry Practicals-I	02+04	04	100	15	15	03	70
CHP HCT: 1.3.	Physical Chemistry-I + Physical Chemistry Practicals-I	02+04	04	100	15	15	03	70
CHG HCT: 1.4.	Symmetry, Group Theory and Chemical Spectroscopy	03	03	100	15	15	03	70

Note: For all Composite Courses, Theory will be evaluated for 100 marks and Practical for 100 marks separately and the average will be taken for the result declaration.

Soft Core

A: Courses; B: Title; C: Contact Hours/week; D: Credit;
E: Max. Marks; F: Internal Assessment Marks; G: Semester End Exams (C_3)

A	B	C	D	E	F		G	
					C_1	C_2	Duration	Max. Marks
CHA SCT: 1.51.	Fundamentals of Chemical Analysis + Analytical Chemistry Practicals-I	02+04	04	100	15	15	03	70
CHI SCT: 1.52.	Chemistry of Selected Elements	02	02	100	15	15	03	70
CHO SCT: 1.53.	Vitamins and Medicinal Chemistry	02	02	100	15	15	03	70
CHP SCT: 1.54.	Biophysical Chemistry and Pharmacokinetics	02	02	100	15	15	03	70

SECOND SEMESTER HARD CORE								
A: Courses; B: Title; C: Contact Hours/week; D: Credit; E: Max. Marks; F: Internal Assessment Marks; G: Semester End Exams (C_3)								
A	**B**	**C**	**D**	**E**	**F**		**G**	
					C_1	**C_2**	**Duration**	**Max. Marks**
CHI HCT: 2.1.	Coordination Chemistry + Inorganic Chemistry Practicals-II	02+04	04	100	15	15	03	70
CHO HCT: 2.2.	Stereochemistry and Heterocyclic Chemistry + Organic Chemistry Practicals-II	02+04	04	100	15	15	03	70
CHP HCT: 2.3.	Physical Chemistry-II + Physical Chemistry Practicals-II	02+04	04	100	15	15	03	70
CHG HCT: 2.4.	Molecular Spectroscopy-II	03	03	100	15	15	03	70
SOFT CORE								
A: Courses; B: Title; C: Contact Hours/week; D: Credit; E: Max. Marks; F: Internal Assessment Marks; G: Semester End Exams (C_3)								
A	**B**	**C**	**D**	**E**	**F**		**G**	
					C_1	**C_2**	**Duration**	**Max. Marks**
CHA SCT: 2.51	Separation Techniques + Analytical Chemistry Practicals-II	02+04	04	100	15	15	03	70
CHI SCT: 2.52.	Industrial Inorganic Chemistry	02	02	100	15	15	03	70
CHO SCT: 2.53.	Dyes and Insecticides	02	02	100	15	15	03	70
CHP SCT: 2.54.	Nanomaterials, Semiconductors and Superconductors	02	02	100	15	15	03	70
OPEN ELECTIVE (for Non-Chemistry Students only)								
A: Courses; B: Title; C: Contact Hours/week; D: Credit; E: Max. Marks; F: Internal Assessment Marks; G: Semester End Exams (C_3)								
A	**B**	**C**	**D**	**E**	**F**		**G**	
					C_1	**C_2**	**Duration**	**Max. Marks**
CH OET: 2.1/3.1.	Chemistry	04	04	100	15	15	03	70
CH OET: 2.2/3.2.	General Chemistry	04	04	100	15	15	03	70
Note: Each course will have three units and one tutorial class/week								

THIRD SEMESTER

HARD CORE

A: Courses; B: Title; C: Contact Hours/week; D: Credit;
E: Max. Marks; F: Internal Assessment Marks; G: Semester End Exams (C_3)

A	B	C	D	E	F		G	
					C_1	C_2	Duration	Max. Marks
CHI HCT: 3.1.	Advanced Inorganic Chemistry	03	03	100	15	15	03	70
CHO HCT: 3.2.	Reagents in Organic Synthesis	03	03	100	15	15	03	70
CHP HCT: 3.3.	Physical Chemistry-III	03	03	100	15	15	03	70

SOFT CORE
COMPOSITE

A: Courses; B: Title; C: Contact Hours/week; D: Credit;
E: Max. Marks; F: Internal Assessment Marks; G: Semester End Exams (C_3)

A	B	C	D	E	F		G	
					C_1	C_2	Duration	Max. Marks
CHA SCT: 3.41.	Applied Analysis I + Analytical Chemistry Practicals-III	02+04	04	100	15	15	03	70
CHI SCT: 3.42.	Frontiers in Inorganic Chemistry + Inorganic Chemistry Practicals- II	02+04	04	100	15	15	03	70
CHO SCT: 3.43	Carbohydrates, Proteins and Nucleic Acids + Organic Chemistry Practicals-III	02+04	04	100	15	15	03	70
CHP SCT: 3.44.	Applications of Electrochemistry and Corrosion + Physical Chemistry Practical - III	02+04	04	100	15	15	03	70

NON-COMPOSITE

A: Courses; B: Title; C: Contact Hours/week; D: Credit;
E: Max. Marks; F: Internal Assessment Marks; G: Semester End Exams (C_3)

A	B	C	D	E	F		G	
					C_1	C_2	Duration	Max. Marks

CHI SCT: 3.42	Bioinorganic Photochemistry	02	02	100	15	15	03	50
CHOSCT: 3.52.	Lipids, Porphyrins, Anthocyanins and Flavonoids	02	02	100	15	15	03	50
CHP SCT: 3.53.	Applications of X-ray crystallography and Quantum Chemistry	02	02	100	15	15	03	50
OPEN ELECTIVE All the courses are same as that described in II Semester								

FOURTH SEMESTER

HARD CORE

A: Courses; B: Title; C: Contact Hours/week; D: Credit;

E: Max. Marks; F: Internal Assessment Marks; G: Semester End Exams (C_3)

A	B	C	D	E	F		G	
					C_1	C_2	Duration	Max. Marks
CHI HCT: 4.1.	Bioinorganic Chemistry	03	03	100	15	15	03	70
CHO HCT: 4.2.	Photochemistry, Pericyclic Reactions and Organometallic Chemistry	03	03	100	15	15	03	70
CHP HCT: 4.3.	Physical Chemistry-IV	03	03	100	15	15	03	70
SOFT CORE All the courses are same as that described in III Semester								

FIRST SEMESTER

CHI HCT: 1.1. CONCEPTS AND MODELS OF INORGANIC CHEMISTRY

UNIT – I

[16 HOURS]

Chemical Periodicity: Review of periodic properties

Structures and energetics of ionic crystals: Introduction, MX (NaCl, CsCl, ZnS) and MX_2 (fluorite, rutile, β-crystobalite and cadmium iodide) types. The perovskite and spinel structures. Thermodynamics of ionic crystal formation. Lattice energy, Born-Haber cycle, Born-Lande equation. Applications of lattice energetics. Radius ratio rules

Structures and energetics of inorganic molecules: Introduction, Energetics of hybridization. VSEPR model for explaining structure of AB, AB_2E, AB_3E, AB_2E_2, ABE_3, AB_2E_3, AB_4E_2, AB_5E and AB_6 molecules. M.O. treatment of homonuclear and heteronuclear diatomic molecules. M.O. treatment involving delocalized π-bonding (CO_3^{2-}, NO^{3-}, NO^{2-}, CO_2 and N^{3-}), M.O. correlation diagrams (Walsh) for triatomic molecules

UNIT – II

[16 HOURS]

Modern concept of acids and bases: Lux-Flood and Usanovich concepts, solvent system and leveling effect. Hard-Soft Acids and Bases, Classification and Theoretical backgrounds. Non-aqueous solvents: Classification of solvents, Properties of solvents (dielectric constant, donor and acceptor properties) protic solvents (anhydrous H_2SO_4 and HF) aprotic solvents (liquid SO_2, BrF_3 and N_2O_4). Solutions of metals in liquid ammonia, hydrated electron. Super acids.

Inner transition elements: Spectral and magnetic properties, redox chemistry.

Applications: Lanthanides as shift reagents, high temperature super conductors. Chemistry of trans-uranium elements.

References

1. Basic Inorganic Chemistry – 3rd edition. F.A. Cotton, G. Wilkinson and P.L. Gaus, John Wiley and Sons (2002).
2. Inorganic Chemistry, 3rd edition. James E. Huheey, Harper and Row Publishers (1983).
3. Inorganic Chemistry, 3rd edition. G.L. Miessler and D.A. Tarr, Pearson Education (2004).
4. Inorganic Chemistry, 2nd edition. D.F. Shriver, P.W. Atkins and C.H. Langford, Oxford University Press (1994).

5. Inorganic Chemistry, 2nd edition. C.E. Housecroft and A.G. Sharpe, Pearson Education Ltd. (2005).

6. Introduction to Modern Inorganic Chemistry, K.M. Mackay and R.A. Mackay, Blackie Publication (1989).

7. Concepts and Models of Inorganic Chemistry 3rd edition. B.E. Douglas, D.H. McDaniel and Alexander, Wiley (2001).

INORGANIC CHEMISTRY PRACTICALS – I

[64 HOURS]

1. Determination of iron in haematite using cerium(IV) solution (0.02M) as the titrant, and gravimetric estimation of insoluble residue.
2. Estimation of calcium and magnesium carbonates in dolomite using EDTA titration, and gravimetric analysis of insoluble residue.
3. Determination of manganese dioxide in pyrolusite using permanganate titration.
4. Quantitative analysis of copper-nickel in alloy/mixture:
   i. Copper volumetrically using KIO_3.
   ii. Nickel gravimetrically using DMG
5. Determination of lead and tin in a mixture: Analysis of solder using EDTA titration.
6. Quantitative analysis of chloride and iodide in a mixture:
   i. Iodide volumetrically using KIO_3
   ii. Total halide gravimetrically
7. Gravimetric analysis of molybdenum with 8-hydroxyquinoline.
8. Quantitative analysis of copper(II) and iron(II) in a mixture:
   i. Copper gravimetrically as CuSCN and
   ii. Iron volumetrically using cerium(IV) solution
9. Spectrophotometric determinations of:
   a. Titanium using hydrogen peroxide
   b. Chromium using diphenyl carbazide in industrial effluents
   c. Iron using thiocyanate/1,10-phenanthroline method in commercial samples
   d. Nickel using dimethylglyoxime in steel solution
10. Micro-titrimetric estimation of :

a) Iron using cerium(IV)

b) Calcium and magnesium using EDTA

11. Quantitative estimation of copper(II), calcium(II) and chloride in a mixture.

12. Circular paper chromatographic separation of: (Demonstration)

    a. Iron and nickel

    b. Copper and nickel

References

1. Vogel's Text Book of Quantitative Chemical Analysis – 5th edition, J. Basset, R.C. Denney, G.H. Jeffery and J. Mendhom.
2. A Text Book of Quantitative Inorganic Analysis by A.I. Vogel, 3rd edition.
3. Spectrophotometric Determination of Elements by Z. Marczenko.
4. Vogel's Qualitative Inorganic Analysis – Svelha.
5. Macro and Semimicro Inorganic Qualitative Analysis by A.I. Vogel.
6. Semimicro Qualitative Analysis by F.J. Welcher and R.B. Halin.
7. Quantitative Chemical Analysis by Daniel C. Harris, 7th edition, (2006).

CHO HCT: 1.2. REACTION MECHANISM

UNIT – I

[16 HOURS]

Basics of organic reactions: Meaning and importance of reaction mechanism, classification and examples for each class.

Bonding in organic systems: Theories of bonding-molecular orbital approaches. Huckel

molecular orbital theory and its application to simple π-systems: ethylene, allyl, cyclopropyl, butadienyl, cyclopentadienyl, pentadienyl, hexatrienyl, cyclohexatrienyl, heptatrienyl, cycloheptatrienyl systems. Calculation of the total π -energy, and M.O. coefficients of the systems.

Aromaticity: Concept of aromaticity, Huckel's rule, Polygon rule, annulenes, heteroannulenes and polycyclic systems.

Structure and reactivity: Brief discussion on effects of hydrogen bonding, resonance, inductive and hyperconjugation on strengths of acids and bases.

Methods of determining organic reaction mechanism: Thermodynamic and kinetic requirements for reactions, kinetic and thermodynamic control. Identification of products. Formation, structure, stability, detection and reactions of carbocations (classical and non-classical), carbanions, free radicals, carbenes, nitrenes, arynes and ylides (Sulphur, nitrogen and phosphorous). Determination of reaction intermediates, isotope labeling and effects of cross over experiments. Kinetic and stereochemical evidence, solvent effect

UNIT – II

[16 HOURS]

Substitution reactions – Kinetics, mechanism and stereochemical factor affecting the rate of S_N1, S_N2, $S_{RN}i$, S_Ni, S_N1', S_N2', S_N1i and $S_{RN}1$ reactions, Neighbouring group participation. Electrophilic substitution reactions – Kinetics, mechanism and stereochemical factor affecting the rate of S_E1 & S_E2

Aromatic electrophilic substitution reactions: Mechanism of nitration, halogenation, sulphonation, Friedel-Crafts alkylation and acylation, Mannich reaction, chloromethylation, Vilsmeier Haack reaction, Diazonium coupling, Gattermann–Koch reaction, Mercuration reaction.

Aromatic nucleophilic substitution reactions: S_N1, S_N2 and benzyne mechanism, Bucherer reaction, von Richter reaction.

Mechanism of Addition reactions: Addition to C-C multiple bonds involving electrophiles, nucleophiles. Markownikoff's rule and anti-Markownikoff's rule.

Additions to carbonyl compounds: Addition of water, alcohol, bisulphate, HCN and amino compounds. Hydrolysis of esters.

Elimination reactions: Mechanism and stereochemistry of eliminations - E_1, E_2, E_1^{CB}. cis elimination, Hofmann and Saytzeff eliminations, competition between elimination and substitution, decarboxylation reactions. Chugaev reaction.

References

1. H. Pine, Hendrickson, Cram and Hammond, Organic Chemistry, Mc Graw Hill, New York, 1987.
2. I.L. Finar, Organic Chemistry, ELBS Longmann, Vol. I & II, 1984.
3. N.S. Issacs, Reactive Intermediates in Organic Chemistry, John Wiley and Sons, New York.1974.
4. R.K. Bansal, Organic Reaction Mechanism, Wiley Eastern Limited, New Delhi, 1993.
5. J. March, Advanced Organic Chemistry, Wiley Interscience, 1994.
6. A Guide Book to Mechanism in Organic Chemistry by Petersykes.
7. F.A. Carey and Sundberg, Advanced Organic Chemistry – Part A & B, 3rd edition, Plenum Press, New York, 1990.
8. S.K. Ghosh, Advanced General Organic Chemistry, Book and Alleied (P) Ltd, 1998.

ORGANIC CHEMISTRY PRACTICALS – I

[64 HOURS]

Qualitative analysis: Separation of binary mixtures, identification of functional groups and preparation of suitable solid derivatives.

References

1. Manual of Organic Chemistry - Dey and Seetharaman.
2. Modern Experimental Organic Chemistry by John H. Miller and E.F. Neugil, p 289.
3. An Introduction to Practical Organic Chemistry - Robert, Wingrove etc.
4. A Text Book of Practical Organic Chemistry – A.I. Vogel, Vol. III.
5. Practical Organic Chemistry - Mann & Saunders.
6. Semimicro Qualitative Organic Analysis by Cheronis, Entrikin and Hodnet.

CHP HCT: 1.3. PHYSICAL CHEMISTRY – I

UNIT – I

[16 HOURS]

Concepts of entropy and free energy: A brief resume of laws of thermodynamics (First and second laws). Entropy as a measure of unavailable energy. Entropy change during spontaneous process. Helmholtz and Gibbs free energies. Thermodynamic criteria of equilibrium and spontaneity. Variation of free energy with temperature and pressure. Maxwell's relations. Third law of thermodynamics - calculation of absolute entropies. Nernst heat theorem & its applications.

Partial molar properties: Partial molar volumes and their determination by intercept method and from density measurements. Chemical potential and its significance. Variation of chemical potential with temperature and pressure. Formulation of the Gibbs - Duhem equation. Derivation of Duhem-Margules equation.

Fugacity: Concept of fugacity, Determination of fugacity of gases. Variation of fugacity with temperature and pressure. Activity and activity coefficients. Variation of activity with temperature and pressure. Determination of activity co-efficients by vapour pressure, depression in freezing point, solubility measurements by electrical methods.

Thermodynamics of dilute solutions: Raoult's law, Henry's law. Ideal and non-ideal solutions.

UNIT – II

[16 HOURS]

Chemical Kinetics: Determination of order of reactions, complex reactions - parallel, consecutive and reversible reactions. Chain reactions - Branched chain reactions- general rate expression, explosion limits.

Theories of reaction rates: Collision theory and its limitations, Activated complex theory (postulates -derivation) and its applications to reactions in solution. Energy of activation, other activation parameters - determinations and their significance. Lindemann theory of unimolecular reactions. Qualitative account of its modifications (no derivation). Potential energy surfaces: Features and construction, theoretical calculations of E_a.

Reactions in solution: Ionic reactions - salt and solvent effects. Effect of pressure on the rates of reactions. Cage effect with an example. Oscillatory reactions.

Fast reactions- Study of fast reactions by continuous and stopped flow techniques, relaxation methods (T-jump and P-jump methods), flash photolysis, pulse and shock tube methods.

Reference

1. Physical Chemistry by P.W. Atkins, ELBS, 5th edition, Oxford University Press (1995).
2. Text Book of Physical Chemistry by Samuel Glasstone, MacMillan Indian Ltd., 2nd edition (1974).
3. Elements of Physical Chemistry by Lewis and Glasstone.
4. Fundamentals of physical chemistry – Maron and Lando (Collier Macmillan) 1974.
5. Thermodynamics for Chemists by S. Glasstone, Affiliated East-West Press, New Delhi, (1965).
6. Chemical Thermodynamics by I.M. Klotz, W.A. Benzamin Inc. New York, Amsterdam (1964).
7. Chemical Kinetics by K.J. Laidler.
8. Chemical Kinetics by Frost and Pearson.
9. Kinetics and Mechanism of Chemical Transformation by J. Rajaram and J.C. Kuriacose.
10. Chemical Kinetics by L.K. Jain.
11. Chemical Kinetics by Benson.

PHYSICAL CHEMISTRY PRACTICALS – I

[64 HOURS]

1. Study of kinetics of hydrolysis of an ester using HCl/H_2SO_4 at two different temperatures, determination of rate constants and energy of activation.
2. Study of kinetics of reaction between $K_2S_2O_8$ and KI, first order, determination of rate constants at two different temperatures and Ea.
3. To study the kinetics of saponification of ethyl acetate by conductivity method, determination of rate constant.
4. Conductometric titration of a mixture of HCl and CH_3COOH against NaOH.
5. Conductometric titration of sodium sulphate against barium chloride.
6. Determination of equivalent conductance at infinite dilution of a strong electrolytes and verification of Onsager equation.
7. Potentiometric titration of KI vs $KMnO_4$ solution.
8. Determination of dissociation constant of a weak acid by potentiometric method.
9. Potentiometric titration of $AgNO_3$ vs KCl.
10. To obtain the absorption spectra of coloured complexes, verification of Beer's law and estimation of metal ions in solution using a spectrophotometer.
11. Spectrophotometric titration of $FeSO_4$ against $KMnO_4$.

12. Determination of heat of solution of benzoic acid by variable temperature method (graphical method).
13. Kinetics of photodegradation of indigocarmine (IC) using ZnO/TiO_2 as photocatalyst and study the effect of [ZnO/TiO_2] and [IC] on the rate of photodegradation.
14. Determination of the molecular weight of a polymer material by viscosity measurements (cellulose acetate/methyl acrylate).
15. Analysis of a binary mixture (Gylcerol & Water) by measurement of refractive index.
16. Determination of degree of association of benzoic acid in benzene by distribution method.

Reference

1. Practical Physical Chemistry – A.J. Findlay.
2. Experimental Physical Chemistry – F. Daniels et al.
3. Selected Experiments in Physical Chemistry – Latham.
4. Experiments in Physical Chemistry – James and Prichard.
5. Experiments in Physical Chemistry – Shoemaker.
6. Advanced Physico-Chemical Experiments – J. Rose.
7. Practical Physical Chemistry – S.R. Palit.
8. Experiments in Physical Chemistry – Yadav, Geol Publishing House.
9. Experiments in Physical Chemistry – Palmer.
10. Experiments in Chemistry – D.V. Jahagirdar, Himalaya Publishing House, Bombay, (1994).
11. Experimental Physical Chemistry – R.C. Das and B. Behera, Tata Mc Graw Hill.

CHG HCT: 1.4. SYMMETRY, GROUP THEORY AND CHEMICAL SPECTROSCOPY

UNIT – I

[16 HOURS]

Molecular symmetry and group theory: Symmetry elements and symmetry operations. Concept of a group, definition of a point group. Classification of molecules into point groups. Subgroups. Schoenflies and Hermann-Maugin symbols for point groups. Multiplication tables (C_n, C_{2V} and C_{3V}). Matrix notation for the symmetry elements. Classess and similarity transformation.

Representationof groups: The Great Orthogonality theorem and its consequences. Character tables (C_s, C_i, C_2, C_{2v}, C_{2h} and C_{3v}). Symmetry and dipole moment.

Applications of group theory: Group theory and hybrid orbital. Group theory to Crystal field theory and Molecular orbital theory (octahedral and tetrahedral complexes). Determining the symmetry groups of normal modes (both linear and non-linear molecules).

UNIT – II

[16 HOURS]

Microwave spectroscopy: Rotation spectra of diatomic Molecules - rigid and non rigid rotator model. Rotational quantum number and the selection rule. Effect of isotopic substitution on rotation spectra. Relative intensities of the spectral lines. Classification of polyatomic molecules based on moment of inertia - Linear, symmetric top, asymmetric top and spherical molecules. Rotation spectra of polyatomic molecules (OCS CH_3F and BCl_3). Moment of inertia expression for linear tri-atomic molecules. Applications - Principles of determination of Bond length and moment of inertia from rotational spectra. Stark effect in rotation spectra and determination of dipole moments.

Vibration spectroscopy: Vibration of diatomic molecules, vibrational energy curves for simple harmonic oscillator. Effects of anharmonic oscillation. Vibration - rotation spectra of carbon monoxide. Expressions for fundamental and overtone frequencies. Vibration of polyatomic molecules – The number of degrees of freedom of vibration. Parallel and perpendicular vibrations (CO_2 and H_2O). fundamental, overtone, combination and difference bands. Fermi resonance. Force constant and its significance. Theory of infrared absorption and theoretical group frequency. Intensity of absorption band and types of absorptions. Correlation chart. Important spectral regions - hydrogen stretching region, double and triple bonds regions, fingerprint region. Factors affecting the group frequency – Physical state, vibrational coupling, electrical effect, hydrogen bonding, steric effect and ring strain. Applications: Structures of small molecules: XY_2 – linear or bent, XY_3 – planar or pyramidal.

UNIT – III

[16 HOURS]

Raman spectroscopy: Introduction, Raman and Rayleigh scattering, Stokes and anti-Stokes lines, polarization of Raman lines, depolarization factor, polarizability ellipsoid. Theories of Raman spectra - classical and quantum theory. Rotation-Raman and vibration-Raman spectra. Comparison of Raman and IR spectra, rule of mutual exclusion principle. Vibration modes of some simple molecules and their activity in Raman.

UV Visible spectroscopy: Quantitative aspects of absorption – Beer's law, Technology associated with absorption measurements. Limitations of the law – real, chemical, instrumental and personal. Theory of molecular absorption. Vibration rotation fine

structure of electronic spectra. Types of absorption bands- n to π*, π to π*, n to σ* and σ to σ*, C-T and ligand field.

Woodwards empirical rules for predicting the wavelength of maximum absorption for olefins, conjugated dienes, cyclic trienes and polyenes, α,ß-unsaturated aldehydes and ketones, benzene and substituted benzene rings. Applications: Qualitative and quantitative analysis of binary mixtures, measurements of dissociation constants of acids and bases, determination of molecular weight, determination of stoichiometry and stability of the complexes. Photometric titrations, kinetic studies.

References

1. Chemical Applications of Group Theory, 3rd edition, F.A. Cotton, John Wiley and Sons (2006).
2. Molecular Symmetry and Group Theory – Robert L Carter, John Wiley and Sons (2005).
3. Symmetry in Chemistry - H. Jaffe and M. Orchin, John Wiley, New York (1965).
4. Vibrational Spectroscopy - Theory and Applications- D.N. Sathyanarayana, New Age International Publications, New Delhi (1996).
5. Group Theory and its Chemical Applications - P.K. Bhattacharya, Himalaya Publications, New Delhi (1998).
6. Fundamentals of Molecular Spectroscopy, C.N. Banwell and E.M. McCash. 4th edition, Tata McGraw Hill, New Delhi.
7. Fundamentals of molecular spectroscopy, G. M. Barrow, MgGraw Hill, New York (International students Edition), 1974.
8. Theoretical chemistry, S. Glasstone, affiliated East-West Press Pvt. Ltd, New Delhi, 1973.
9. Introduction to Spectroscopy - Pavia, Lampman and Kriz, 3rd edition, Thomson.
10. Spectroscopy, B.P. Straughan and S. Walker, John Wiley & Sons Inc., New York, Vol. 1 and 2, 1976.
11. Vibration Spectroscopy Theory and Applications, D.N. Satyanarayana, New Age International, New Delhi.
12. Spectroscopy, B.P. Straughan and S. Salker, John Wiley and Sons Inc., New York, Vol.2, 1976.
13. Organic Spectroscopy, William Kemp, English Language Book society, Macmillan, 1987.
14. Instrumental methods of analysis, H. H. Willard, L. L. Merritt and J. A. Dean, 7th Edition, 1988.
15. Physical methods in inorganic chemistry, R. S. Drago, affiliated East-West press Pvt. Ltd., (Student Edition) 1978.

CHA SCT: 1.51 FUNDAMENTALS OF CHEMICAL ANALYSIS

UNIT – I

[16 HOURS]

Analytical Chemistry: Meaning and analytical prospective, scope and function: Analytical problems and their solutions, trends in analytical methods and procedures.

Language of analytical chemistry - Analysis, determination and measurement. Techniques, methods, procedures and protocols. Classifying analytical techniques. selecting an analytical method - accuracy, precision, sensitivity, selectivity, robustness and ruggedness. Scale of operation, equipment, time and cost. Making the final choice

Errors and treatment of analytical data: Limitations of analytical methods – Error: determinate and indeterminate errors, minimization of errors. Accuracy and precision, distribution of random errors, the normal error curve. Statistical treatment of finite samples - measures of central tendency and variability: mean, median, range, standard deviation and variance. Student's t-test, confidence interval of mean. Testing for significance - comparison of two means and two standard deviations. Comparison of an experimental mean and a true mean. Criteria for the rejection of an observation - Q-test. Propagation of errors: determinate errors and indeterminate errors.

Acid-base titrations in non-aqueous media: Role of solvent in acid-base titrations, solvent systems, differentiating ability of a solvent, some selected solvents, titrants and standards, titration curves, effect of water, determining the equivalence point, typical applications - determination of carboxylic acids, phenols and amines.

UNIT – II

[16 HOURS]

Titrimetric analysis: An overview of titrimetry. Principles of titrimetric analysis. Titration curves. Titrations based on acid-base reactions - titration curves for strong acid and strong base, weak acid and strong base and weak base and strong acid titrations. Selecting and evaluating the end point. Finding the end point by visual indicators, monitoring pH and temperature. Quantitative applications – selecting and standardizing a titrant, inorganic analysis - alkalinity, acidity and free CO_2 in water and waste waters, nitrogen, sulphur ammonium salts, nitrates and nitrites, carbonates and bicarbonates.

Precipitation titrations: Titration curves, feasibility of precipitation titrations, factors affecting shape - titrant and analyte concentration, completeness of the reaction, titrants and standards, indicators for precipitation titrations involving silver nitrate, the Volhard, the Mohr and the Fajan's methods, typical applications.

Complexometric titrations: Complex formation reactions, stability of complexes, stepwise formation constants, chelating agents, EDTA - acidic properties, complexes with metal

ions, equilibrium calculations involving EDTA, conditional formation constants, derivation of EDTA titration curves, effect of other complexing agents, factors affecting the shape of titration curves - completeness of reaction, indicators for EDTA titrations - theory of common indicators, titration methods employing EDTA - direct, back and displacement titrations, indirect determinations, titration of mixtures.

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001, John Wiley & Sons, Inc, India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993, Prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.
5. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003, Pearson Education Pvt. Ltd., New Delhi.
6. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California, 1990.
7. Principles and Practice of Analytical Chemistry, F.W. Fifield and Kealey, 3rd edition, 2000, Blackwell Sci., Ltd. Malden, USA.
8. Modern Analytical Chemistry, David Harvey, McGraw Hill, New Delhi, 2000.

ANALYTICAL CHEMISTRY PRACTICALS – I

[64 HOURS]

1. Determination of total acidity of vinegar and wines by acid-base titration.
2. Determination of purity of a commercial boric acid sample, and Na_2CO_3 content of washing soda.
3. Analysis of chromate-dichromate mixture by acid-base titration.
4. Determination of replaceable hydrogen and relative molecular mass of a weak organic acid by titration with NaOH.
5. Determination of aspirin in their tablet preparations by residual acid-base titrimetry.
6. Determination of purity of aniline
7. Assay of chlorpromazine tablets by non-aqueous acid-base titration.
8. Determination of carbonate and bicarbonate in a mixture by pH-metric titration and comparison with visual acid-base titration.
9. Determination of benzoic acid in food products by titration with methanolic KOH in chloroform medium using thymol blue as indicator.

10. Analysis of water/waste water for acidity by visual, pH metric and conductometric titrations.
11. Analysis of water/waste water for alkalinity by visual, pH metric and conductometric titrations.
12. Determination of carbonate and hydroxide-analysis of a commercial washing soda by visual and pH-titrimetry.
13. Spectrophotometric determination of creatinine and phosphorus in urine.
14. Flame emission spectrometric determination of sodium and potassium in river/lake water.

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001 John Wiley & Sons, Inc, India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993, Prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.
5. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003, Pearson Education Pvt. Ltd., New Delhi.
6. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California, 1990.
7. Practical Clinical biochemistry methods and interpretations, R. Chawla, J.P. Bothers Medical Publishers (P) Ltd., 1995.
8. Laboratory manual in biochemistry, J. Jayaraman, New Age International Publishers, New Delhi, 1981.
9. Practical Clinical Biochemistry by Harold Varley and Arnold.Heinmann, 4th edition.

CHI SCT: 1.52 CHEMISTRY OF SELECTED ELEMENTS

UNIT – I

[16 HOURS]

Compounds of hydrogen: The hydrogen and hydride ions, Dihydrogen and hydrogen bonding. Classes of binary hydrides: Molecular hydrides, saline hydrides and metallic hydrides.

The Group 1 elements: Occurrence, extraction and uses. Simple compounds: Hydrides, halides, oxides, hydroxides, oxoacids, nitrides, solubility and hydration and solutions in liquid ammonia. Coordination and organometallic comopounds. Applications.

The Group 2 elements: Occurrence, extraction and uses. Halides, hydrides and salts of oxoacids. Complex ion in aqueous solution and complexes with amido and alkoxy ligands. The Group 17 elements: Occurrence, recovery and uses. Trends in properties and pseudohalogens.

UNIT – II

[16 HOURS]

Interhalogens: Physical properties and structures, chemical properties, cationic interhalogens, halogen complexes and polyhalides.

Compounds with oxygen: Halogen oxides, oxoacids and oxoanions.

Trends in rates of redox reactions and redox properties of individual oxidation states.

Chemistry of astatine.

The Group 18 elements: Occurrence, recovery and uses. Synthesis and structure of xenon

fluorides, Reaction of xenon fluorides, xenon-oxygen compounds, Organoxenon compounds,

Other compounds of noble gases.

M-M bonds: Multiple metal-metal bonds.

Cluster compounds: carbonyl and carbide clusters.

References

1. Basic Inorganic Chemistry – 3rd edition. F.A. Cotton, G. Wilkinson and P.L. Gaus, John Wiley and Sons (2002).
2. Inorganic Chemistry, 3rd edition. James E. Huheey, Harper and Row Publishers (1983).

3. Inorganic Chemistry, 3rd edition. G.L. Miessler and D.A. Tarr, Pearson Education (2004).

4. Inorganic Chemistry, 2nd edition. C.E. Housecroft and A.G. Sharpe, Pearson Education.
5. Chemistry of the Elements – N.N. Greenwood and A. Earnshaw, Pergamon Press (1985).
6. Inorganic Chemistry - 2nd edition, D.F. Shriver, P.W. Atkins and C.H. Langford, Oxford University Press, (1994).

CHO SCT: 1.53 VITAMINS AND MEDICINAL CHEMISTRY

UNIT – I

[16 HOURS]

Vitamins: Introduction, constitution, synthesis and biological significance of thiamine, riboflavin, pyridoxine, biotin, ascorbic acid, vitamine A_1 & A_2, E_1 and E_2 , B_{12} and K groups.

Green chemistry:

Definition and principles, planning a green synthesis in a chemical laboratory, Green preparation-Aqueous phase reactions, solid state (solvent less) reactions, photochemical reactions, Phase transfer catalyst catalyzed reactions, enzymatic transformations & reactions in ionic liquids.

UNIT – II

[16 HOURS]

Medicinal Chemistry-Chemotherapy: Definition, History, and Evolution of Chemother Classification of drugs on the basis of therapeutic action, pharmacophonic, API (active pharmaceutical ingredient) chiral drugs, development of new drugs, procedures followed in drug design, concept of lead and lead-compounds and lead modifications, molecular modeling, concept of pro-drug and soft drug, factor affecting bioactivity.

Theories of drug activity, occupancy-theory, rate theory, induced-fit theory. Quantitative structure-activity relationship, history and development of QSAR, concept of drug receptors, elementary treatment of drug receptor interactions.

Physiochemical parameters: lipophilicity, partition-coefficient, electronic ionization constant, steric, Shelton and surface activity parameters and redox potential.

Evaluation methods: Free-Wilson analysis, Hansch-analysis, relationship between Free-Wilson analysis and Hansch-analysis – LD_{50}, ED_{50}, ID_{50}, IC_{50} (mathematical derivation of equation excluded).

References

1. Introduction to medicinal chemistry, A Gringuage, Wiley-VCH.
2. Wilson and Gisvold's Text Book of organic medicinal and pharmaceutical chemistry, Ed Robert F. Dorge.
3. An introduction to drug design, S.S. Pandey and J.R. Dimmock, New Age International.
4. Burger's medicinal chemistry and drug discovery, Vol-1 (Chapter-9 and Ch-14), Ed.M.E. Wolff, John Wiley.
5. L. Finar, Organic Chemistry, ELBS Longmann, Vol. I & II, 1984.
6. K. Albert, L. Lehninger, D. L. Nelson, M. M. Cox, Principles of Biochemistry, CBZ publishers, 1st edition, New Delhi, 1993.
7. Harper's Biochemistry, Ed. R. Harper, 22nd edition, Prentice Hall Press, New York, 1990.
8. Harper's review of biochemistry – P. W. Martin, P. A. Mayer & V. W. Rodfwell, 5th edition, Maurzen Asian Edition, California, 1981.

CHP SCT: 1.54. BIOPHYSICAL CHEMISTRY AND PHARMACOKINETICS

UNIT – I

[16 HOURS]

Biophysical chemistry: Electrophoresis - principles of free electrophoresis, zone electrophoresis, gel electrophoresis and its applications in qualitative and quantitative study of proteins. Determination of isoelectric point of a protein. Electroosmosis and streaming potential and its biological significance. Biological significance of Donnan membrane phenomenon. Micelles and its involvement during digestion and absorption of dietary lipids. Diffusion of solutes across biomembranes and its application in the mechanism of respiratory exchange. "Salting In" and "Salting Out" of proteins. Osmotic behaviour of cells and osmo-regulation and its application in the evolution of excretory systems of organisms. Effect of temperature and pH on the viscosity of biomolecules (albumin solution). Significance of viscosity in biological systems - mechanism of muscle contraction, detection of intrastrand disulfide bonds in proteins, polymerization of DNA and nature of blood flow through different vessels. Effect of temperature, solute concentration (amino acids) on surface tension. Biological significance of surface tension - stability of Alveoli in lungs, interfacial tension in living cells (Danielli and Davson model). Application of sedimentation velocity and sedimentation equilibrium method for molecular weight determination of proteins.

UNIT – II

[16 HOURS]

Pharmacokinetics: Introduction, biopharmaceutics, pharmacokinetics, clinical pharmacokinetics, pharmacodynamics, toxicokinetics and clinical toxicology. Measurement of drug concentration in blood, plasma or serum. Plasma level-time curve, significance of measuring plasma drug concentrations.

One compartment open model: Intravenous route of administration of drug, elimination rate constant, apparent volume of distribution and significance. Calculation of elimination rate constant from urinary excretion data, clinical application.

Two compartment model: Plasma level-time curve, relationship between tissue and plasma drug concentrations, Apparent volumes of distribution. Drug clearance, clinical example. Plasma level-time curve for a three compartment open model.

Drug absorption: Factors affecting the rate of drug absorption - nature of the cell membrane, Route of drug administration - oral drug absorption, Intravenous infusion and intravenous solutions, Effect of food on gastrointestinal drug absorption rate.

References

1. Introduction to Physical Organic Chemistry, R.D. Gilliom, Madison – Wesley, USA (1970).
2. Physical Organic Chemistry, Reaction Rate and Equilibrium Mechanism – L.P. Hammett, McGraw HillBook, Co., (1970).
3. Biophysical Chemistry, Principle and Technique – A. Upadhyay, K. Upadhyay and N. Nath, Himalaya Publishing House, Bombay, (1998).
4. Essentials of Physical Chemistry and Pharmacy – H. J. Arnikar, S. S. Kadam, K.N. Gujan, Orient Longman, Bombay, (1992).
5. Applied Biopharmacokinetics and Pharmacokinetics - Leon Shargel, Andrew YuPrentice-Hall International, Inc (4^{th} edition).
6. Essentials of Physical Chemistry and Pharmacy – H.J. Arnikar, S.S. Kadam, K.N. Gujan, Orient Longman, Bombay, (1992).

SECOND SEMESTER

CHI HCT: 2.1. COORDINATION CHEMISTRY

UNIT – I

[16 HOURS]

Preparation of coordination compounds: Introduction, Preparative methods - simple addition reactions, substitution reactions, oxidation-reduction reactions, thermal dissociation reactions. Geometries of metal complexes of higher coordination numbers (2-12).

Stability of coordination compounds: Introduction, trends in stepwise stability constants, factors influencing the stability of metal complexes with reference to the nature of metal ion and ligands, the Irving-William series, chelate effect.

Determination of stability constants: Theoretical aspects of determination of stability constants of metal complexes by spectrophotometric and polarographic methods.

Crystal field theory: Salient features of CFT, d-orbital splitting in octahedral, tetrahedral, square planar and tetragonal complexes, Jahn-Teller distortions, measurement of 10 Dq and factors affecting it. Evidences for metal-ligand covalency.

Molecular Orbital Theory: MOT to octahedral, tetrahedral and square planar complexes without and with pi-bonding.

UNIT – II

[16 HOURS]

Electronic spectra: Introduction, selection rules and intensities, electronic spectra of octahedral and tetrahedral complexes, Term symbols for dn ions, Orgel and Tanabe-Sugano diagrams, charge-transfer spectra.

Magnetic properties: Introduction, magnetic susceptibility and its measurements, spin and orbital contributions to the magnetic moment, the effects of temperature on μ_{eff}, spin-cross over, ferromagnetism, anti-ferromagnetism and ferrimagnetism.

Reaction and Mechanisms: Introduction. Substitution reactions - Inert and labile compounds, mechanisms of substitution.

Kinetic consequences of Reaction pathways - Dissociation, interchange and association. Experimental evidence in octahedral substitution - Dissociation, associative mechanisms, the conjugate base mechanism, the kinetic chelate effect.

Substitution reactions of square-planar complexes - kinetics and stereochemistry of square-planar substitutions, evidence for associative reactions, explanations of the trans effect.

Electron-transfer processes: Inner-sphere mechanism and outer-sphere mechanism, conditions for high and low oxidation numbers. Photochemistry of Coordination Compounds: Overview and General Concepts.

References

1. Physical Inorganic Chemistry - A Coordination Chemistry Approach- S.F.A. Kettle, Spektrum, Oxford, (1996).
2. Inorganic Chemistry - 2nd edition, C.E. Housecroft and A.G. Sharpe, Pearson Education Ltd., (2005).
3. Inorganic Chemistry - 3rd edition, G.L. Miessler and D.A. Tarr, Pearson Education, (2004).
4. Inorganic Chemistry - 2nd edition, D.F. Shriver, P.W. Atkins and C.H. Langford, Oxford University Press, (1994).
5. Inorganic Chemistry- 3rd edition, James E. Huheey, Harper and Row Publishers, (1983).
6. Basic Inorganic Chemistry- 3rd edition, F.A. Cotton, G. Wilkinson and P.L. Gaus, John Wiley and Sons, (2002).

INORGANIC CHEMISTRY PRACTICALS – II

[64 HOURS]

PART – I

1. Determination of bismuth, cadmium and lead in a mixture: Analysis of a low melting alloy (Wood's alloy).
2. Simultaneous spectrophotometric determination of chromium and manganese in a steel solution.
3. Gravimetric determination of copper(II) and nickel(II) using salicylaldoxime.
4. Preparation of mercurytetrathiocyanatocobaltate(II) and estimation of mercury by gravimetry.
5. Preparation of tris(oxalato)ferrate(III) and estimate the metal ion.

PART – II

Semimicro qualitative analysis of mixtures containing TWO anions and TWO cations (excluding sodium, potassium and ammonium cations) and ONE of the following less common cations: W, Mo, Ce, Th, Ti, Zr, V, U and Li.

References

1. Vogel's Text Book of Quantitative Chemical Analysis – 5th edition, J. Basset, R.C. Denney, G.H. Jeffery and J. Mendhom.
2. A Text Book of Quantitative Inorganic Analysis by A.I. Vogel, 3rd edition.
3. Spectrophotometric Determination of Elements by Z. Marczenko.
4. Vogel's Qualitative Inorganic Analysis – Svelha.
5. Macro and Semimicro Inorganic Qualitative Analysis by A.I. Vogel.
6. Semimicro Qualitative Analysis by F.J. Welcher and R.B. Halin.
7. Quantitative Chemical Analysis by Daniel C. Harris, 7th edition, (2006).

CHO HCT: 2.2. STEREOCHEMISTRY AND HETEROCYCLIC CHEMISTRY

UNIT – I

[16 HOURS]

Stereoisomerism: Projection formulae [flywedge, Fischer, Newman and sawhorse], enantiomers, diastereoisomers, mesomers, racemic mixture and their resolution, configurational notations of simple molecules, DL and RS configurational notations.

Optical isomerism: Conditions for optical isomerism: Elements of symmetry-plane of symmetry, centre of symmetry, alternating axis of symmetry (rotation-reflection symmetry). Optical isomerism due to chiral centers and molecular dissymmetry, allenes and biphenyls, criteria for optical purity.

Geometrical isomerism: Due to C=C, C=N and N=N bonds, E, Z conventions, determination of configuration by physical and chemical methods. Geometrical isomerism in cyclic systems. **Conformational analysis:** Elementary account of conformational equilibria of ethane, butane and cyclohexane. Conformation of cyclic compounds such as cyclopentane, cyclohexane, cyclohexanones and decalins. Conformational analysis of 1,2-, 1,3- and 1,4- disubstituted cyclohexane derivatives and D-Glucose. Effect of conformation on the course and rate of reactions.

Stereoselectivity: Meaning and examples of stereospecific reactions, stereoselective reactions, diastereoselective reactions, regioselective, regiospecific reactions, enantioselective reactions and enantiospecific reactions.

UNIT – II

[16 HOURS]

Nomenclature of heterocyclic compounds. Structure (no elucidation), reactivity, synthesis (minimum three synthesis) and reactions (minimum three reactions) of furan, pyrrole, thiophene, indole, pyridine, quinoline, isoquinoline, pyrazole, imidazole, pyrone, coumarin, chromones, pyrimidines, purines.

References

1. J. March, Advanced Organic Chemistry, Wiley Inter Science, 1994.
2. F.A. Carey and Sundberg, Advanced Organic Chemistry – Part A & B, 3rd edition, Plenum Press, New York, 1990.
3. Comprehensive Organic Synthesis – B.M. Trost and I. Fleming series, Pergamon Press, New York, 1991.
4. S.K. Ghosh, Advanced General Organic Chemistry, Book and Allied (P) Ltd., 1998.
5. Heterocyclic Chemistry – Joule & Smith.
6. Basic Principles of Heterocyclic Chemistry – L.A. Pacquette.
7. E.L. Eliel and S.H. Wilen, Stereochemistry of Organic Compounds, John Wiley and Sons, New York. 1994.
8. Stereochemistry and Mechanism through Solved Problems by P.S Kalsi.

ORGANIC CHEMISTRY PRACTICALS – II

[64 HOURS]

Multistep synthesis

1. Preparation p-bromoaniline from acetanilide.
2. Preparation of n-butyl bromide from n-butyl alcohol.
3. Oxidation of cyclohexanol to adipic acid via cyclohexanone.
4. Esterification: Preparation of benzoccaine from p-nitrotoluene.
5. Diazotization (Sandmeyer's reaction): Preparation of p-chlorobenzoic acid from p-toluidine.
6. Molecular rearrangement: Preparation of o-chlorobenzoic acid from phthalic anhydride.
7. Preparation benzilic acid from benzaldehyde.
8. Preparation of o-hydroxy benzophenone from phenyl benzoate via Fries rearrangement.
9. Prepartion of benzanilide from benzophenone oxime via Beckmann rearrangement.
10. Synthesis of m-chloroiodobenzene from m-dinitrobenzene.

References

1. Manual of Organic Chemistry - Dey and Seetharaman.
2. Modern Experimental Organic Chemistry by John H. Miller and E.F. Neugil, p 289.
3. An Introduction to Practical Organic Chemistry - Robert, Wingrove etc.
4. A Text Book of Practical Organic Chemistry – A.I. Vogel, Vol.III.
5. Practical Organic Chemistry - Mann & Saunders.

CHP HCT: 2.3. PHYSICAL CHEMISTRY – II

UNIT – I

[16 HOURS]

Electrochemistry of solutions: Arrhenius theory of strong and weak electrolytes and its limitations. Factor effecting electrolytic conductance, Debye-Huckel theory - concept of ionic atmosphere. Debye-Huckel-Onsager equation of conductivity and its validity. Debye-Huckel limiting law (DHL), its modification for appreciable concentrations. A brief survey of Helmholtz-Perrin, Guoy-Chapman and Stern electrical double layer (no derivation). Determination of transference number by emf and Hittorf's methods. True and apparent transference numbers. Abnormal transference numbers, effect of temperature on transference numbers. Liquid junction potential-determination and minimization.

Irreversible electrode process: Introduction, reversible and irreversible electrodes, reversible and irreversible cells. Polarization, over voltage - concentration over voltage,

activation over voltage and ohmic over voltage. Experimental determination of over voltage. Equations for concentration over potential, stationary and non-stationary surface. Polarography- Half wave potential, application in qualitative and quantitative analysis. Butler-Volmer equation, Tafel equation. Hydrogen oxygen over voltage. Effect of temperature, current density and pH on over voltage.

UNIT – II

[16 HOURS]

Quantum Chemistry: A brief resume of black body radiation, and atomic spectra-Bohr's theory of hydrogen atom. Photoelectric and Compton effects, de-Broglie concept, uncertainty principle. Operators - algebra of operators, commutative and non-commutative operators, linear operator, Laplacian operator, Hermitian operator, Hamiltonian operator, turn over rule. Wave equation for stretched strings, Schrodinger wave equation for particles, Eigen values and Eigen functions, postulates of quantum mechanics. Application of Schrodinger equation to a free particle and to a particle trapped in a potential field (one dimension and three dimensions). Degeneracy, Wave equation for H-atom, separation and solution of R, ϕ and θ equations. Application of Schrodinger equation to rigid rotator and harmonic oscillator.

Reference

1. Text Book of Physical Chemistry by Samuel Glasstone, MacMillan Indian Ltd., 2nd edition (1974).
2. Elements of Physical Chemistry by Lewis and Glasstone.
3. Physical Chemistry by P.W. Atkins, ELBS, 4th edition, Oxford University Press (1990).
4. Physical Chemistry – G.M. Barrow, McGraw Hill International Service (1988).
5. Introduction to Electrochemistry by S. Glasstone.
6. Electrochemistry –Principles and Applications by E.G. Potter.
7. Electrochemistry by Reiger, Prentice Hall (1987).
8. Modern Electrochemistry Vol. I and II by J.O.M. Bockris and A.K.N. Reddy, Pentium Press, New York (1970).
9. Quantum Chemistry – A.K. Chandra. 2nd edition, Tata McGraw Hill Publishing Co. Ltd., (1983).
10. Quantum Chemistry – Eyring, Walter and Kimball. John Wiley and Sons, Inc., New York.
11. Quantum Chemistry – I.N. Levine. Pearson Education, New Delhi, (2000).
12. Theoretical Chemistry – S. Glasstone. East West Press, New Delhi, (1973).
13. Quantum Chemistry – R.K. Prasad, New Age International Publishers, (1996).
14. Valence Theory – Tedder, Murel and Kettle.
15. Quantum Chemistry – D.A. McQuarrie.

PHYSICAL CHEMISTRY PRACTICALS – II

[64 HOURS]

1. Study of kinetics of reaction between CAT and indigocarmine spectrophotometrically and determination of rate constant.
2. Kinetics of reaction between sodium formate and iodine, determination of energy of activation.
3. Determination of energy of activation for the bromide-bromate reaction.
4. Determination of dissociation constant and mean ionic activity coefficient of weak electrolytes by conductivity method.
5. Conductometric titration of oxalic acid against NaOH and NH_4OH.
6. pH titration of (a) CH_3COOH vs. NaOH and determination of K_a.
7. Potentiometric titration of a mixture of halides (KCl+KI) against $AgNO_3$.
8. Determination of redox potential of Fe^{2+} ions by potentiometric method.
9. Determination of activity of 0.1 M HCl by EMF method.
10. Determination of partial molar volume of NaCl-H_2O/KCl- H_2O/KNO_3/ H_2O systems.
11. G.M. Counter – determination of G.M. plateau and dead time.
12. Verification of inverse square law using gamma emitter.
13. Determine the concentration of KI potentiometrically by calibration method.
14. To study the kinetics of reaction between acetone and iodine - determination of order of reaction w.r.t. iodine and acetone.
15. To determine the eutectic point of a two component system (Naphthalene-m-dinitrobenzene system).
16. Coulometric titration I_2 vs $Na_2S_2O_3$.

Reference

1. Practical Physical Chemistry – A.J. Findlay.
2. Experimental Physical Chemistry – F. Daniels et al.
3. Selected Experiments in Physical Chemistry – Latham.
4. Experiments in Physical Chemistry – James and Prichard.
5. Experiments in Physical Chemistry – Shoemaker.
6. Advanced Physico-Chemical Experiments – J. Rose.
7. Practical Physical Chemistry – S.R. Palit.
8. Experiments in Physical Chemistry – Yadav, Geol Publishing House.
9. Experiments in Physical Chemistry – Palmer.
10. Experiments in Chemistry – D.V. Jahagirdar, Himalaya Publishing House, Bombay, (1994).
11. Experimental Physical Chemistry – R.C. Das. and B. Behera, Tata Mc Graw Hill.

CHG HCT: 2.4. MOLECULAR SPECTROSCOPY – II

UNIT – I

[16 HOURS]

NMR Spectroscopy: Magnetic properties of nuclei (magnetic moment, g factor, nuclear spin), effect of external magnetic field on spinning nuclei, Larmor precession frequency, resonance conditions, population of nuclear magnetic energy levels, relaxation processes, relaxation time, line width and other factors affecting line width. Chemical Shift: Standards employed in NMR, factors influencing chemical shift: electronegativity, shielding and deshielding, van der Walls deshielding magnetic anisotropy, H-bonding, diamagnetic and paramagnetic anisotropies, spin-spin coupling, chemical shift values and correlation for protons bonded to carbon and other nuclei, Instrumentation. Chemical shift equivalence and magnetic equivalence, effects of chiral centre, Karplus curve-variation of coupling constants with dihedral angle. Complex NMR Spectra: Simplification of complex spectra-isotopic substitution, increased magnetic field strength, double resonance and lanthanide shift reagents; Nuclear Overhauser Effect (NOE), variable temperature probe, FT-NMR, Spectroscopy and advantages. ^{13}C-NMR Spectroscopy: Comparison of ^{1}H-NMR and ^{13}C-NMR, multiplicity-Proton decoupling-Noise decoupling-Off resonance decoupling-Selective proton decoupling - Chemical shift, application of CMR. NMR of ^{19}F, ^{31}P, ^{11}B and ^{15}N Applications of NMR: Structural diagnosis, conformational analysis, keto-enol tautomerism, H-bonding. Two dimensional NMR Spectroscopy: COSY, NOESY, MRI.

UNIT – II

[16 HOURS]

Electron Spin Resonance Spectroscopy: Basic principles, hyperfine couplings, the 'g' values, factors affecting 'g' values, isotropic and anisotropic hyperfine coupling constants, Zero Field splitting and Kramer's degeneracy. Measurement techniques and Applications to simple inorganic and organic free radicals and to inorganic complexes.

NQR Spectroscopy: Quadrupolar nuclei, electric field gradient, nuclear quadrupole coupling constants, energies of quadrupolar transitions, effect of magnetic field. Applications. Mössbauer spectroscopy: The Mössbauer effect, chemical isomer shifts, quadrupole interactions, measurement techniques and spectrum display, application to the study of Fe^{2+} and Fe^{3+} compounds, Sn^{2+} and Sn^{4+} compounds, nature of M-L bond, coordination number and structure, detection of oxidation states and inequivalent Mössbauer atoms.

UNIT – III

[16 HOURS]

IR spectroscopy: Introduction, instrumentation, sample handling, modes of vibrations, Hooks law, Characteristic group frequencies and skeletal frequencies. Finger print region, Identification of functional groups- alkenes, aromatics, carbonyl compounds (aldehydes and ketones, esters and lactones), halogen compounds, sulphur and phosphours

compounds, amides, lactums, amino acids and amines, Factors affecting group frequencies and band shapes, conjugation, resonance and inductance, hydrogen bonding and ring strain. tautomerism, Cis-trans isomerism. Applications of IR spectroscopy.

Mass Spectrometry: Basic principles, Instrumentation -Mass spectrometer, interpretation of mass spectra, resolution, exact masses of nuclides, molecular ions, meta-stable ions and isotope ions. Different methods of ionization (chemical ionization, electron impact, field ionization, MALDI etc.). Fragmentation processes-representation of fragmentation, basic fragmentation types and rules. Factors influencing fragmentations and reaction pathways. McLafferty rearrangement. Fragmentations (fragmentation of organic compounds with respect to their structure determination) associated with functional groups- alkanes, alkenes, cycloalkanes, aromatic hydrocarbons, halides, alcohols, phenols, ethers, acetals, ketals, aldehydes, ketones, quinines, carboxylic acids, esters, amides, acid chlorides, nitro compounds, amines & nitrogen heterocycles. Fragmentation patterns of glucose, myrcene, nicotine, retro Diels-Alder fragmentation. Application in structure elucidiation and evaluation of heats of sublimation & ionization potential. Nitrogen rule. LC-MS and GC-MS, High resolution mass spectroscopy. Composite problems involving the applications of UV, IR, ^{1}H and ^{13}C-NMR and mass spectroscopic techniques. Structural elucidation of organic molecules.

References

1. Organic Spectroscopy-3rd Ed.-W. Kemp (Pagrave Publishers, New York), 1991.
2. Spectrometric Identification of Organic Compounds - Silverstein, Bassler & Monnill (Wiley) 1981.
3. Spectroscopy of Organic Compounds- 3rd Ed.-P.S. Kalsi (New Age, New Delhi) 2000.
4. E.A.V. Ebsworth, D.W.H. Ranklin and S. Cradock: Structural Methods in Inorganic Chemistry, Blackwell Scientific, 1991.
5. J. A. Iggo: NMR Spectroscopy in Inorganic Chemistry, Oxford University Press, 1999.
6. C. N. R. Rao and J. R. Ferraro: Spectroscopy in Inorganic Chemistry, Vol I & II (Academic) 1970.
7. Spectroscopy, B. P. Straughan and S. Salker, John Wiley and Sons Inc., New Yourk, Vol.2, 1976.
8. Application of Absorption Spectroscopy of Organic Compounds, John R. Dyer, Prentice/Hall of India Private Limited, New Delhi, 1974.
9. Organic Spectroscopy, V. R. Dani, Tata McGraw-Hall Publishing Company Limited, New Delhi. 1995.
10. Interpretation of Carbon-13 NMR Spectra, F.W. Wehrli and T. Wirthin, Heyden, London, 1976.
11. NMR spectroscopy-Powai.

CHA SCT 2.51: SEPARATION TECHNIQUES

UNIT – I

[16 HOURS]

Fundamentals of chromatography: General description, definition, terms and parameters used in chromatography, classification of chromatographic methods, criteria for selection of stationary and mobile phase-nature of adsorbents, factors influencing the adsorbents, nature and types of mobile phases and stationary phases.

Column chromatography: Theories – plate theory, rate theory, band broadening-eddy diffusion, longitudinal diffusion and resistance to mass transfer, column efficiency, Van Deemter's equation and its modern version, optimization column performance, interrelationships-capacity factor, selectivity factor, column resolution, distribution constant and applications of conventional column chromatography, advantages and limitations.

Thin layer chromatography (TLC): Definition, mechanism, efficiency of TLC plates, methodology –selection of stationary and mobile phases, preparation of micro and macro plates, development, spray reagents, identification and detection, reproducibility of R_f values, qualitative and quantitative analysis.

Paper chromatography (PC): Definitions, theory and principle, techniques; one, two-dimensional and circular PC, mechanism of separation, types of paper, methodology-

preparation of sample, choice of solvents, location of spots and measurement of R_f value, factors affecting R_f values, advantages and applications

High performance liquid chromatography (HPLC): Instrumentation, pumps, column packing, characteristics of liquid chromatographic detectors-UV, IR, refractometer and fluorescence detectors, advantages and applications.

UNIT – II

[16 HOURS]

Gas chromatography (GC): Principle, instrumentation, columns, study of detectors – thermal conductivity, flame ionization, electron capture and mass spectrometry, factors affecting separation, retention volume, retention time, applications.

Ion exchange chromatography (IEC): Definitions, principle, requirements for ion-exchange resin and its synthesis, types of ion-exchange resins, basic features of ion-exchange reactions, resin properties-ion-exchange capacity, resin selectivity and factors affecting the selectivity, applications of IEC in preparative, purification and recovery processes.

Solvent extraction: definition, types, principle and efficiency of extraction, sequence of extraction process, factors affecting extraction-pH and oxidation state, masking and salting out agents, techniques-batch and continuous extraction, applications.

Size-exclusion chromatography: Theory and principle of size-exclusion chromatography, experimental techniques of gel-filtration chromatography (GFC) and gel-permeation chromatography (GPC), materials for packing - factors governing column efficiency, methodology and applications.

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001 John Wiley & Sons, Inc. India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993 Prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.
5. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003 Pearson Education Pvt. Ltd., New Delhi.
6. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California, 1990.
7. Introduction to Instrumental Analysis, Robert. D. Braun, Pharm. Med. Prem. India, 1987.
8. Instrumental Method of Analysis, W.M. Dean and Settle, 7th edition, 1986, CBS Publishers, New Delhi.
9. Instant Notes of Analytical Chemistry, Kealey and Haines, Viva Books Pvt. Ltd., 2002.
10. Modern Analytical Chemistry, David Harvey, McGraw Hill, New Delhi, 2000.
11. Principles and Practice of Analytical Chemistry, F. W. Fifield and Kealey, 5th edition, 2000, Blackwell Sci., Ltd. Malden, USA.

ANALYTICAL CHEMISTRY PRACTICALS – II

[64 HOURS]

1. Determination of percentage of chloride in a sample by precipitation titration - Mohr,
2. Volhard and Fajan's methods.
3. Determination of silver in an alloy and Na_2CO_3 in soda ash by Volhard method.
4. Mercurimetric determination of blood or urinary chloride.
5. Determination of calcium in calcium gluconate/calcium carbonate tablets/injections and of calcium in milk powder by EDTA titration.
6. Analysis of commercial hypochlorite and peroxide solution by iodometric titration.
7. Determination of ascorbic acid in vitamin C tablets by titrations with $KBrO_3$ and of vitamin C in citrus fruit juice by iodimetric titration.
8. Determination of iron in pharmaceuticals by visual and potentiometric titration using cerium(IV) sulphate.
9. Determination of total cation concentration of tap water by ion-exchange chromatography.
10. Determination of magnesium in milk of magnesium tablets by ion-exchange chromatography.
11. Cation exchange chromatographic separation of cadmium and zinc and their estimation by EDTA titration.
12. Gas chromatographic determination of ethanol in beverages.
13. Determination of aspirin, phenacetin and caffeine in a mixture by HPLC.
14. Anion exchange chromatographic separation of zinc and magnesium followed by EDTA titration of the metals.
15. Separation and determination of chloride and bromide on an anion exchanger.
16. Thin layer chromatographic separation of amino acids.

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001 John Wiley & Sons, Inc, India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993, Prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.

5. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003, Pearson Education Pvt. Ltd., New Delhi.
6. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California, 1990.
7. Practical Clinical biochemistry methods and interpretations, R. Chawla, J.P. Bothers Medical Publishers (P) Ltd., 1995.
8. Laboratory manual in biochemistry, J. Jayaraman, New Age International Publishers, New Delhi, 1981.
9. Practical Clinical Biochemistry by Harold Varley and Arnold. Heinmann, 4th edition.

CHI SCT 2.52: INDUSTRIAL INORGANIC CHEMISTRY

UNIT – I

[16 HOURS]

Metal Carbides: salt like, covalent and industrial carbides. Intercalation compounds of graphite, alkali metals. Industrially important recactions of oxides with carbon.

Silicone polymers: Introduction, nature of chemical bonds containing silicon, general methods of preparation (fluids and resins) and properties of silicones. Applications. Industrial uses of silicon, silicon carbide and silicon dioxide.

Chemical reactivity and group trends of germanium, tin and lead: Applications, metallic tin and alloys, lead alloys and oxides of lead.

Compounds of arsenic, antimony and bismuth: Intermetallic compounds and alloys and their uses.

Ceramics: Raw materials used in ceramics and ceramic insulators.

UNIT – II

[16 HOURS]

Inorganic fibers: Introduction, properties, classification, asbestos fibers, optical fibers, carbon fibers, Applications.

Zeolites: Introduction, types of zeolites, manufacture of synthetic zeolites and applications.

Mineral fertilizers: Phosphorous containing fertilizers - Economic importance, importance of superphosphate, ammonium phosphates and their synthesis.

Nitrogen containing fertilizers - Importance and synthesis of ammonium sulfate, ammonium nitrate and urea.

Potassium containing fertilizers - Economic importance and manufacture of potassium sulfate.

Inorganic pigments: General information and economic importance.

White pigments – titanium dioxide pigments, zinc oxide pigments.

Colored pigments – Iron oxide, chromium oxide, mixed-metal oxide pigments and ceramic colorants.

Corrosion protection pigments, luster pigments, luminescent pigments, magnetic pigments.

References

1. Inorganic Chemistry Principles of Structure and Reactivity: James E. Huheey, Ellen A. Keiter, Richard L. Keiter, Okhil K. Medhi, Delhi University, New Delhi (2006).
2. Chemistry of the Elements – N.N. Greenwood and A. Earnshaw, Pergamon Press (1985).
3. Industrial Inorganic Chemistry – 2nd edition. K.H. Buchel, H.H. Moretto and P. Woditsh, Wiley - VCH (2000).

CHO SCT 2.53: DYES & INSECTICIDES

UNIT – I

[16 HOURS]

Dyes: Introduction, modern theories of colour and chemical constitution. A general study of the following: Direct azo dyes (congored, rosanthrene O, procion dyes), acid azo dyes (ponceau2R, Naphthol blue black 6B), basic azo dyes (chrysoidin G, bismark brown), developed dyes, mordent dyes, vat dyes, disperse dyes, fibre reactive dyes, sulphur dyes and solvent dyes. Fluoroscent brightening agents (tinopal B.V), cyanine dyes (classification, application in photography, quinoline blue and sensitol), chemistry of colour developer, and instant colour processes.

Synthesis and applications of malachite green, rhodamine-B, phenolphthalein and methyl orange. Triphenylmethane dyes: crystal violet, pararosaniline, aurin, chromeviolet.

Application of dyes: i. photography ii. DVD, CD and LCD iii. Biological studies and iv. Electronics.

UNIT – II

[16 HOURS]

Insecticides: Introduction, classification, mode of action and synthesis of chlorinated insecticides (DDT, chlordane, heptachlor and hexachlorocyclohexane), Naturally occurring insecticides-pyrethroids-natural pyrethrins-isolation and structures, synthetic pyrethroids, allethrin, cypermethrin, phenvalerate.

Organophosphorous insecticides: Malathion, parathion, DDVP, diazenon.

Carbamate insecticides: Sevin, carbofluron, aldicab, beygon.

Insect Pheromones: Introduction, classification, use in insect pest control. Synthesis of disparlure, faranol, grandisol, brevicomin and bomykol.

Fungicides: Introduction, Inorganic & organic fungicides, Systemic fungicides-types & examples.

Herbicides: Introduction, study of sulfonyl ureas, heterocyclic sulfonamides, heterocyclic amines, dihydropyrano[2,3-b]pyridylimidazolinones,pyrrolopyridylimidazolinones,1,2,4 triazine- 3,5-diones, hydroxyoxazolidinones & hydroxypyrrolidinones, pyridine herbicides & 1,3,4-oxadiazoles. Mechanism of action and toxicities of insecticides, fungicides and herbicides.

References

1. A Text Book of Fertilizers, Ranjan Kumar Basak.
2. Agronomy - Theory & Digest, Bidhan Chandra, Krishi Vishwavidyalaya, Mohanpur.
3. Fundamentals of Agronomy, S.S.Cheema, K.Dhaliwal, T.S. Shota, Punjab Agricultural University.
4. Principles and Practices of Agronomy, Shri.S.S.Singh, Allahabad Agricultural Institute.
5. Fertilizers, Organic Manures & Biofertilizers–A Product Quality Guide for Major & Micronutrients, HLS Tandon, Fertilizer Development and Consultation Organisation, New Delhi.
6. Handbook on Fertilizer Technology, Bham Swaminathan & Manish Goswami, The Fertilizer Association of India, New Delhi.
7. Outlines of Chemical Technology, Charles E. Dryden, Affiliated East-West Press, New Delhi.
8. Synthetic Organic Chemistry, G. R. Chatwal, Himalaya Publishing House.
9. Synthesis and Chemistry of Agrochemicals, Vol I & II, ACS, Wahington.
10. Chemistry of Pesticides, K H Buchel.
11. Advances in Pesticide Formulation Technology, ACS.
12. Chemicals for Crop Protection and Pest Managements, M B Green, G.S. Hartley West, Pergamon.
13. Chemistry of Insecticides and Fungicides, Sree Ramulu, Oxford & IBH, 1985.

CHP SCT: 2.54. NANOMATERIALS, SEMICONDUCTORS AND SUPERCONDUCTORS

UNIT – I

[16 HOURS]

Chemistry of Nanomaterials: Introduction, nanoparticles, nanotobes (carbon nanotubes, SWNT and MWNT), nano wires, nano fibers and nano gel. Fullerenes and other bulk balls. Graphine and its applications. Quantum dots.

Synthesis: Chemical vapour deposition (CVD), sol-gel, silica-gel, solvothermal, hydrothermal methods, microwave, electrochemical, laser abalation, biologiocal and bacterial methods. Characterization (X- ray, IR, UV and SEM).

Applications of Nanomaterials: Renewable energy (nano solar cells), coloured glasses (gold and silver ruby glasses), chemical sensors, biosensors, SAM, electrical and electronics (RAM). Chemical and photocatalytic applications. Lithography, drug delivery targeting and medical applications, micro-electrochemical machines (MEMS). Inorganic and organic nano porous gel.

UNIT – II

[16 HOURS]

Semiconductors: Band theory, energy bands, intrinsic and extrinsic semiconductors.

Conductivity: electrons and holes, temperature dependence on conductivity, Optical properties: absorption spectrum, photoconductivity, photovoltaic effect and luminescence.

Junction properties: metal-metal junctions, metal-semiconductor junctions, p-n junctions, transistors, industrial applications of semiconductors: Mixed oxides, spinels and other magnetic materials.

Superconductors: Meissner effect, type I and II super conductors, isotope effect, basic concepts of BCS theory, manifestations of the energy gap, Josephson devices.

Reference

1. Hand Book of Nanotechnology, Bharat Bhushan, Springer Publisher.
2. Nanotechnology, Richard Booker and Earl Boysen, Wiley.
3. Nanometerials, A.K. Bandopadhyay, New Age International, 2nd edition.
4. Nanotechnology - Importance and Applications, M. H. Fulekar, Ink International publishing.
5. Solid State Chemistry – N.B. Hannay.
6. Introduction to Solids – Azaroff.
7. Solid State Chemistry and its applications – A.R. West.
8. Principles of the Solid State – H.V. Keer.
9. Basic Solid State Chemistry, 2nd edition, Anthony R. West.
10. Solid State Chemistry: An Introduction, 3rd edition, Lesley E. Smart and Elaine A. Moore.
11. Introduction to Solid state Physics—C. Kittel, 5th edition, Wiley Eastern, Limited.
12. C.N.R. Rao and J. Gopalakrishna "New Directions in solid state chemistry" Cambridge University Press, Cambridge (1999).

OPEN ELECTIVE (FOR NON-CHEMISTRY STUDENTS ONLY)

CH OET: 2.1/3.1- CHEMISTRY

UNIT – I

[16 HOURS]

Periodic Table and chemical Periodicity: Periodic properties of elements, State of Matter, their resources. Important periodic properties of the elements, covalent radii, ionic radii, ionization potential, electron affinity and electronegativity.

Structure and Bonding: Properties of ionic compounds, structure of crystal lattices (NaCl, CsCl, ZnS, Wurtzite and rutile), Lattice energy, Born-Haber Cycle, radius ratio rules and their limitations. MO treatment for homo- and heteronuclear molecules. VSEPR model to simple molecules.

Concepts of Acids and Bases: Lux-Flood and solvent system concepts. Hard-soft acids and bases.

Ionic Bond: Properties of ionic substances, structures of crystal lattices (NaCl, CsCl, and ZnS). Lattice energy, Born-Haber cycle, uses of Born-Haber type calculations, Born-Lande equation. Ionic radii, factors affecting the radii of ions, radius ratio effects, covalent character in ionic bonds, hydration energy and solubility of ionic compounds.

UNIT – II

[16 HOURS]

Purification: Crystallization, sublimation, fractional crystallization, distillation techniques (simple distillation, steam distillation, distillation under reduced pressure, fractional distillation).

Separation techniques:-Solvent extraction, continuous extraction, chromatography (principles of TLC, PC, column, GC, ion exchange chromatography) and electrophoresis

Characterization: Detection of elements, estimation of carbon, hydrogen, halogens, sulphur, nitrogen and phosphourous. Detection of functional groups (hydroxyl, carboxyl, keto, ester, amino, nitro, amide, thiol, ether etc) in the unknown samples. Basic principles for the determination of hydroxyl, carboxyl, keto, ester, amino, nitro groups. Estimation of sugars, aminoacids and proteins.

Reaction Mechanism: Basics of organic reactions: Meaning and importance of reaction mechanism, classification and examples for each class.

Structure and reactivity: Brief discussion on effects of hydrogen bonding, resonance, inductive and hyperconjugation on strengths of acids and bases.

Methods of determining organic reaction mechanism: Thermodynamic and kinetic requirements for reactions, kinetic and thermodynamic control. Identification of products.

UNIT – III

[16 HOURS]

Spectroscopy: UV-VIS Spectroscopy (outer shell electronic spectroscopy): Quantitative aspects of Absorption -Beer's law. Terminology associated with absorption measurements. Limitation of the law: Real, chemical, instrumental and personal. Theory of molecular absorption. Vibration, rotation, fine structure of electronic spectra. Empirical rules for predicting the wavelength of maximum absorption: Olefins, conjugated dienes, cyclic trienes and polyenes -α, β-unsaturated aldehydes and ketones – benzene

IR spectroscopy: Principles, Hook's law, characteristic group frequencies and skeletal

frequencies. Finger print region. Identification of functional groups: Alkenes, alkynes, aromatics, carbonyl compounds (aldehydes and ketones, esters and lactones), halogen compounds, sulphur and phosphorous compounds, amides, lactams, amino acids, and imines.

Factors affecting group frequencies and band shapes, conjugation, resonance and inductance, hydrogen bonding and ring strain, tautomerism, cis-trans isomerism. Applications of IR spectra to co-ordinatation compounds,

NMR Spectroscopy: Magnetic properties of nuclei (magnetic moment, g factor, nuclear spin), effect of external magnetic field on spinning nuclei, Larmor precession frequency, resonance conditions, population of nuclear magnetic energy levels, relaxation processes, relaxation time, line width and other factors affecting line width. Chemical Shift: Standards employed in NMR, factors influencing chemical shift: electronegativity, shielding and deshielding, application of NMR.

CH OET: 2.2/3.2 - GENERAL CHEMISTRY

UNIT – I

[16 HOURS]

Periodic Table. Chemical Periodicity: Periodic properties of elements, State of Matter, their resources. Important periodic properties of the elements, covalent radii, ionic radii, ionization potential, electron affinity and electronegativity.

Structure and Bonding: Properties of ionic compounds, structure of crystal lattices (NaCl, CsCl, ZnS, Wurtzite and rutile), Lattice energy, Born-Haber Cycle, radius ratio rules and their limitations. MO treatment for homo- and heteronuclear molecules. VSEPR model to simple molecules.

Concepts of Acids and Bases: Lux-Flood and solvent system concepts. Hard-soft acids and bases.

Ionic Bond: Properties of ionic substances, structures of crystal lattices (NaCl, CsCl, and ZnS). Lattice energy, Born-Haber cycle, uses of Born-Haber type calculations, Born-Lande equation. Ionic radii, factors affecting the radii of ions, radius ratio effects, covalent character in ionic bonds, hydration energy and solubility of ionic compounds.

UNIT – II

[16 HOURS]

Thermodynamics: First and second laws of thermodynamics. Concept of entropy and free energy, entropy as a measure of unavailable energy. Entropy and free energy changes and spontaneity of process. Variation of free energy with temperature and pressure. **Chemical kinetics:** Rate and order of reaction. Factor affecting the rate of reaction. Order of reaction and its determination. Energy of activation and its determination. Brief account of collision and activated complex theories. **Electrochemistry:** Electrolytic conductance, specific, equivalent and molar conductance. Ionic mobility and transference number. Factors affecting the electrolytic conductance. Arrhenius theory of strong and weak electrolytes. Assumptions of Debye-Huckel theory of strong electrolytes. Electrode potential and construction of electrochemical cells.

Spectroscopy: Rotation spectra of diatomic molecules (rigid and non-rigid rotator model). Principles of determination of bond length and moment of inertia from rotation spectra.

Infrared spectroscopy: Vibration of diatomic molecules, vibrational energy curves for simple harmonic oscillator. Theory of IR absorption, types of absorption bands. Number of fundamental vibrations and theoretical group frequencies. Important spectral regions, characterization of functional groups and structure of simple molecules – CO_2, H_2O and CH_3COOH.

UNIT – III

[16 HOURS]

Fundamentals of chromatography: General description, definition, terms and parameters used in chromatography, classification of chromatographic methods, criteria for selection of stationary and mobile phase-nature of adsorbents, factors influencing the adsorbents, nature and types of mobile phases and stationary phases.

Column chromatography: Theories – plate theory, rate theory, band broadening-eddy diffusion, longitudinal diffusion and resistance to mass transfer, column efficiency, Van

Deemter's equation and its modern version, optimization column performance,

interrelationships-capacity factor, selectivity factor, column resolution, distribution constant and applications of conventional column chromatography, advantages and limitations.

Thin layer chromatography (TLC): Definition, mechanism, efficiency of TLC plates, methodology –selection of stationary and mobile phases, preparation of micro and macro plates, development, spray reagents, identification and detection, reproducibility of R_f values, qualitative and quantitative analysis.

Gas chromatography (GC): Principle, instrumentations, columns, study of detectors – thermal conductivity, flame ionization, electron capture and mass spectrometry, factors affecting separation, retention volume, retention time, applications.

References

1. I. L. Finar, Organic Chemistry, ELBS Longmann, Vol. I & II, 1984.
2. Morison and Boyd. Organic chemistry..
3. Introduction to stereochemistry – K. Mislow.
4. R. K. Bansal, Organic Reaction Mechanism, Wiley Eastern Limited, New Delhi, 1993.
5. J. March, Advanced Organic Chemistry, Wiley Interscience, 1994.
6. E. S. Gould, Mechanism and Structure in Organic Chemistry, Halt, Rinhart & Winston, New York, 964.
7. A Guide book to mechanism in Organic Chemistry – Petersykes
8. Stereochemistry and mechanism through solved problems – P. S. Kalsi.
9. F. A. Carey and Sundberg, Advanced Organic Chemistry – Part A & B, 3rd edition, Plenum Press, New York, 1990.
10. Physical Chemistry by P.W. Atkins, ELBS, 4th edition, Oxford University Press (1990).
11. Text Book of Physical Chemistry by Samuel Glasstone, MacMillan Indian Ltd., 2nd edition (1974).
12. Elements of Physical Chemistry by Lewis and Glasstone.
13. Fundamentals of Molecular Spectroscopy, C.N. Banwell and E.M. McCash. 4th edition, Tata McGraw Hill, New Delhi.

THIRD SEMESTER

CHI HCT: 3.1. ADVANCED INORGANIC CHEMISTRY

UNIT – I

[16 HOURS]

Fundamental concepts: Introduction, Classification of organometallic compounds by bond type, nomenclature, the effective atomic number rule, complexes that disobey the EAN rule, common reactions used in complex formation.

Organometallics of transition metals: Preparation, bonding and structures of nickel, cobalt, iron and manganese carbonyls. Preparation and structures of metal nitrosyls in organometallics. **Ferrocene and ruthenocene:** Preparation, structure and bonding.

Complexes containing alkene, alkyne, arene and allyl ligands: preparation, structure and bonding. The isolobal principles.

UNIT – II

[16 HOURS]

Homogeneous catalysis – Industrial Applications: Alkene hydrogenation, hydroformylation, The Wacker's process, Monsanto acetic acid process and L-DOPA synthesis, alkene oligomerizations, water-gas shift reactions.

Heterogeneous catalysis - Commercial Applications: Alkene polymerization: Ziegler-Natta catalysis, Fischer-Tropsch carbon chain growth.

Alkene metathesis, hydroboration, arylation or vinylation of olefins (Heck reaction).

Biological and Medicinal Applications: Organomercury, boron, silicon and aresenic compounds

Zeolites as catalysts for organic transformation: Uses of ZSM – 5.

UNIT – III

[16 HOURS]

Chemistry of main group elements: Diborane and its reactions, polyhedral boranes (preparation, properties, structure and bonding). Wade's rules, carboranes and borazines.

Inorganic chains, rings and cages of boron, carbon and phosphorous.

Silicates: Structure, classification - silicates with discrete anions, silicates containing chain anion, silicates with layer structure, silicones with three dimensional net work and applications.

Silicone: General methods of preparation, properties. Silicone polymers - silicone fluids, silicone greases, silicone resins, silicone rubbers and their applications.

Heterocyclic inorganic ring system: Sulphur-nitrogen ring, nitrogen-phosphorous ring **Phosphonitrilic or phosphazine polymers:** Preparation, properties, structure and applications.

References

1. Organometallic Chemistry, 2nd edition, R.C. Mehrothra and A. Singh, New Age International Publications (2006).
2. Fundamental Transition Metal Organometallic Chemistry - Charles M. Lukehart, Brooks, Cole Publishing Company (1985).
3. The Organometallic Chemistry of the Transition Metals, 4th edition, Robert H. Crabtree, Wiley Interscience, (2005).
4. Organometallics - A Concise Introdution, 2nd edition, Chistoph Elschenbroich and Albert salzer VCH, (1992).
5. Inorganic Chemistry, 2nd edition, C.E. Housecroft and A.G. Sharpe, Pearson Education Ltd., (2005).
6. Inorganic Chemistry- 3rd edition, G.L. Miessler and D.A. Tarr, Pearson Education, (2004).
7. Basic Organometallic Chemistry - B.D. Gupta and A.J. Elias, Universities Press (2010).
8. Inorganic Chemistry Principles of Structure and Reactivity: James E. Huheey, Ellen A. Keiter, Richard L. Keiter, Okhil K. Medhi, Delhi University, New Delhi (2006)
9. Chemistry of the Elements – N.N. Greenwood and A. Earnshaw, Pergamon Press (1985).
10. Inorganic Chemistry - 2nd edition, D.F. Shriver, P.W. Atkins and C.H. Langford, Oxford University Press, (1994).

CHO HCT: 3.2. REAGENTS IN ORGANIC SYNTHESIS

UNIT – I

16 HOURS]

Oxidation: Oxidation with chromium and manganese reagents (CrO_3, $K_2Cr_2O_7$, PCC, PDC, Sarret reagent, MnO_2, $KMnO_4$, ozone, peroxides and peracids, periodic acid, OsO_4, SeO_2, NBS, Oppenauer oxidation, Sharpless epoxidation.

Reduction: Catalytic hydrogenation (homogeneous and heterogeneous) – catalysts (Pt, Pd, Ra-C, Ni, Ru, Rh), solvents and reduction of functional groups, catalytic hydrogen transfer reactions. Wilkinson catalyst, $LiAlH_4$, $NaBH_4$, DIBAL-H, Sodium cyanoborohydride, dissolving metal reactions (Birch reduction). Leukart reaction (reductive amination), diborane as reducing agent, Meerwein-Ponndorf-Verley reduction, Wolff-Kishner reduction, Clemensen reduction, tributyl tinhydride, stannous chloride, Bakers yeast,

Organoboron compounds: Introduction and preparations. Hydroboration and its applications. Reactions of organoboranes: isomerization reactions, oxidation, protonolysis, carbonylation, cyanidation. Reactions with aldehydes or ketones (E and Z-alkenes).

UNIT – II

[16 HOURS]

Reagents and reactions in organic synthesis: Use of following reagents in organic synthesis and functional group transformations: Lithium diisopropylamide (LDA), Gilmann reagent, dicyclohexyl carbodimide (DCC), dichlorodicyanoquinone (DDQ), Silane reagents-trialkylsilyl halides, trimethylsilyl cyanide, trimethyl silane, phase transfer catalyst, crown ethers, cyclodextrins, Ziegler-Natta catalyst, diazomethane, Woodward and Prevost hydroxylation, Stark enamine reaction, phosphorous ylides - Wittig and related reactions, sulphur ylides – reactions with aldehydes and ketones, 1,3-dithiane anions - Umpolung reaction, Peterson reaction. Palladium reagents: Suzuki coupling, Heck reaction, Negishi reaction

UNIT – III

[16 HOURS]

Molecular rearrangements: Introduction Carbon to carbon migration: Pinacol-pinacolone, Wagner-Meerwein, Benzidine, benzylic acid, Favorskii, Fries rearrangement, dienophile rearrangement. Carbon to nitrogen migration: Hofmann, Curtius, Lossen, Schmidt and Beckmann rearrangements. Miscellaneous rearrangements: Wittig, Smiles, Bayer-Villeger rearrangement and Barton reaction.

Retrosynthesis: Introduction to disconnection approach: Basic principles and terminologies used in disconnection approach. One group C-X and two group C-X disconnections. Synthons and synthetic equivalents. Retrosynthesis and synthesis of benzofurans, p-methoxy acetophenone, saccharine, α-bisabolene, nuciferal, tetralone, ibuprofen, functional group transformations in organic synthesis; nitro to keto, nitro to aniline, acid to alcohol etc..

References

1. H. Pine, Hendrickson, Cram and Hammond, Organic Chemistry, Mc Graw Hill, New York, 1987.
2. I.L. Finar, Organic Chemistry, ELBS Longmann, Vol. I & II, 1984.
3. R.K. Bansal, Organic Reaction Mechanism, Wiley Eastern Limited, New Delhi, 1993.
4. J. March, Advanced Organic Chemistry, Wiley Interscience, 1994.
5. F.A. Carey and Sundberg, Advanced Organic Chemistry – Part A & B, 3rd edition, Plenum Press, New York, 1990.

6. S.K. Ghosh, Advanced General Organic Chemistry, Book and Alleied (P) Ltd, 1998.

CHP HCT: 3.3. PHYSICAL CHEMISTRY – III

UNIT – I

[16 HOURS]

Polymers: Fundamentals of polymers - monomers, repeat units, degree of polymerization. Linear, branched and network polymers. Classification of polymers. Polymerization - condensation, addition, free radical, ionic, co-ordination polymerization and ring opening polymerization. Molecular weight and size. Polydispersion. Average molecular weight concepts – number, weight and viscosity average molecular weight. Determination of molecular weights - viscosity method, osmotic pressure method, sedimentation and light scattering method.

Kinetics of Polymerization - Condensation, addition, free radical, ionic, co-ordination polymerization.

Phase transitions in polymers and thermal characterization: Glass transition, crystallinity and melting- correlation with the polymer structure.

Polymers in solution: Criteria of polymer solubility. Thermodynamics of polymer solutions.

Colloids: Types and classification. Preparation and properties of colloids. Stability of colloids. Micelles: Surface active agents – micellisation, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of surfactants. Micellar catalysis.

UNIT – II

[16 HOURS]

Photochemistry: Introduction to photochemistry, quantum yield and its determination, factors affecting quantum yield, Actinometry - Uranyloxalate and potassium ferrioxalate actinometers, acetone and diethylketone actinometers. Term symbols and significance. Photosensitization: by mercury, dissociation of H_2. Photochemical kinetics of: Decomposition of CH_3CHO, formation of HI and HCl. Fluorescence and phosphorescence – theory and applications. Resonance fluorescence and quenching of fluorescence. Photodegradation: Photocatalyst – ZnO, TiO_2, principle, application of ZnO/TiO_2 in the photo degradation of dyes (IC), pesticides (DDT) and in industrial effluents. Effect of photo degradation on COD value.

Radiation chemistry: Introduction, units, interaction of electromagnetic radiation with matter, G-value, LET of radiation. Chemical dosimetry - Fricke and ceric sulphate dosimeters. Radiolysis - cysteine, and biphenyl. Radioisotopes as tracers, use of isotopic tracers in the elucidation of reaction mechanism, structure determination and solubility of sparingly soluble substances. ^{14}C dating, medical applications of isotopic tracers. Physico-

chemical applications – isotope dilution method, activation analysis and radiometric titrations. Hazards in radiochemical work and radiation protection.

UNIT – III

[16 HOURS]

Nuclear chemistry: Nuclear stability – nuclear forces, packing fraction, binding energy, liquid drop, shell and collective models. Radioactive decay – General characteristics, decay kinetics, parent –daughter decay growth relationships, determination of half-lives. Brief survey of alpha, beta and gamma decays. Nuclear reactions – Bethe's notation, types of nuclear reactions – specific nuclear reactions, photonuclear reactions, Oppenheimer – Phillips process, spallation reactions, Szilard-Chalmers process. Definition of Curie and related calculations. Production of radioisotopes and labelled compounds by bombardment.

Radiochemical separation techniques: carriers, solvent extraction and ion ion-exchange methods.

Radiation detection and measurement: Experimental techniques in the assay of radioisotopes. Radiation detectors – ionization chambers, proportional and Geiger-Muller counters – G.M. Plateau, dead time, coincidence loss, determination of dead time. Scintillation and semiconductor radiation detectors.

Nuclear power reactors: Types of nuclear power reactors, basic features and components of nuclear power reactors. An introduction to breeder reactors.

References

1. Text Book of Polymer Science, F.W. Billmeyer, Jr., John Wiley, London (1994).
2. Polymer Science. V. R. Gowrikar, N.V. Vishwanathan and J. Sreedhar, Wiley Eastern, New Delhi (1990).
3. Fundamentals of Polymer Science and Engineering. A. Kumar and S.K. Gupta, Tata – McGraw Hill New Delhi (1978).
4. Polymer Characterization, D. Campbell and J.R. White, Chapman and Hall, New York.
5. Fundamental Principles of Polymer Materials, R.L. Rosen, John Wiley and Sons, New York.
6. Functional Monomers and Polymers by K. Takemoto, Y. Inaki and P.M. Ottenbrite, Marcel Dekker, Inc., New York, 1987.
7. Physical Chemistry by P.W. Atkins, ELBS, 5^{th} edition, Oxford University Press (1995).
8. Text Book of Physical Chemistry by Samuel Glasstone, MacMillan Indian Ltd., 2^{nd} edition (1974).
9. Nuclear Chemistry by Friedlander and Kennedy, John Wiley and Sons (1987).

10. Essentials of Nuclear Chemistry by H.J. Arnikar, Eastern Wiley (1990).
11. Nuclear Chemistry by U.N. Dash, Sultan Chand and Sons (1991).
12. Fundamentals of Radiochemistry by D.D. Sood, A.V.R. Reddy and N. Ramamoorthy
13. Nuclear Radiation Detectors by S.S. Kapoor and Ramamoorthy, Wiley Eastern (1986).

CHA SCT 3.41: APPLIED ANALYSIS – I

UNIT – I

[16 HOURS]

Air pollution, analysis and control: Historical overview - global implications of air pollution, sources of pollutants, classification of pollutants. Sources and effects of particulates carbon monoxide, sulphur oxides, nitrogen oxides, hydrocarbons and photochemical oxidants on human health, vegetation and materials. Standards for air pollutants.

Air quality monitoring: Sampling methods and devices for particulates and gaseous pollutants. SO_2: ambient air measurements and stack gas measurements - Turbidimetric, colorimetric, conductometric and coulometric methods, NOX: Griess-ilosvay and Jacobs-Hockheiser colorimetric methods, chemiluminiscent technique, CO: NDIR, amperometric,

FID and catalytic oxidation methods. Hydrocarbons: total and individual hydrocarbons by gas chromatography. Oxidants and ozone: colorimetric, coulometric, titrimetric and chemiluminescence methods.

Air Pollution control: Atmospheric cleaning processes, approaches to contaminant control-detection and control at source.

Control devices for particulates: Gravitational settlers, centrifugal collectors, wet collectors, electrostatic precipitation and fabric filtration.

Control devices for gaseous pollutants: adsorption, absorption, condensation and combustion processes. Automative emission control-catalytic converters.

UNIT – II

[16 HOURS]

Water pollution and analysis: Water resources, origin of wastewater, types of water pollutants; their sources and effects, chemical analysis for water pollution control - objectives of analysis, parameters of analysis, sample collection and preservation. Environmental and public health significance and measurement of colour, turbidity, total solids, acidity, alkalinity, hardness, chloride, residual chlorine, chlorine demand, sulphate, fluoride, phosphates and different forms of nitrogen in natural and waste/polluted waters, heavy metal pollution - public health significance of Pb, Cd, Cr, Hg, As, Cu, Zn and Mn,

general survey of the instrumental techniques for the analysis of heavy metals in aquatic systems, organic loadings - significance and measurement of DO, BOD, COD, TOD, and TOC, phenols, pesticides, surfactants and tannin and lignin as water pollutants and their determination.

References

1. Standard Methods of Chemical Analysis, A.J. Weleher (Part B), Robert E. Kriegor Publishing Co. USA, 1975.
2. Environmental Chemistry, S.E. Manahan Willard grant press, London, 1983.
3. Environmental Chemical Analysis, Iain L Marr and Malcolm S. Cresser, Blackie and Son Ltd., London, 1983.
4. Chemistry for Environmental Engineering, Chair N. Sawyer and Perry L.M Canty, Mcgraw Hill Book, Co., New York, 1975.
5. The Air Pollution Hand Book, Richard Mabey, Penguin, 1978.
6. The Pollution Hand Book, Richard Mabey, Ponguin 1978.
7. Soil Chemical Analysis, M.L. Jackson, Prentice Hall of India Pvt, Ltd., New Delhi, 1973.
8. Experiments in Environmental Chemistry, P.D. Vowler and D.W. Counel, Pergamon press, Oxford 1980.
9. Manual Soil Laboratory Testing, vol I, K.H. Head, Pentech Press, London 1980.
10. A Text Book of Environmental Chemistry and Pollution Control, S.S. Dara, S. Chand and co. Ltd. New Delhi 2004.
11. Air pollution Vol II edition by A.C. Stern, Academic Press New York, 1968.
12. Instrumental Methods for Automatic Air Monitoring Systems in Air Pollution Control, Part-III edition by W. Stranss, John-Wiley and Sons, New York, 1978.
13. Analysis of Air pollutants, P.O. Warner, John Wiley and Sons, New York, 1976.
14. The Chemical Analysis Air pollutants, Interscience, New York, 1960.
15. The Analysis of Air Pollutants, W. Liethe, Ann Arbor Science Pub. Inc. Michigan 1970.
16. Environmental Chemistry, A. K. De.

ANALYTICAL CHEMISTRY PRACTICALS – III

[64 HOURS]

PART – III

1. Determination of calcium in limestone by redox, acid-base and complexation titrations.
2. Determination of vitamin C in orange juice by titration with cerium(IV) and with 2,6-dichlorophenol indophenol.
3. Determination of aluminium and magnesium in antacids by EDTA titration.
4. Determination of saccharin in tablets by precipitation titration.
5. Determination of sulpha drugs by potentiometry using $NaNO_2$ and iodometric assay of penicillin.
6. Determination of iron in mustard seeds and phosphorus in peas by spectrophotometry.
7. Analysis of waste water for anionic detergents and phenol by spectrophotometry.
8. Determination of manganese in steel by extraction-free spectrophotometry and molybdenum in steel by extractive spectrophotometry.
9. Analyses of waste waters for DO and COD by titrimetry.
10. Analysis of a ground water sample for sulphate by titrimetry (EDTA) and turbidimetry.
11. Catalytic determination of traces of selenium in biological materials and iodide in blood serum.
12. Photometric and potentiometric titration of iron(III) with EDTA.
13. Analysis of brackish water for chloride content by a) spectrophotometry (mercuric thiocyanate method), b) conductometry (silver nitrate) and c) potentiometry (silver nitrate).
14. Conductometric titration of sodium acetate with HCl and NH_4Cl with NaOH.
15. Determination of fluoride in drinking water/ground water by spectrophotometry (alizarin red lake method).
16. Analysis of waste water for
    a) phosphate by molybdenum blue method
    b) ammonia-nitrogen by Nessler's method
    c) nitrite-nitrogen by NEDA method

14. Analysis of a soil sample for
    a) calcium carbonate and organic carbon by titrimetry.
    b) calcium and magnesium by EDTA titration.
15. Analysis of a soil sample for

a) Available phosphorus by spectrophotometry.

b) Nitrate-nitrogen/nitrite nitrogen/ammonia nitrogen by spectrophotometry.

c) sodium and potassium by flame photometry.

16. Analysis of urine for

a) urea and uric acid by titrimetry snd spectrophotometry.

b) Sulphate by precipitation titration after ion-exchange separation.

c) Sugar by Benedict's reagent.

17. Analysis of blood for

a) cholesterol by spectrophotometry

b) bicarbonate by acid-base titration

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001 John Wiley & Sons, Inc. India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993, prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.
5. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003 Pearson Education Pvt. Ltd., New Delhi.
6. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California, 1990.
7. Pharmaceutical Drug Analysis by Ashutoshkar, New Age International Publishers, New Delhi, 2005.
8. Practical Pharmaceutical Chemistry, Ed. A. H. Geckett, J. B. Stenlake, 4th edition. Part I and II, CBS Publishers, New Delhi.
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations, P. D. Sethi, 3rd edition, CBS Publishers & Distributors, New Delhi, 1997.
10. Practical Clinical biochemistry methods and interpretations, R. Chawla, J.P. Bothers Medical Publishers (P) Ltd., 1995.
11. Laboratory Manual in Biochemistry, J. Jayaraman, New Age International Publishers, New Delhi, 1981.
12. Practical Clinical Biochemistry, Harold Varley and Arnold. Hein mann, 4th edition.

13. Environmental Science: Laboratory Manual, Maurice A. Strabbe, The C.V. Mosbey Co. Saint Loucs, 1972.
14. Experiments on Water Pollution, D.I. Williams and D. Anglesia, Wayland Publishers Ltd., England, 1978.
15. Experiments on Land Pollution, D.I. Williams and D. Anglesia, Wayland Publishers Ltd., England, 1978.
16. Experiments in Environmental Chemistry, P.D. Vowler and D.W. Counel, Pergamon Press, Oxford 1980.
17. Manual Soil Laboratory Testing, vol. I, K.H. Head, Pentech Press, London 1980.

CHI SCT 3.42: FRONTIERS IN INORGANIC CHEMISTRY

UNIT – I

[16 HOURS]

Materials chemistry: General principles-defects, non-stoichiometric compounds and solid solutions, atom and ion diffusion, solid electrolytes. Synthesis of materials-The formation of extended structures, chemical deposition.

Metal oxides, nitrides and fluorides: Monoxides of the 3d metals, higher oxides and complex oxides, oxide glasses, nitrides and fluorides.

Chalcogenides, intercalation chemistry and metal rich phases: Layered MS_2 compounds and intercalation, Chevrel phases.

Framework structures: Structures based on tetrahedral oxoanions, structures based on octahedral and tetrahedral.

Inorganic pigments: Coloured pigments, white and black inorganic materials.

Molecular materials and fullerides: Fullerides, Molecular material chemistry.

Silicates: Structure, classification - silicates with discrete anions, silicates containing chain anion, silicates with layer structure, silicones with three dimensional net work and applications.

UNIT – II

[16 HOURS]

Nanomaterials, nanoscience and nanotechnology: Fundamentals-Terminology and history, novel optical properties of nanomaterials.

Characterization and fabrication: Characterization methods. Top-down and bottom-up fabrication. Solution based synthesis of nanoparticles. Vapour-phase synthesis of nanoparticles. Synthesis using frameworks, supports and substrates.

Artificially layered materials: Quantum wells and multiple quantum wells. Solid state superlattices. Artificially layered crystal structures.

Self-assembled nanostructures: Self-assembly and bottom-up fabrication. Supramolecular chemistry and morphosynthesis. Dimensional control in nanostructures.

Bioinorganic nanomaterials: DNA and nanomaterials. Natural and artificial nanomaterials-Biomimetics. Bionanocomposites.

Inorganic-organic nanocomposites: Uses and design strategies. Polymer nanocomposites.

References

1. Inorganic Chemistry, 4th edition. P. Atkins, T. Overton, J. Rourke, M. Weller and F. Armstrong, Oxford University Press (2006).
2. Inorganic Chemistry Principles of Structure and Reactivity: James E. Huheey, Ellen A. Keiter, Richard L. Keiter, Okhil K. Medhi, Delhi University, New Delhi (2006).
3. Chemistry of the Elements – N.N. Greenwood and A. Earnshaw, Pergamon Press (1985).
4. Industrial Inorganic Chemistry – 2nd edition. K.H. Buchel, H.H. Moretto and P. Woditsh, Wiley - VCH (2000).
5. Basic Inorganic Chemistry – 3rd edition. F.A. Cotton, G. Wilkinson and P.L. Gaus, John Wiley and Sons (2002).
6. Inorganic Chemistry, 3rd edition. James E. Huheey, Harper and Row Publishers (1983).
7. Inorganic Chemistry, 3rd edition. G.L. Miessler and D.A. Tarr, Pearson Education (2004).
8. Inorganic Chemistry, 2nd edition. C.E. Housecroft and A.G. Sharpe, Pearson Education.

INORGANIC CHEMISTRY PRACTICALS – III

[64 HOURS]

PART – I

1. Electrogravimetric determination of:
   a) Copper in copper sulphate
   b) Nickel in nickel suphate
   c) Copper and nickel in alloy solution
   d) Lead in lead nitrate.
2. Flame photometric determination of the following metal ions from different samples:

a) sodium b) potassium c) calcium d) lithium and d) sodium and potassium in a mixture.

3. Polarographic estimation of cadmium and zinc.
4. Determination of iron as the 8-hydroxyquinolate by solvent extraction method.
5. Quantitative determination of nickel using dithizone and 1,10-phenanthroline by synergistic extraction.
6. Spectrophotometric determination of the pKa value of methyl red.
7. Determination of chromium(III) and iron(III) in a mixture: Kinetic masking method.
8. Semimicrogravimetric estimation of aluminium.

PART – II

9. Preparation and characterization of:
   a) Chloropentammine cobalt(III) chloride
   b) Estimation of chloride in a complex by potentiometric or ion-exchange method
   c) Record the electronic absorption spectrum of a complex and verify Tanabe Sugano diagram.
10. Using chloropentamine cobalt(III) chloride, prepare nitro and nitritopentamine cobalt(III) chloride. Record the IR spectra of the isomers and interpret.
11. Estimate the chloride ion in a given complex by silver nitrate titration after ion-exchange separation.
12. Preparation of cis- and trans-dichlorobis(ethylenediammine) cobalt(III)chloride. Record the UV-Vis spectra and compare it with cis-form. Measure the molar conductance.
13. Preparation of hexamine cobalt(III) chloride and estimate cobalt ion.
14. Determination of magnetic susceptibility of any two compounds/complexes by Gouy method.
15. Determination of the composition of iron-phenanthroline complex by:
    (a) Job's method
    (b) mole-ratio method and
    (c) slope-ratio method
16. Determine the stability constant of iron-tiron/iron-phenanthroline by Turner-Anderson method.
17. Demonstration Experiments:
    (a) Recording and interpretation of IR and NMR spectra of complexes.
    (b) Spectrochemical series - Evaluation of Dq value.

(c) DNA interaction with metal complexes by UV-visible absorption and viscosity methods.

References

1. Advanced Physico-Chemical Experiments – J. Rose.
2. Instrumental Analysis Manual - Modern Experiments for Laboratory – G.G. Guilbault and L.G. Hargis.
3. A Text Book of Quantitative Inorganic Analysis – A.I. Vogel, 5^{th} edition.
4. Experimental Inorganic Chemistry – G. Palmer.
5. Inorganic Synthesis – O. Glemser.
6. Experimental Inorganic/Physical Chemistry- Mounir A. Malati.
7. Quantitative Chemical Analysis – Daniel C. Harris, (2006) 7^{th} edition.
8. Spectrophotometric Determination of Elements – Z. Marczenko.

CHO SCT 3.43: CARBOHYDRATES, PROTEINS AND NUCLEIC ACIDS

UNIT – I

[16 HOURS]

Carbohydrates: Carbohydrates: Introduction, Ring size determination of monosaccharides, configuration and conformations of monosaccharides, anomeric effect, Hudson's rules, epimerization and mutarotation. Synthesis, industrial and biological importance of glycosides, amino sugars, sucrose, maltose and lactose. Polysaccharides: General methods of structure elucidation. Industrial importance and biological importance of cellulose, starch, glycogen, dextran, hemicellulose, pectin, agar- agar. Photosynthesis and biosynthesis of carbohydrates.

UNIT – II

[16 HOURS]

Amino Acids: General structure, physiological properties, protection of functional groups, **Peptides**: Structure and conformation of peptide bond, peptide synthesis: Solution phase and Merrifield's solid phase synthesis, Racemization and use of HOBt, Synthesis of oxytocin and vasopressin, biological importance of insulin, selective cleavage of polypeptide bonds (chemical and enzymatic). Proteins: Structure determination: C and N terminal residue determination, primary, secondary, tertiary and quartenary structure determination, denaturing and renaturing of proteins.

Nucleic acids: Introduction, structure and synthesis of nucleosides and nucleotides, protecting groups for hydroxy group in sugar, amino group in the base and phosphate functions. Methods of formation of internucleotide bonds: DCC, phosphodiester approach and phosphoramide methods. Solid phase synthesis of oligonucleotides. Structure of RNA and DNA, Crick-Watson model, role of nucleic acids in the biosynthesis of proteins.

Protecting groups: Protection of hydroxyl, carboxyl, carbonyl, thiol and amino groups. llustration of protection and deprotection in synthesis.

References

1. L. Finar, Organic Chemistry, ELBS Longmann, Vol. I & II, 1984.
2. K. Albert, L. Lehninger, D.L. Nelson, M.M. Cox, Principles of Biochemistry, CBZ publishers, 1st edition, New Delhi, 1993.
3. Harper's Biochemistry, Ed. R.Harper, 22nd edition, Prentice Hall Press, New York, 1990.

ORGANIC CHEMISTRY PRACTICALS – III

PART – I

[64HOURS]

Isolation of natural products & estimations:

1. Fractional crystallization: separation of mixture of naphthalene and biphenyl
2. Thin layer chromatography: Separation of plant pigments
3. Isolation of piperine from pepper
4. Isolation of caffeine from tea
5. Isolation of azeleic acid from castor oil
6. Estimation of ketones by haloform reaction
7. Estimation of sugars by Bertrand's method
8. Estimation of nitro groups
9. Estimation of amino group
10. Determination of iodine value of an oil or fat
11. Determination of saponification value of an oil
12. Determination of equivalent weight of carboxylic acid by silver salt method

PART – II

Spectral analysis: Structural elucidation of some simple organic compounds by UV, IR, NMR and mass. Spectra have to be provided by the teachers.

References

1. Manual of Organic Chemistry - Dey and Seetharaman.
2. A Text Book of Practical Organic Chemistry – A.I. Vogel, Vol. III
3. Practical Organic Chemistry - Mann & Saunders.

CHP SCT: 3.44. APPLICATIONS OF ELECTROCHEMISTRY AND CORROSION

UNIT – I

[16 HOURS]

Electrochemical cells and batteries: Introduction, galvanic and electrolytic cells, schematic representation of cells. Faradays's law, faradaic and non-faradaic current, mass transfer in cells. Batteries: Classification, characteristics, primary, secondary and lithium batteries. Fuel cells.

Energetics of cell reactions: Effect of temperature, pressure and concentration on energetics of cell reactions (calculation of ΔG, ΔH and ΔS).

Electrochemical measurements: Amperometry, coulometry at controlled potential and at constant current. Cyclic voltammetry – basic principles, instrumentation and applications. **Electrogravimetry:** Theory, electrode reactions, electroplating of metals, electro-deposition of alloys, characteristics of good deposit, completeness of deposition, separation of metals at controlled cathode potential. Determination of copper and nickel in Cu-Ni alloy.

UNIT – II

[16 HOURS]

Corrosion: Manifestations of corrosion, types of corrosion, basis of electrochemical corrosion, theories of corrosion. Local cell theory (Wagner and Traud theory). Current – potential relations (Evan diagram) in corrosion cells. Effect of pH, nature of metal and dissolved oxygen (principle of differential aeration) on corrosion. Corrosion rate measurement by different methods – chemical and electrochemical methods (potentiodynamic polarization and AC impendence). General aspects of corrosion prevention and control. General classification of corrosion control methods – designing aspects, effect of allying and surface modification. Corrosion prevention by painting, phosphating and anodic (passivation) and cathodic protection.

Corrosion inhibitors: Introduction, classification – passivating (anodic), cathodic, organic, precipitation and volatile corrosion inhibitors. Green inhibitors and their significance. Corrosion inhibition mechanism, synergism of corrosion inhibitors. Application of potentiodynamic polarization, impendence and IR and UV-visible spectroscopy for the study of behaviour of corrosion inhibitors.

References

1. Text Book of Physical Chemistry by Samuel Glasstone, MacMillan Indian Ltd., 2nd edition (1974).
2. Elements of Physical Chemistry by Lewis and Glasstone.
3. Physical Chemistry – G.M. Barrow, McGraw Hill International Service (1988).
4. Introduction to Electrochemistry by S. Glasstone.

5. Electrochemistry –Principles and Applications by E.G. Potter.
6. Electrochemistry by Reiger, Prentice Hall (1987).
7. An introduction to metallic corrosion and its prevention, Raj Narayan, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
8. Fundamentals of metallic corrosion, Philips A. Schweitzer, CRC press Taylor and Francis group, New York.
9. Corrosion: Fundamentals, testing and protection, Thomas A. Adler et al., ASM International.
10. Analytical methods in corrosion science and engineering, Philippe Marcus and Florian Mansfeld, Taylor and Francis group, New York.
11. Corrosion prevention and control, Baldev Raj, U Kamachi Mudali & S. Rangarajan, Narora Publishing House, India.
12. Corrosion Engineering, Fontana & Mars, Tata Mc Graw Hill Education Pvt ltd., India

PHYSICAL CHEMISTRY PRACTICALS – III

[64 HOURS]

1. To study the kinetics of saponification of ethyl acetate by conductivity method, determination of the energy of activation.
2. Study of kinetics of reaction between $K_2S_2O_8$ and KI, second order, determination of rate constants at two different temperatures and Ea.
3. Study the salt effects on kinetics of reaction between $K_2S_2O_8$ and KI.
4. Conductometric titration of thorium nitrate with potassium tartarate.
5. Conductometric titration of orthophosphoric acid against NaOH.
6. Conductometric titration of a mixture of HCl, CH_3COOH and $CuSO_4$ against NaOH.
7. Potentiometric titration of mixture of weak acids against NaOH.
8. Conductometric titration of potassium iodide with mercuric perchlorate.
9. To study the acid catalysed kinetics of oxidation of glycine by chloramine-T (CAT) - determination of order of reaction w.r.t. [CAT] and [glycine].
10. Potentiometric titration of $Pb(NO_3)_2$ vs EDTA.
11. Potentiometric titration of mixture of KCl+KBr+KI vs $AgNO_3$.
12. Study of phase diagram of a three component system (e.g. acetic acid-chloroform water and system).
13. Study of corrosion rate of mild steel in the presence of corrosion inhibitor by mass loss method at different temperature – determination of thermodynamic parameters.

14. Kinetics of decomposition of diacetone alcohol by NaOH - determination of energy of activation and other thermodynamic parameters.
15. Spectrophotometric kinetics of oxidation of indigocarmine by chloramine-T (CAT) – (a) Determination of order of reaction w.r.t. [CAT] (b) Effect of pH and determination of order w.r.t.[H^+].
16. Kinetic study on Ru(III) catalysed reaction between primary amine and CAT (a) Determination of order of reaction w.r.t. [amine] and [CAT] (b) Determination of E_a and thermodynamic parameters.
17. Kinetics of saponification of ethyl acetate by conductivity method and study the effect of dielectric constant of the medium (using CH_3OH).
18. Study of photolysis of uranyl oxalate (a) determination of intensity of light source (b) study of photocatalysis of oxalic acid.
19. Determination of rate of photolysis of CAT/CAB solution.
20. Determination of pK value of an indicator (methyl orange).
21. Spectrophotometric analysis of a mixture of (a) $KMnO_4$ and $K_2Cr_2O_7$.
22. Study of complex formation between ferric salt and salicylic acid.
23. Determination of half-wave potential of metal ions in a mixture (Mn^{2+}, Cd^{2+} and Zn^{2+}).
24. Estimation of metal ion in solution by polarographic method.
25. Determination of half-life of ^{40}K using GM counter.
26. Determination of energy gap of a semiconductor by four probe method.
27. Synthesis of nanomaterial (ZnO) by electrochemical method and its application for photodegradation studies.

References

1. Practical Physical Chemistry – A.J. Findlay.
2. Experimental Physical Chemistry – F. Daniels et al.
3. Selected Experiments in Physical Chemistry – Latham.
4. Experiments in Physical Chemistry – James and Prichard.
5. Experiments in Physical Chemistry – Shoemaker.
6. Advanced Physico-Chemical Experiments – J. Rose.
7. Practical Physical Chemistry – S.R. Palit.
8. Experiments in Physical Chemistry – Yadav, Geol Publishing House.
9. Experiments in Physical Chemistry – Palmer.
10. Experiments in Chemistry – D.V. Jahagirdar, Himalaya Publishing House, Bombay, (1994).
11. Experimental Physical Chemistry – R.C. Das. and B. Behera, Tata Mc Graw Hill.

NON-COMPOSITE

CHI SCT 3.51: BIOINORGANIC PHOTOCHEMISTRY

UNIT – I

[16 HOURS]

Introduction, Philosophy of bioinorganic photochemistry Fundamentals: Light and matter Nature of light, Accessible light sources and Interaction between light and matter.

Formation and properties of electronic excited states: Wave mechanics and quantum numbers and Electronic excitation.

Photophysical deactivation of electronic excited states: Spontaneous deactivation, Quenching and Coordination and organometallic compounds.

Photochemical reactions: Photochemical reaction channels, Intramolecular photoreactions, Photodissociation and photoionization, Photoisomerization, Intermolecular photoreactions, The coordination compound specificity. Ligand field photochemistry, Photochemistry from LC or LLCT states, Inner-sphere charge transfer photochemistry, Outer-sphere charge transfer photochemistry, Photosensitized reactions, Homogeneous photocatalysis.

Natural photoprocesses involving inorganic compounds

From interstellar space to planetary atmospheres: Homogeneous systems: from interstellar space to planetary atmospheres and primitive soup models. Heterogeneous photochemistry in ice phases.

UNIT – II

[16 HOURS]

Applications: Fluorescent and chromogenic sensing and labeling: Cations as targets in biochemical sensing Cations common in biological systems, Fluorescent detection of toxic cations, Fluorescent and chromogenic sensing of anions, Common anions and Toxic anions. Optical detection of neutral molecules. Nanoparticles in biochemical sensing and labeling.

Therapeutic strategies; Photobiostimulation, Photoactivation of drugs, Photodynamic therapy, Mechanisms of PDT and PTT. Photosensitizers, Inorganic photosensitizers, Supporting role of metal ions in photodynamic therapy, and Combination of polypyrrolic photosensitizers and

metallopharmaceuticals, Recent PDT development and Nanomedical methods.

Photodynamic inactivation of microorganisms: Bacteria, Viruses, Fungi and Parasites. **Phototoxicity and photoprotection:** Chemical and physical photoprotection. Inorganic sunscreens.

Photocatalysis in environmental protection: Development of homo- and heterogeneous methods. Homogeneous photocatalysis and heterogeneous photocatalysis. Water and air detoxifi cation. Other applications of photocatalysis.

References

1. Bioinorganic Photochemistry- Grazyna Stochel, Malgorzata Brindell, Wojciech Macyk, Zofia Stasicka, Konrad Szacilowski. Wiley Publishers (2009).
2. Photochemistry and Photophysics of Coordination Compounds I-Volume Editors: Balzani, V., Campagna, Springer Publications.Vol. 280, 2007.
3. Photochemistry and Photophysics of Coordination Compounds II - Volume Editors: Balzani, V., Campagna, Springer Publications.Vol. 281, 2007.

CHO SCT 3.52: LIPIDS, PORPHYRINS, ANTHOCYANINS AND FLAVONOIDS

UNIT – I

[16 HOURS]

Lipids: Nomenclature, classification, purification, structure and synthesis of fatty acids, phospholipids, sphingolipids. Biological importance of lipids (Lecithin, sphingolipids, oils and fats).

Prostaglandins: Introduction, classification and biological importance of PG's. Constitution of PGE_1. Synthesis of PGE & F series.

Terpenoids: Introduction, classification and general methods of structural elucidation. Biological importance of terpenoids. Chemistry of pinene, camphor, caryophyllene, santonin, abietic acid and vetivone.

UNIT – II

[16 HOURS]

Porphyrins: Introduction, structure and biological functions of haemin. Vitamin B_{12}: structure and as coenzyme in molecular rearrangement reactions; Chlorophyll: structure and biological importance.

Flavonoids and Isoflavonoids: Occurrence, nomenclature and general methods of structure determination. Isolation and synthesis of Apigenin, Luteolin, Kaempferol, Quercetin, wedelolactone, Butein, Daidzein.

Biosynthesis of flavonoids and isoflavonoids: Acetate Pathway and Shikimic acid Pathway. Biological importance of flavonoids and isoflavonoids

Carotenoids: Methods of isolation. Structure elucidation and synthesis of β-carotene. Structural relationship of α-, β- and γ-carotenes.

References

1. L. Finar, Organic Chemistry, ELBS Longmann, Vol. I & II, 1984.
2. K. Albert, L. Lehninger, D. L. Nelson, M. M. Cox, Principles of Biochemistry, CBZ publishers, 1st edition, New Delhi, 1993.
3. Harper's Biochemistry, Ed. R.Harper, 22nd edition, Prentice Hall Press, New York, 1990.
4. Encyclopedia of Chemical technology – Kirck-Othmer series.
5. Harper's review of biochemistry – P. W. Martin, P. A. Mayer & V. W. Rodfwell, 5th edition, Maurzen Asian Edition, California, 1981.

CHP SCT: 3.53 APPLICATIONS OF X-RAY CRYSTALLOGRAPHY AND QUANTUM CHEMISTRY

UNIT –I

[16 HOURS]

Applications of X-ray crystallography: Crystal growth techniques. Data collection, Data reduction, Structure solving and refinement, Shelx-2013, Olex-2, WinGX, Encifer, PLATON,

MERCURY, SUPERFLIP, ORTEP, Packing, R-value, CIF, CIF-Tab, Disorder, polymorphism & pseudopolymorphism, Hydrogen bonding interactions, Bifurcated and trifurcated hydrogen bonding.

UNIT –II

[16 HOURS]

Applications of quantum mechanics: Application of variation theorem to a particle in one dimensional box, linear oscillator, H and He-atoms, SCF method for many electron atom. Slater Orbitals –Effective nuclear charge (ENC), expressions for slater orbitals for 1s, 2s, 3s, 2p and 3d electrons (no derivation), Slater's rules for calculation of ENC-Slater's orbitals for He, Carbon and nitrogen. Theories of valence – Introduction, linear and non-linear variation functions, secular equations, coulombic, exchange, normalization and overlap integrals, secular determinants.

References

1. Structure determination by x-ray crystallography by Mark Ladd & Rex Palmer
2. An Introduction to X-ray crystallography by M. M. Woolfson
3. Crystal Structure Determination by Werner Massa & Robert O. Gould
4. Crystal Structure Determination (Oxford Chemistry Primers) by William Clegg

5. X-Ray Structure Determination: A Practical Guide, 2nd Edition by George H. Stout & Lyle H. Jensen
6. Crystal Structure Refinement: A Crystallographer's Guide to SHELXL (International Union of Crystallography Texts on Crystallography) [Hardcover] by Peter Müller , Regine Herbst-Irmer , Anthony Spek, Thomas Schneider & Michael Sawaya
7. Crystal Structure Analysis:A Primer by Jenny Pickworth Glusker, Kenneth N. Trueblood
8. Crystal Structure Analysis for Chemists and Biologists by Jenny P. Glusker, Mitchell Lewis, Miriam Rossi
9. Crystal structure analysis: principles and practice by Alexander J. Blake, William Clegg, Jacqueline M Cole
10. Principles of X-ray Crystallography by Li-Ling OOi (Oxford Univ Press).
11. A Practical Guide to solving single crystal structures by Manuel A. Fernandes
12. Quantum Chemistry – A.K. Chandra. Second Edition, Tata McGraw Hill Publishing Co. Ltd., (1983).
13. Quantum Chemistry – Eyring, Walter and Kimball. John Wiley and Sons, Inc., New York.
14. Quantum Chemistry –I.N. Levine. Pearson Education, New Delhi, (2000).
15. Theoretical Chemistry – S. Glasstone. East West Press, New Delhi, (1973).
16. Quantum Chemistry – R.K. Prasad, New Age International Publishers, (1996).
17. Valence Theory – Tedder, Murel and Kettle.
18. Quantum Chemistry – D.A. McQuarrie.
19. Theoretical Inorganic Chemistry – Day & Selbin

FOURTH SEMESTER

CHI HCT: 4.1. BIOINORGANIC CHEMISTRY

UNIT – I

[16 HOURS]

Structural and molecular biology: Introduction, The structural building blocks of proteins, the structural building block of nucleic acids. Metal ion interactions with nucleosides and nucleotides. General features of DNA - metal complex interaction.

Bioenergetics: Introduction, Redox reactions in metabolism, the central role of ATP in metabolism. Kinetic stability of ATP, Mitochondrial flow of electrons from NADH to O_2. Oxidative phosphorylation and respiratory chain.

Sodium and potassium-channels and pumps: Introduction, transport across membranes. Potassium and sodium channels, The sodium-potassium ATPase, Macro cyclic crown ether compounds, cryptands and ionophores.

Biochemistry of calcium: Introduction - comparison of Ca^{2+} and Mg^{2+}. Biological roles of calcium, binding sites of calcium and proteins, storage of calcium, calcium in muscle contraction, calcium in blood clotting process.

Vitamin B_{12} and Coenzymes: Structural feature, names of different forms, chemistry of cobalamin, biochemical functions of cobalamins, model compounds. Special characteristics of B_{12} co-enzyme. Photosystems.

UNIT – II

[16 HOURS]

Metal ion transport and storage: Iron storage and transport: Transferrin, ferratin, phosvitin and gastroferrin. Iron transport in microbes: siderophores, in vivo microbial transport of iron

Oxygen transport and oxygen uptake proteins: Properties of dioxygen (O_2): Thermodynamic and kinetic aspects of dioxygen as an oxidant, activation of dioxygen through complexation with metal ions.

Haemoglobin (Hb) and Myoglobin (Mb) in oxygen transport mechanism: Introduction to porphyrin system, substituent effects on porphyrin rings, functions of Hb and Mb.

Characteristics of O_2^- binding interaction with Hb and Mb. Model compounds for oxygen carriers (Vaska's complex and cobalt(III) – Schiff base complexes). Hemerythrin and hemocyanin.

Electron transport proteins and redox enzymes: Iron – sulfur proteins (rubredoxins and ferredoxins) and cytochromes including cytochrome P_{450}. Catalase and peroxidase: Structure and reactivity.

Superoxide dismutase: Structure and reactivity.

Molybdenum containing enzymes: Aspects of molybdenum chemistry, Xanthine oxidase, aldehyde oxidase, sulfite oxidase, nitrogenase and nitrite reductase.

Non-redox metalloenzymes - Structure and reactivity: Carboxypeptidase-A, alcohol dehydrogenase, leucine aminopeptidase and carbonic anhydrase.

UNIT – III

[16 HOURS]

Therapeutic uses of Metals - Metals in medicine: Introduction, metals and human biochemistry, general requirements.

Disease due to metal deficiency and treatment: Iron, zinc, copper, sodium, potassium, magnesium, calcium and selenium.

Metal complexes as drugs and therapeutic agents: Introduction, antibacterial agents, antiviral agents, metal complexes in cancer therapy, metal complexes for the treatment of rheumatoid arthritis, vanadium diabetes, metal complexes as radio diagnostic agents.

Treatment of toxicity due to inorganics: General aspects of mechanism of metal ion toxicity,

(i) Mechanism of antidote complex with poison, rendering it inert: arsenic, lead, mercury, iron, copper

(ii) Antidote accelerated metabolic conversion of poison to non-toxic product: cyanide and carbon monoxide

References

1. The Inorganic Chemistry of Biological Process- 2nd edition, M. N. Hughes, John Wiley and Sons, (1988).
2. Bioinorganic Chemistry - R.W. Hay, Ellis Horwood Ltd., (1984).
3. Biological Inorganic Chemistry – An Introduction, R.R. Crichton, Elsevier, (2008).
4. Bioinorganic Chemistry - A.K. Das, Books and Allied (P) Ltd, (2007).
5. Bioinorganic Chemistry - K. Hussain Reddy, New Age International Ltd. (2003).
6. Bioinorganic Chemistry: A Survey - Eiichiro Ochiai, Academic Press, (2008).
7. Bioinorganic Chemistry: A Short Course - 2nd edition, R.M. Roat-Malone, Wiley Interscience, (2007).
8. Medicinal Applications of Coodination Chemistry - Chris Jones and John Thornback, RSC Publishing, (2007).

9. Transition Metal Complexes as Drugs and Chemotherapeutic Agents - N. Farrell, Kluwer Academic Publishers (1989).

10. The Biological Chemistry of the Elements: The Inorganic Chemistry of Life - 2nd edition, J.J.R. Frausto da Silva and R.J.P. Williams, Oxford University Press, (2001).

CHO HCT: 4.2. PHOTOCHEMISTRY, PERICYCLIC REACTIONS AND ORGANOMETALLIC CHEMISTRY

UNIT – I

[16 HOURS]

Photochemistry: Light absorption and electronic transitions, Jablonski diagram, intersystem crossing, energy transfer, sensitizers, quenchers. Photochemistry of olefins, conjugated dienes, aromatic compounds, ketones- Norrish type-I and Norrish type-II reactions, enones, Paterno-Buchi reaction, di-pi- rearrangements, photooxidations, photoreductions.

Pericyclic reactions: Electrocyclic reactions: Stereochemistry, symmetry and Woodward-Hofmann rules for electrocyclic reactions, FMO theory of electrocyclic reactions, correlation diagram for butadiene to cyclobutene and hexatriene to cyclohexadiene systems. Cycloaddition reactions: Classification, analysis by FMO and correlation diagram method. Cycloaddition reactions: [2+2] and [4+2] cycloadditions- FMO and correlation diagram method Deils-Alder reaction, hetero Diels-Alder reaction and their applications. Intra and intermolecular 1,3-dipolar cycloadditions: involving nitrile oxide, nitrile imine, nitrile ylide and their application in organic synthesis. Sigmatropic reactions: Classification, stereochemistry and mechanisms. suprafacial and antarafacial shifts of H and carbon moieties. [3,3] and [5,5]- sigmatropic rearrangement, Claisen, Cope and aza-Cope rearrangement.

UNIT – II

[16 HOURS]

Chemistry of organometallic compounds: Synthesis and reactions of organolithium (n-BuLi, PhLi), organocadmium, organomagnesium (Grignard reagent), organomanganese, organoselenium and organotellurium. Organoaluminium reagents: Preparation, site selective and stereoselctive additions of nucleophiles mediated by organoaluminum reagents, reaction with acid chlorides, allyl vinyl ethers, 1,2-addition to imines and application in the synthesis of natural products. Organocopper reagents: Gilmann reagent, preparation, reactions with aldehydes, ketones and imines. Application in the synthesis of brevicomin, Organozinc reagents: Preparation - oxidative addition and transmetallation, addition reactions of alkyl, aryl, allylic and propargylic zinc reagents, diastereoselective and enantioselective addition reaction with aldehydes, Reformatsky reaction.

Organosamarium reagents: Reactions promoted by samarium diiodide and dicyclopentadienyl samarium – Barbier type reaction, Reformatsky type reactions, ketyl-alkene coupling reactions, pinacolic coupling reactions, acyl anion reactions. Organotin reagents: tributyltin hydride, Barton decarboxylation reaction, Barton deoxygenation reaction, Stille coupling, Stille-Kelley coupling reactions, Barton McCombie reaction, Keck stereoselective allylation and other applications.

UNIT – III

[16 HOURS]

Asymmetric synthesis: Definition, importance, mechanism, energy consideration, advantages and limitations, methods of determination of enantiomeric excess. Methods of asymmetric induction.

i. **Topocity - Prochirality**- Substrate selectivity - Diastereoselectivity and enantio-selectivity-Substrate controlled methods-use of chiral substrates - examples

ii. Auxiliary controlled methods- Use of chiral auxiliaries - Chiral enolates-alkylation of chiral imines - Asymmetric Diels - Alder reaction

Reagent controlled methods- Use of chiral reagents - Asymmetric oxidation –Sharpless epoxidation - Asymmetric reduction - Use of lithium aluminium hydride and borate reagents. Synthesis and applications of oxazaborolidines, IPC-BBN, IPC_2BH, (S)-BINAP-DIAMINE and (R)-BINAL-H. Use of (R,R)-DIPAMP, (S,S)-CHIRAPHOS, (R,R)-DIOP, SAMP, RAMP, S-Proline, S-PBMgCl, (-)-$BOAlCl_2$, (+) and (-)-DET.

References

1. H. Pine, Hendrickson, Cram and Hammond, Organic Chemistry, Mac Grow Hill, New York, 1987.
2. Organic Chemistry - Morrison and Boyd
3. I.L. Finar, Organic Chemistry, ELBS Longmann, Vol. 1 & II, 1984.
4. J. March, Advanced Organic Chemistry, Wiley Interscience, 1994.
5. E.S. Gould, Mechanism and Structure in Organic Chemistry, Halt, Rinhart & Winston, New York, 1964.
6. F.A. Carey and Sundberg. Advanced Organic Chemistry – Part A & B, 3rd edition, Plenum Press, New York. 1990.
7. Principles of Organic Synthesis - ROC Norman and Coxon.
8. S.K. Ghosh, Advanced General Organic Chemistry, Book and Allied (P) Ltd. 1998.

CHP HCT: 4.3. PHYSICAL CHEMISTRY – IV

UNIT – I

[16 HOURS**]**

Homogenous Catalysis: Acid-Base catalysis, specific acid and base catalysis. General acid and base catalysis. Oxidation of amino acids and carbohydrates in presence of acid and base catalysis. Acidity functions - Bronstead, Hückel, Hammett and Bunnett hypothesis.

Enzyme kinetics: Effect of substrate concentration (Michaelis - Menton equation), Effect of pH, effect of catalysts and inhibitors (substrate, zeolite, Cr^{3+}, Fe^{2+} ZnO, U.V light), effect of temperature. A brief kinetic and mechanistic applications of glucose oxidase in the oxidation of glucose.

Linear Free Energy Relationship: Hammett equation, Taft equation, Okemoto Brown equation and its application to oxidation of amino acids and aromatic amines. Swain-Scott and Edward equation. Winstein - Grunwald relationship. Isokinetic relationship and significance of isokinetic temperature, Exner criterion.

Surface reactions: Langmuir unimolecular and bimolecular reactions.

Kinetic Isotope Effect: Theory of kinetic isotope effect - normal and inverse isotope effect, primary isotope effect, secondary isotope effect, solvent isotope effect.

UNIT – II

[16 HOURS]

Phase rule studies: Thermodynamic derivation of phase rule. Application of phase rule to the two component systems - compound formation with congruent melting point and incongruent melting points, Roozeboom's classification. Application of phase rule to three component systems- systems of three liquids and systems of two salts and water.

Statistical thermodynamics: Micro and macro states, phase and ensembles. Thermodynamic probability and most probable distribution – Maxwell-Boltzmann distribution law. Maxwell-Boltzmann, statistics and applications, Bose-Eistein and Feimi-Dirac Statistics. Partition functions – definition, evaluation of translational, rotational and vibrational and electronic for monoatomic, diatomic and polyatomic gaseous molecules. Calculation of thermodynamic functions and equilibrium constants in terms of partition functions, entropy of monoatomic gases. Sackur-Tetrode equation. Comparison of third law and statistical entropies.

UNIT – III

[16 HOURS]

Solid state chemistry: Types of imperfections, classification of imperfections, point defects, Schottky defects, Frenkel defects, disordered crystals, line defects, dislocation types, plane defects, small-angle and large-angle boundaries, stacking faults, crystal growth and twinning.

Fundamentals of X-ray crystallography: law of interfacial angles, laws of symmetry, Miller indices, Bragg equation, Experimental methods – powder and rotating crystal methods, indexing of powder and rotating crystal photographs. Atomic scattering factor, structure factor, Fourier synthesis and electron density diagrams. Electron diffraction of gases, experimental technique, Scattering-Intensity curves, Wierl equation (no derivation), Radial distribution method determination of bond lengths and bond angles.

References

1. Chemical Kinetics by K.J. Laidler.
2. Chemical Kinetics by Frost and Pearson.
3. Kinetics and Mechanism of Chemical Transformation by J. Rajaram and J.C. Kuriacose.
4. Chemical Kinetics by L.K. Jain.
5. Chemical Kinetics by Benson.
6. Text Book of Physical Chemistry by Samuel Glasstone, MacMillan Indian Ltd., 2nd edition (1974).
7. Elements of Physical Chemistry by Lewis and Glasstone.
8. Phase Rule, Gurthu and Gurthu.
9. Statistical Themodynamics by B.C. Meclelland, Chapman and Hall, London (1973).
10. Elementary Statistical Thermodynamics by N.D. Smith, Plenum Press, NY (1982).
11. Elements of Classical and Statistical Thermodynamics by L.K. Nash, Addison-Wesley (1970).
12. Statistical Thermodynamics by I.M. Klotz.
13. Introduction to Statistical Thermodynamics by M. Dole, Prantice Hall, (1962).
14. Solid State Chemistry – N.B. Hannay.
15. Introduction to Solids – Azaroff.
16. Solid State Chemistry and its applications – A.R. West.
17. Principles of the Solid State – H.V. Keer.
18. Basic Solid State Chemistry, 2nd edition, Anthony R. West.
19. Solid State Chemistry: An Introduction, 3rd edition, Lesley E. Smart and Elaine A. Moore.
20. Molecular Structure by Wheatley
21. Physical Chemistry by Barrow
22. Physical Chemistry by Glasstone & Lewis

PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE [AUTONOMOUS]

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

Affiliated to University of Mysore

DEPARTMENT OF STUDIES IN COMMERCE

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

Title of the Programme: Master of Commerce (M.Com)

Preamble:

Department of Studies in Commerce was started in the year 2002. The programme provides an extreme and rigorous base for teaching and research. The programme serves the needs of academics and prepares students for research and teaching. The programme provides students with a deeper and broader exposure in the field of commerce. This Programme equips individuals for the senior jobs in the corporate houses in the Multi-National Companies. The core curriculum of the programme mainly focuses on Financial Management, Business Taxation, Portfolio Management, Derivate Markets and Corporate Finance, etc., Candidates can add to their qualification status by pursuing M.Phil. or doctorate courses in related area. Higher studies increase the career prospects of the candidate.

Master of Commerce is a four semester programme following Choice Based Credit System (CBCS). The CBCS is an advanced mode of learning in higher education wherein a student has freedom in selecting his/her own choices in the curriculum for completing Master's degree programme. CBCS facilitates the learning process to move from teacher centric to student centric education.

The Main objective of the programme is to provide an advanced knowledge and understanding of the main theoretical and applied concepts in commerce delivered from an Indian and International perspective. The core objectives of the programme are,

- To provide high quality professional education to the Commerce students.
- To equip the students to hold positions in corporate as well as education sector.
- To focus on the development of the whole person with conceptual, analytical and communication skills.
- To develop independent thinking by each student.
- To encourage more industry academic interface.

1. Definitions

Course

Every course offered will have three components associated with the teaching-learning process of the course, namely

(i) Lecture – L (ii) Tutorial- T (iii) Practical - P, where

L stands Lecture session. **T** stands Tutorial session consisting participatorydiscussion / self-study/ desk work/ brief seminar presentations by students andsuch other novel methods that make a student to absorb and assimilate moreeffectively the contents delivered in the Lecture classes.

P stands Practice session and it consists of Hands on experience / LaboratoryExperiments / Field Studies / Case studiesetc that equip students to acquire the muchrequired skill component.

In terms of credits, every one hour session of L amounts to 1 credit per semesterand a minimum of two hour session of T or P amounts to 1 credit per semester,over a period of one semester of 16 weeks for teaching-learning process. The totalduration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components. That means a course mayhave only lecture component, or only practical component or combination of anytwo or all the three components.

The total credits earned by a student at the end of the semester upon successfullycompleting the course are L + T + P. The credit pattern of the course is indicatedas

L: T: P.

If a course is of 4 credits then the different credit distribution patterns in L: T: P format could be

4 : 0 : 0,	1 : 2 : 1,	1 : 1 : 2,	1 : 0 : 3,	1 : 3 : 0,
2 : 1 : 1,	2 : 2 : 0,	2 : 0 : 2,	3 : 1 : 0,	3 : 0 : 1,
0 : 2 : 2,	0 : 4 : 0,	0 : 0 : 4,	0 : 1 : 3,	0 : 3 : 1,

The concerned BoS will choose the convenient credit pattern for every course based on the requirement.

Different courses of study are labelled and defined as follows:

Core Course

A course which should compulsorily be studied by a candidate as a core requirementis termed as a Core course.

A Core course may be a **Soft Core** if there is a choice or an option for thecandidate to choose a course from a pool of courses from the main discipline /course of study or from a sister/related discipline / course which supports themain discipline / course. In contrast to the phrase Soft Core, a compulsory corecourse is called a **Hard Core** Course.

Elective Course

Generally a course which can be chosen from a pool of courses and which may bevery specific or specialized or advanced or supportive to the discipline / course ofstudy or which provides an extended scope or which enables an exposure to someother discipline / course/domain or nurtures the candidate's proficiency/ skill iscalled an Elective Course. Elective courses may be offered by the main discipline/ course of study or by sister / related discipline / course of study. A Soft Corecourse may also be considered as an elective.

An elective course chosen generally from an unrelated discipline / course, withan intention to seek exposure is called an **Open Elective**.

An elective course designed to acquire a special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such acourse on his own with an advisory support by a teacher is called a **Self Study Elective.**

A core course offered in a discipline / course may be treated as an elective byother discipline / course and vice versa.

Project work/Dissertation work is a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficultproblem. A project work up to 4 credits is called Minor Project work. A projectwork of 6 to 8 credits is called Major Project Work. Dissertation work can be of10-12 credits. A Project/Dissertation work may be a hard core or a soft core asdecided by the concerned BoS.

2. Eligibility for Admission:

The candidate who has passed B.COM/BBM/BBA of University of Mysore or any other recognized university considered as equivalent there to, with a minimum of 45% aggregate marks in the qualifying examination. A relaxation of 5% is available for SC/ST and Cat-I candidates.

3. Scheme of Instructions

3.1 A Master's Degree program is of 4 semesters-two year's duration for regular candidates. A regular candidate canavail a maximum of 8 semesters – 4 years (in one stretch) to complete Master's Degree (including blank semesters, if any) Whenever a candidate opts for blanksemester(s)/DROP in a course or in courses or is compelled to DROP a course orcourses as per the provision of the regulation, he/she has to study the prevailing courses offered by the department as per the prevailing scheme,when he/she continues his/her study.

3.2 A candidate has to earn a minimum of 80 credits, for successful completion of a Master's degree with a distribution of credits for different courses as given in thefollowing table.

Course Type	**Credits**
Hard Core	A minimum of 44
Soft Core	A minimum of 32
Open Elective	A minimum of 4

Every course including project work, practical work, field work, seminar, self-study elective should be entitled as hard core or soft core or open elective by theconcernedBoS.

3.3 A candidate can enroll for a maximum of 24 credits per semester with the prior approval in the department.

3.4 Only such candidates who register for a minimum of 18 credits per semester inthe first two semesters and complete successfully 80 credits in total of the 4 semesters shall be considered for declaration of ranks, medals and are eligible toapply for student fellowship, scholarship, free ships and hostel facilities.

3.5 In excess to the minimum of 80 credits for master's degree in the concerned discipline / course of study, a candidate can opt to complete a minimum of 18extra credits to acquire **add on proficiency diploma** in that particular discipline /subject along with the master's degree. In such of the cases wherein, a candidateopts to earn at least 4 extra credits in different discipline / subjects in addition to aminimum of 80 credits at masters level as said above then an **add on proficiency certification** will be issued to the candidate by listing the courses studied andgrades earned.

3.6 A candidate admitted to Master'sProgram can exercise an option to exit with Bachelor Honors Degree / PG diploma after earning 40 credits successfully.

4. Continuous Assessment, Earning of Credits and Award of Grades

The evaluation of the candidate shall be based on continuous assessment. The Structure for evaluation is as follows:

4.1 Assessment and evaluation processes happen in a continuous mode. However, forreporting purposes, a semester is divided into 3 discrete components identified asC1, C2, and C3.

4.2 The performance of a candidate in a course will be assessed for a maximum of 100 marks as explained below:

4.2.1 The first component (C1), of assessment is for 15 marks. This will be based ontest/ assignment/seminar/quiz/group discussions etc.,During the first half of the semester, the first 50%of the syllabus will be completed. This shall be consolidated during the 8th week of the semester. Beyond 8thweek, making changes in C1 is not permitted.

4.2.2 The second component (C2), of assessment is for 15 marks. This will be based ontest/ assignment/seminar/quiz/group discussions etc.,The continuous assessment and scores of second half ofthe semester will be consolidated during the 16thweek of the semester. During thesecond half of the semester the remaining units in the course will be completed.

4.2.3 The outline for continuous assessment activities for Component-I (C1) and Component-II (C2) will be proposed by the teacher(s) concerned before thecommencement of the semester and will be discussed and decided in the Departmental Council. The students should be informed about themodalities well in advance. The evaluated courses/assignments duringcomponent I (C1) and component II (C2) of assessment are immediatelyreturned to the candidates after obtaining acknowledgement in the registermaintained by the concern teacher for this purpose.

4.2.4 During the 18t -20th week of the semester, a semester-end examination of 3 hoursduration shall be conducted for each course. This forms the third/final component of assessment (C3) and the maximum marks for the final component will be 70.

Setting question papers and evaluation of answer scripts:

XXI. Question papers in two sets shall be set by the internal examiner and one set by external examiner for a course. Whenever there are no sufficient internal examiners, The Chairman, BoE shall get the question papers set by external examiners.

Whenever there are no external examiners, The Chairman, BoE shall get the question papers set by internal examiner.

XXII. The Board of Examiners shall scrutinize and approve the question papers and scheme of evaluation.

XXIII. (i) There shall be single evaluation for all theory papers by internal examiner and 25% of the total scripts will be reviewed by an external examiner.

(ii) The average of first valuation and the review evaluation will be considered as the final marks of the candidate.

(iii) If there is difference of marks in maiden and reviewed evaluation is greater than 15 marks then the script will go for third evaluation by the external examiner and marks awarded in the third evaluation will be final.

(iv) The examination for Practical work/ Field work/Project work will be conducted jointly by one internal and one external examiner.

(v) If a course is fully of (L=0): T: (P=0) type, then the examination for C3 Component will be as decided by the BOS concerned.

XXIV. Challenge Evaluation

A student who desires to apply for challenge evaluation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10 days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Controller of Examinations within 15 days after the announcement of the results. This challenge evaluation is only for C3 component.

The answer scripts, for which challenge evaluation is sought for, shall be sent to external examiner. The marks awarded in the challenge evaluation will be final.

4.2.5 In case of a course with only practical component a practical examination will be conducted with two examiners (one Internal and one external)

A candidate will be assessed on the basis of

a) Knowledge of relevant processes

b) Skills and operations involved

c) Results / products including calculation and reporting.

If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the Departmental council.

4.2.6 If **X** is the marks scored by the candidate out of 70 in C3 in theory examination, if **Y** is the marks scored by the candidate out of 70 in C3 in Practical examination,and if **Z** is the marks scored by the candidate out of 70 in C3 for a course of(L=0):T:(P=0)type that is entirely tutorial based course, then the final marks (M) inC3 is decided as per the following table.

L.T.P distribution	Formula to compute Mark (M) in C3
L:T:P	$\frac{[(L+T)*X]+[(T+P)*Y]}{L+2T+P}$
L:(T=0):P	$\frac{(L*X)+(P*Y)}{L+P}$
L:T:(P=0)	X
L:(T=0):(P=0)	X
(L=0):T :P	Y
(L=0): (T=0):P	Y
(L=0): T:(P=0)	Z

4.2.7 The details of continuous assessment are summarized in the following table:

Component	Syllabus in a Course	Weightage	Period of Continuous Assessment
C1	First 50% (2 units of total Units)	15%	First half of the semester To be consolidated by 8th week
C2	Remaining 50% (Remaining units of the course)	15%	Second half of the semester. To be consolidated by 16th week
C3	Semester-end examination (All units of the course)	70%	To be completed during 18th-20th Week.

4.2.8 A candidate's performance from all 3 components will be in terms of scores, andthe sum of all three scores will be for a maximum of 100 marks (15 +15 + 70).

4.2.9 **Finally, awarding the grades should be completed latest by 24th week ofthe semester**.

4.3 **Minor/ Major Project Evaluation**

A student in the fourth semester shall register for a Project Work which carries 4 credits. Work load for Project Work tutorial class is 1 hour per batch of 4 students per week for the teacher. The student shall do field work and library work in the remaining 3 hours per week. Continuous assessment criteria for major project work include:

Component-I(C 1): Periodic Progress and Progress Reports – 15 Marks

Component- II (C 2): Results of Work and Draft Report – 15 Marks

Component-III (C3): Final Viva-voce and Project Report Evaluation- 70 Marks. (The Project Report evaluation is for 50 Marks and the Viva –Voce examination is for 20 Marks.)

4.4 In case a candidate secures less than 30% in C1and C2 put together in a course, thecandidate is said to have DROPPED that course, and such a candidate isnot allowed to appear for C3 in that course.

In case a candidate's class attendance in a course is less than 75%, the candidate is said to have DROPPED that course, and such acandidate is not allowed to appear for C3 in that course.

Teachers offering the courses will place the above details in the DepartmentCouncil meeting during the last week of the semester, before the commencementof C3, and subsequently a notification pertaining to the above will be brought outby the Chairman of the Department before the commencement of C3 examination.

A copy of this notification shall also be sent to the office of the Director & Controller of Examinations.

4.5 In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUPoption.

In case a candidate secures more than or equal to 30% in C3, but his/her grade(G) = 4, as per section 4.9 below, then he/she may be declared to have beenconditionally successful in this course, provided such a benefit of conditionalclearance based on G=4 shall not be availed for more than 8 credits for the entireprogramme of Master's Degree of two years.

In case a candidate secures less than 30% in C3, he/she may chooseDROP/MAKE-UP option.

The candidate has to exercise his/her option to DROP immediately within 10 daysfrom the date of notification of results.

A MAKE UP examination for C3 shall be conducted in all the semesters. Candidates can register for the MAKE UP examination within 10 days from the date of notification of results. The MAKE UP examination will be conducted within one month of the notification of the results.

If a candidate is still unsuccessful, A MAKE UP Examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with next regular even semester examinations;

however, not exceeding double the duration norm in one stretch from the date of joining the course

4.6 A candidate has to re-register for the DROPPED course when the course isoffered again by the department if it is a hard core course. The candidate maychoose the same or an alternate core/elective in case the dropped course is softcore / elective course. A candidate who is said to have DROPPED project workhas to re-register for the same subsequently within the stipulated period. **Thedetails of any dropped course will not appear in the grade card.**

4.7 The tentative / provisional grade card will be issued by the Controller of Examinations at the end of every semester indicating the courses completed successfully. Thisstatement will not contain the list of DROPPED courses.

4.8 Upon successful completion of Bachelors Honors/ Masters Degree a final gradecard consisting of grades of all courses successfully completed by the candidatewill be issued by the Controller of Examinations.

4.9 The grade and the grade point earned by the candidate in the subject will be asgiven below.

Marks(M)	Grade	Grade Point (GP = V x G)
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

Here, **P** is the Percentage of marks (P=[(C1+C2)+M] secured by a candidate in acourse which is rounded to nearest integer. **V** is the credit value of course. **G** is the Grade and **GP** is the Grade Point

4.10 A candidate can withdraw any course within ten days from the date ofnotification of final results. Whenever a candidate withdraws a paper, he/she hasto register for the same course in case it is hard core course, the same course oran alternate course if it is soft core/open elective.

A DROPPED course is automatically considered as a course withdrawn.

4.11 Overall Cumulative Grade Point Average (CGPA) of a candidate after successfully completing the required number of credits (76) is given by:

CGPA = ΣGP / Total Number of Credits

5. Classification of Results

The Final Grade Point (FGP) to be awarded to the student is based on CGPAsecured by the candidate and is given as follows

CGPA	Numerical Index	Qualitative Index
4<= CGPA <5	5	Second Class
5<= CGPA <6	6	
6<= CGPA <7	7	First Class
7<= CGPA <8	8	
8<= CGPA <9	9	Distinction
9<= CGPA <10	10	

Overall Percentage = 10* CGPA or is said to be 50% in case CGPA<5

6. Medium of Instruction

The medium of instruction shall be English. However, a candidate will be permitted to write the examinations either in Englishor Kannada. This rule is not applicableto languages

7. Credits (Minimum) Matrix: A candidate has to earn a minimum of 80 credits, for successful completion of a Master Degree. The 80 credits shall be earned by the candidate by studying Hardcore, Soft core and Open Elective.

8. Attendance and Conduct:

Students SHALL NOT take up any employment/course, part time or full time during their study. Students found violating this rule shall be removed from the course. Minimum attendance of 75% of actual working hours in all the courses is required. A student who does not satisfy the requirements of attendance and conduct shall not be permitted to write examination.

In the case of a candidate who represents his institution/University/Karnataka State/Nation in Sports/NCC/NSS/Cultural or any official activities, shortage of attendance up to maximum of 15 days in a Semester per course may be condoned, based on the recommendation and prior permission of the Head of the Institution concerned.

The Head of the Department shall notify the list of all students who have less than 75% attendance in each course at the beginning of the 16thweek of the semester.A copy of the

same should be sent to the Controller of Examination of the college.

9. Provision for Appeal

If a candidate is not satisfied with the evaluation of C1 and C2 components, he / shecan approach the grievance cell with the written submission together with all facts,the assignments, and test papers etc., which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered torevise the marks if the case is genuine and is also empowered to levy penalty asprescribed by the college on the candidate if his/her submission is found to bebaseless and unduly motivated. This cell may recommend takingdisciplinary/corrective action on an evaluator if he/she found guilty. The decisiontaken by the grievance cell is final.

For every program there will be one grievance cell. The composition of the grievancecell is as follows.

1. The Controller of Examinations-ex-officio Chairman / Convener

2. One senior faculty member (other than those concerned with the evaluation of thecourse concerned) drawn from the department/discipline and/or from the sister departments/sister disciplines.

3. One senior faculty member / course expert drawn from outside the department.

10. Discipline

Every student is required to maintain discipline and decorum both inside and outside the campus in accordance with the instructions of the college and alsoaspertheinstructionsissuedbytheUniversityof Mysore/Government ofKarnataka/UGCfromtimetotimeregardingStudentConductRules.

Any act of indiscipline of a student is first to be considered by the Disciplinary committee of the college for necessary action. If the issue demands more serious consideration, the act of indiscipline will be reported to the concerned authority who will initiate appropriate action.

Concerned authority may take necessary actions depending upon the prima facie evidence.

Any other issue not envisaged above, shall be resolved by the competent authority of the autonomous college, which shall be final and binding.

DOS IN COMMERECE

CHOICE BASED CREDIT SYSTEM

(TO BE IMPLEMENTED FROM THE ACADEMIC YEAR 2019-2020)

MASTER OF COMMERCE

COURSE STRUCTURE AND SYLLABUS

MINIMUM CREDITS REQUIRED FOR M.Com DEGREE

I – IV Semesters	Hard Core Course		Soft Core Course		Open Elective Course		Total	
	Numbers	Credits	Numbers	Credits	Numbers	Credits	Numbers	Credits
	11	**44**	**8**	**32**	**1**	**4**	**20**	**80**

MINIMUM CREDITS TO BE REGISTERED BY A STUDENT IN A NORMAL PHASE TO SUCESSFULLY COMPLETE M.Com DEGREE IN FOUR SEMESTERS

Semesters	Hard Core Course		Soft Core Course		Open Elective Course		Total	
	Numbers	Credits	Numbers	Credits	Numbers	Credits	Numbers	Credits
I	4	16	1	4			5	20
II	3	12	1	4	1	4	5	20
III	2	8	3	12			5	20
IV	2	8	3	12			5	20
Total	**11**	**44**	**8**	**32**	**1**	**4**	**20**	**80**

FIRST SEMESTER – M.COM

Sl.No.	Title of the Course	Hard Core/ Soft Core/ Open Elective	Number of Credits			
			L	T	P	Total
HC01	Accounting Theory	HC	3	1	0	**4**
HC02	Corporate GovernanceAnd Business Ethics	HC	3	1	0	**4**
HC03	Financial Management	HC	3	1	0	**4**
HC04	Marketing Management	HC	3	1	0	**4**
SC01	Business Policy and Environment	SC	3	1	0	**4**
SC02	Statistics for Business Decisions	SC	3	1	0	**4**
SC03	Advanced Auditing	SC	3	1	0	**4**

SECOND SEMESTER – M.COM

Sl.No.	Title of the Course	Hard Core/ Soft Core/ Open Elective	Number of Credits			
			L	T	P	Total
HC05	Capital Market Instruments	HC	3	1	0	**4**
HC06	Human Resource Management	HC	3	1	0	**4**
HC07	Organizational Behavior	HC	3	1	0	**4**
SC04	Computer Applications in Commerce	SC	3	1	0	**4**
SC05	Strategic Management	SC	3	1	0	**4**
OE01	Stock Markets and Investment Decisions	OE	3	1	0	**4**

III SEMESTER – M.COM

Sl.No.	Title of the Course	Hard Core/ Soft Core/ Open Elective	Number of Credits			
			L	T	P	Total
HC08	Business Research Methods	HC	3	1	0	**4**
HC09	International Business	HC	3	1	0	**4**
SC06	Management of Social Enterprises	SC	3	1	0	**4**
SC07	Portfolio Management	SC	3	1	0	**4**
SC08	Entrepreneurship Development	SC	3	1	0	**4**
SC09	Elective Group A:Business Taxation Paper1:Goods And Services Tax And Customs Duty	SC	3	1	0	**4**
SC10	Elective Group B : Financial Accounting Paper 1: Contemporary Areas of Financial Accounting	SC	3	1	0	**4**
SC11	Elective Group C: Financial Management Paper1 : Strategic Financial Management	SC	3	1	0	**4**
SC12	Elective Group D:HumanResource Management Paper1:Strategic Management of Human Resources	SC	3	1	0	**4**
SC13	Elective Group E:Management Accounting Paper1:Marginal Costing and Decision Making	SC	3	1	0	**4**

IV SEMESTER – M.COM

Sl.No.	Title of the Course	Hard Core/ Soft Core/ Open Elective	Number of Credits			
			L	T	P	Total
HC10	International Accounting	HC	3	1	0	**4**
HC11	Operations Research	HC	3	1	0	**4**
SC14	Foreign Exchange Management	SC	3	1	0	**4**
SC15	International Financial Management	SC	3	1	0	**4**
SC16	Project Work	SC	3	1	0	**4**
SC17	Elective Group A:Business Taxation Paper 2:Corporate Tax Law and Planning	SC	3	1	0	**4**
SC18	Elective Group B: Financial Accounting Paper 2:International Financial ReportingStandards	SC	3	1	0	**4**
SC19	Elective Group C: Financial Management Paper 2: Financial Derivatives	SC	3	1	0	**4**
SC20	Elective Group D: Human Resource Management Paper 2: International Human Resource Management	SC	3	1	0	**4**
SC21	Elective Group E:Management Accounting Paper 2: Cost Management	SC	3	1	0	**4**

ELECTIVE GROUPS:

Any TWO groups from the available electives shall be selected by students at the commencement of the Semester. Once groups have been selected, no change in the selected groups will be allowed later. The department will announce at the end of the second semester, elective groups which will be offered during III and IV semesters depending on the availability of faculty members and the demand for electives.

MINOR PROJECT WORK:

A student in the fourth semester shall register for a project work which carries 4 credits. Workload for project work and tutorial class is 1 hour per batch of 4 students per week for the teacher. The students shall do field work and library work in the remaining 3 hours per week. Continuous assessment criteria for project work include:

Component-I (C-1): Periodic Progress and Progress Reports-15 Marks

Component-II (C-2): Results of Work and draft report-15 Marks

Component-III (C-3): Final Viva-voce and Project Report Evaluation-70 Marks.

The project Reports evaluation is for 50 Marks and the Viva-voce examination is for 20 Marks

M.COM SYLLABUS

1st SEMESTER

HC01: ACCOUNTING THEORY

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description

The course provides the coverage of the meaning of accounting theory, its types, approaches to formulate accounting theory; the IASB's conceptual framework; definition, recognition, measurement and disclosure of elements of financial statements; accounting regulation and policy in India.

2. Course Objectives

The goal of this course is to provide the knowledge of accounting theory based on conceptual framework of accounting theory and also the critical thinking skills necessary to analyze and interpret accounting related transactions in accordance with accounting theory, and the financial reports generated by the accounting system.

3. Pedagogy:

Course activities consist of lectures, case study analysis, group discussions, seminar presentation, assignment writing and tests. Reading and analysis of annual reports of companies will be the integral part of instruction.

4. Course Contents:

Module 1: An Introduction to Accounting Theory: Postulates, Principles and Concepts of accounting theory. Approaches to formulateAccountingtheory: Syntactical, Semantical and behavioral accounting theories. Proprietary, entity and other fund theories. Ind.AS Framework for the Preparation and Presentation of Financial Statements

Module 2: Recognition, Measurement and Disclosure of Elements of Financial Statements: Recognition and measurement principles and methods of incomes, expenses, assets and liabilities and their disclosure. Problems and case Analysis of annual reports.

Module 3: Accounting Regulations and Policies: Institutional framework for formulating and implementing accounting regulations in India- Ministry of Corporate Affairs - National Financial Regulatory Authority - Institute of Chartered Accountants of India - Reserve Bank of India - and Securities Exchange Board of India - Accounting policies and

practices for Government - Profit and for Non Profit Organization's - Analysis of regulations and annual reports.

Module 4:Disclosure of accounting information: Social accounting – Human Resource Accounting – Environmental Accounting – Inflation accounting (concepts only):

References:

1. Anthony R.N., D.F. Hawkins and K.A. Merchant, Accounting: Text and Cases, McGraw Hill, 1999.
2. Richard G. Schroeder, Myrtle W. Clark and Jack M. Cathey, Financial Accounting Theory and Analysis: Cases, John Wiley and Sons, 2005.
3. Ahmed RiahiBelkaoui, Accounting Theory, Quorm Books, 2000.
4. JawaharLal, Accounting Theory and Practice, Himalaya Publishing House, 2008.
5. L.S. Porwal, Accounting Theory, TMH, 2000.
6. Thomas R.Dyckman, Charles J Davis, Roland E.Dukes, Intermidate Accounting, Irwin McGraw-Hill.
7. Eldon S. Hendriksen, Accounting Theory.
8. Charles Hoffman and LivApneseth Watson, XBRL for Dummies, Wiley Publishing Inc.
9. www.iasb.org.
10. www.icai.org.
11. www.mca.gov.in

HC02: CORPORATE GOVERNANCE AND BUSINESS ETHICS

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description:

The course provides coverage of concept of corporate governance, ethics, Corporate Social Responsibility and corporate governance in India and reforming of BOD and different Committees.

2. Course Objectives:

This subject aims to:

a) Enable the student to understand the concept of corporate governance and help students to know about corporate ethics and cultural influences;

b) Impart knowledge of corporate social responsibility and accountability; and

c) Give information about the corporate governance reforming committee reports in India.

3. Pedagogy:

The subject matter will be presented through lecture, class discussion, student presentation, Guest lectures and laboratory experiences.

4. Course Contents:

Module 1: Concept of Corporate Governance: Its importance - Principles of corporate governance - OECD Principles of corporate governance, Theories of corporate governance - Agency theory and stewardship theory - Models of corporate governance around the world - Need for good corporate governance - Evolution of Corporate Governance in India

Module 2: Corporate Management and Functions of Board Committees: Management vs. Governance - internal constituents of the corporate governance - key managerial personnel (KMP); chairman - qualities of a chairman – powers - responsibilities and duties of a chairman - chief executive officer (CEO) - role and responsibilities of the CEO - separation of roles of chairman and CEO - CFO – manager - company secretary – auditor - **Statutory committees ofboard-** audit committee, remuneration committee - nomination committee - compliance **committee -** shareholders grievance committee - investor's relation committee - investment committee - risk management committee - other committees.

Module 3:Regulatory framework of corporate governance: Corporate Governance committees - Cadbury Committee on corporate governance, 1992 - Sarbanes-Oxley Act, 2002 - Kumar Mangalam Birla Committee, 1999 - Naresh Chandra Committee Report, 2002 - Narayana Murthy committee Report, 2003, Dr. J. J. Irani Committee Report on Company Law, 2005 (**Only highlights of committee reports**) - SEBI guidelines and

clause 49 - reforms in the Companies Act; whistleblowing - whistleblower policy - Case studies.

Module 4: Business Ethics and Corporate Social Responsibilities: Concept – Importance - Principles of Business ethics - Arguments for and against business ethics - benefits of corporate ethics - techniques to improve ethical conduct of business - Ethics in functional areas of business-marketing - HRM - Accounting and auditing - Finance etc., **Corporate Social Responsibility**:Meaning - CSR models - corporate social challenges - corporate accountability - business and ecology - Sustainability Reporting - Case analysis.

References:

1. Business ethics by L.P. Hartman, Tata McGrawhill.
2. Business ethics by W.H.Shaw-(Thomson) 7
3. Corporate management and Accountability by L.C. Gupta (McMillan Institute for FM and Research, Chennai-1974)
4. Strategic Management by Hill, Ireland and Horkisson (Thomson)
5. Business and society by Keith Davis (McGraw Hill)
6. Corporate Governance by Kenneth Kim, John R. Nofsinger, Derek J Mohr, 2010 3/E, Prentice Hall

HC03: FINANCIAL MANAGEMENT

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description:

Financial management making assumes greater importance in maximizing value of an organization. This course is designed to focus on the analysis of three crucial long-term financial decisions- (1) Cash flow measurement, (2) Capital budgeting, (3) Cost of capital and, (4) Capital Structure. Risk analysis of capital budgeting decision is added as a special top

2. Course Objectives:

To equip students with necessary skills to evaluate capital projects with a focus on advanced capital budgeting techniques like MIRR (Modified IRR) and selection of projects under conditions of risk and uncertainty. To enable students analyze the leverage and dividend decisions based on theoretical and practical framework.

3. Pedagogy:

Students to work out detailed case studies involving the application of various criteria for project selection including risk analysis of capital projects. Analysis of leverage and dividend polices should be based on a sample of leading corporate organizations such as SENSEX companies, followed by seminar presentations and group discussions.

4. Course Contents:

Module 1: Capital Budgeting: Importance – Challenges dependence and independence of cash flows in evaluating projects - Measures of risk and returns - NCF estimation DCF Techniques NPV vs. IRR Conflicts - Fisher's rate of intersection - Multiple IRRs – MIRR - Capital Rationing

Module 2: Risk Analysis in Capital Budgeting: Inflation in capital budgeting - real vs. nominal discount rates. Approaches to risk absorption - Expected Net Present Value (ENPV) - Payback method - Risk-Adjusted Discount rate - Use of Normal Distributions - Sensitivity analysis - Measurement of Project Risk- Risk analysis of Project Portfolios

Module 3: **Cost of Capital**: Long-term financing, Public issue of debt, Preferred stock and Common stock, Term loans - Cost of equity – Cost of preferred capital - Cost of debt- Cost of retained earnings – WACC- Marginal cost of capital - The CAPM approach - Adjusting WACC for risk.

Module 4: **Capital Structures Theories**: Traditional view vs MM hypothesis, MM position I &II - Capital structure designing in practice – EBIT- EPS analysis - the pecking order theory - Factors impacting leverage decision. Contemporary issues and challenges in Financial Management.

References:

1. Financial Management and Policy: Van Horn; Prentice Hall of India.
2. Fundamentals of Financial Management: Brigaham& Houston, Thomson Learning, Bombay.
3. Principles of Corporate Finance: Richard Brealey and Stewart Myers, Tata McGraw Hill, 2000.
4. Financial Management and Policy: Text and Cases: V K Bhalla, Annual Publishers, 2002.
5. Financial Management: Chandra, Prasanna; TMH, New Delhi.
6. Capital Budgeting: Dr. G. Kotreshwar, Chandana Publications (2014), Mysore

C04: MARKETING MANAGEMENT

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Descriptions:

This course provides the coverage of concept of marketing, marketing concepts, marketing planning, market segmentation, online marketing etc.

2. Course Objective:

The objective of this course is to provide the student the knowledge about marketing and its significance and managing them in organizations.

3. Pedagogy:

Teaching method comprises of lecture sessions and tutorials. Lecture sessions focus on providing conceptual understanding and analytical setting for select aspects of the course contents.

4. Course Contents

Module 1: Marketing Concepts and Tools: Meaning and definition of marketing –scope of marketing-core marketing concepts –evaluation of marketing concepts and its stages – objectives of marketing – building customer satisfaction, value and retention. Understanding the value philosophy -direct marketing vis-à-vis on-line marketing – advantages and dis-advantages of direct marketing and online marketing -Major channels of Direct Marketing – Marketing in 21st century – e-commerce

Module 2: Scanning the Marketing Environment: Analysis of needs and trends in macro-environment –classification of macro environment- classification of macro environmental factors. Global Marketing Environment and Global Marketing Economy - Marketing environment of India - Marketing Intelligence system - Marketing Research system.

Module 3: Market-oriented Strategic Planning - Corporate and division strategic planning – business strategic planning - Price or differentiation oriented strategies - Stages of New product development

Module 4: Developing Marketing Strategies - Developing and communicating a positioning strategy - differentiation tools, product life cycle marketing strategies - designing competitive strategies - Positioning the product - Product line decisions - brand decisions - pricing decisions - promotion decisions and channel decisions

References:

1. Philip Kotler, Marketing Management, PHI , New Delhi.
2. RajanSaxena, Marketing Management, TMH , New Delhi.
3. Stanton, Fundamental s of Marketing, TMH, New Delhi.
4. Gandhi, Marketing: A Managerial introduction, TMH, New Delhi,
5. Marketing: Paul Baines, Chris Fill and Kelly Page, Oxford University Press, 2nd Edition, 2011.

SC01: BUSINESS POCILY AND ENVIRONMENT

Total Credits: 4 Credit Pattern: 3:1:0 No of hours:5 per week

1. Course Description:

This course provides the coverage of business as a social system, internal and external environment, business ethics, social responsibility and business policy.

2. Course objectives:

The objective of this course is to provide the student the knowledge about human resources, their significance and managing them in organizations.

3. Pedagogy:

Teaching method comprises of lecture sessions and tutorials. Lecture sessions focus on providing conceptual understanding and analytical setting for select aspects of the course content.

4. Course Contents:

Module 1: Introduction: Business in a social system; Concept and Nature and significance of business environment - Need to study business environment - Elements of Business Environment- internal environment and external environment- Economic-political-socio-cultural - technological environment; Environmental analysis – Techniques - Government - Business Interface - Changing Dimensions of Indian Business – Case studies

Module 2: Legal Aspect of Business:

Law relating to Intellectual Property -Concept and development of intellectual property law in India; patents, trademarks and copyrights; Competition Act, 2002 - Consumer protection in India- Consumer Protection Act, 2018 - rights of consumers - consumer disputes redressal agencies - Law relating to prevention and control of air pollution and water pollution - Environment (Protection) Act, 1986 - national green tribunal – case studies

Module 3: Business Policy: Importance of business policy - essentials of business policy classification or business policy - Production policy, Product Liability clause - personnel policy - Financial policy - Marketing Policy - Case studies.

Module 4: Globalization and WTO; Make in India policy - objectives and features - Financial inclusion policy - Business incubators - meaning definition – types - services of incubators - stages of incubation - Sun-rise sectors of India Economy- Challenges of Indian economy - Recent trends-Anti globalization wave – Reasons - US protectionism policies – Brexit – Globalised business order and emerging business policies - case studies

References:

1. Awasthappa, K. (2014). Essentials of Business environment. New Delhi: Himalaya Publishing House.
2. Cherunilam, F. (2014). Business Environment: Text and Cases. New Delhi: Himalaya Publishing House.
3. Ghosh, P.K. &Kapoor, G.K. (2000). Business Policy and Environment. New Delhi: S. Chand and Sons.
4. Singh, S. (2013). Environmental Policy in India. New Delhi: IIPA.
5. RudarDutt and Sundaram (2005).Indian Economy. New Delhi: S. Chand and Sons.
6. Dasgupta, A. &Sengupta. (1998). Government & Business. New Delhi: Allied Book Agency.
7. Misra, S.K. and Puri, V.K. (2004). Economic Environment of Business. New Delhi: Himalaya Publishing House.
8. Bare Act on Competition Law
9. Bare Act on Consumer Protection Law
10. Bare Act on Pollution Control and Environmental Protection

SC02: STATISTICS FOR BUSINESS DECISIONS

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description:

The course comprises of probability theories, sampling techniques, time series analysis and multivariate analysis.

2. Course Objectives:

The aim of this course is to enable a student to have knowledge about application of probability theory and sampling in different areas of commerce, time series analysis and application of multiple correlation and regression analysis.

3. Pedagogy:

Class room teaching of basic statistical models shall be followed by solving problems involving business applications. Assigned problems are to be worked on an individual basis, followed by group discussion of case problems.

4. Course Contents:

Module 1: Probability Theory and Theoretical Distributions: Meaning – terminology - types and rules - Random variables and use of expected value in decision making -

Binomial, Poisson and Normal probability distributions and their characteristics and applications in business decisions case studies

Module 2: Sampling: Meaning of sample and population - Probability and non-probability of sampling - Use of random digits to choose random samples - Sampling from normal and non – normal populations - The Central limit theorem - Use of sampling in business decisions - Testing of hypothesis Small and Large sample Tests -case studies.

Module 3: Time Series Analysis: Variations in time series – Cyclical - seasonal and irregular Variations; Trend analysis - Application of time series analysis in forecasting - Measure of Trend - Method of least squares and Measure of seasonal Indices - case studies

Module 4: Multivariate Analysis: Partial Correlation - Multiple Correlation and Regression correlation analysis - Analysis of Variance - Application of multivariate analysis in business decisions case studies

References:

1. Statistics for Business and Economics: Wonnacott and Wonnacott Wiley Publications

2. Econometrics: Wonnacott and Wonnacott Wiley Publications

3. Statistics: Sanchetti and Kapoor

4. Statistical Analysis for Decision Makin: Morris Hamber

5. Statistics for Management: Richard Livin and David Robin

6. Statistical Methods: S.P. Gupta

SC03: ADVANCED AUDITING

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description:

This paper is to educate the present auditing practices, conceptual understanding, different terminologies, International Auditing practices, comparison with Indian Auditing practices. To know leading & Top Auditing Firms and its importance, to learn Auditing and Digitalization, Indian Standards on Auditing (SA), major scams in India and its impact on economy of the Country.

2. Course Objectives:

After completion of the course the students should capable with:

a) To understand the conceptual ideology of auditing and its practices.

b) To know the importance of auditing with different accounting practices.

c) To compare the national auditing practices with international auditing principles.

d) To have a detailed knowledge on Auditing Standards and its uses.

e) To evaluate impact of auditing on the Indian & global economy and its contribution for the economic development.

3. Pedagogy:

The course content is covered class room lecture, students' interaction/seminar, case discussion, major scams and work out the practical insight of auditing issues, challenges as an auditor and also visiting companies for practical exposure. Practical Works: Auditing, Standards, Practice Manuals, Leading and pending cases on auditing issues, on-line auditing methods, proper scrutiny and verification of accounting for best auditing practices.

4. Course Contents:

Module 1: Introduction - Objectives of Auditing, Different Types of Auditing - Auditor - Qualification, Qualities, Rights and Duties, Ethics in auditing, Audit of Auditors, Rotation of Auditors - Computerized Environment - Auditing and Digitalization, Audit Programme - Internal Check and Internal Control - Government Accounting - Professional Accounting - Auditing Boards - GAAS, CAG, PCAOB case studies

Module 2: Auditing Standards and Audit Procedures

Auditing Standards - Generally Accepted Auditing Standards - Introductory Matters SA 100-199 - General Principles and Responsibilities SA 200-299 - General Activities SA 1200 - Auditor Communications SA 260 - Quality Control for an Audit of Financial Statements - Statements SA 220 and Guidance Notes - Case studies

Audit Procedures - Audit Planning and Risk Assessment SA 300-499 - Auditing Internal Control Over Financial Reporting - Audit Procedures in Response to Risks – Nature – Timing - and Extent - Auditor's Responsibilities Regarding Supplemental and Other Information - Concluding Audit Procedures, Post-Audit Matters - Case Studies

Module-3: Audit Reports - Auditor Reporting SA 700-799 - Reporting on Audits of Financial Statements - Other Reporting Topics - Matters Relating to Filings Under Federal Securities Laws - Other Matters Associated with Audits (SA 6101, SA 6105, SA 6110, SA 6115) - Standards on Quality Control (SQCs) - Standards on Auditing (SAs) - Audit Committee and Corporate Governance - Audit of Limited Companies Schedule III of Companies Act 2013 - Environmental Auditing, Audit Data Analytics - Case Studies - Leading & Top Auditing Firms -Case studies.

Module: 4: Audit Regulation and Laws - CAG Recommendations, Hierarchy of Audit regulations in India, Investigation, Forensic Audit - Peer and Quality Review - Auditing Software – Winman – SAP - Audit related Penalties - Imprisonment and Prosecution - Rethinking of Audit - International Auditing Practices - Comparison with Indian Auditing practices - Indian Standards on Auditing (SA) - Major Scams in India and its Impact on

Economy of the Country - Case Studies - Kingston Cotton Mill Company 1896 – Sahara and SubrathaRaiCaseStudy.

References:

1. A Hand Book of Practical Auditing – by B.N. Tandon, S. Sundharabahu& S Sudharsnam, Publisher: S.Chand Publishing, New Delhi.
2. Advanced Auditing and Professional Ethics – ICAI, https//www.icai.org/Auditing Standard
3. Internal Audit Practice from A to Z, Patrick OnwuraNzechukwu, Book Store, https://bookstore.theiia.org/
4. Advanced Auditing & Professional Ethics, By CA PanakjGarg,
5. Simplified Approach to Advanced Auditing and Professional Ethics by VikasOswal
6. https://www.cag.gov.in/content/audit-regulations
7. https://www.aicpa.org/research/standards/auditattest/sas.html
8. https://www.investopedia.com/terms/g/gaas.asp
9. https://www.dummies.com/business/accounting/auditing/generally-accepted-auditing-standards/

2nd SEMESTER

HC05: CAPITAL MARKET INSTRUMENTS

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description:

Capital markets in recent times are flooded with new and innovative instruments enhancing vibrancy and volume of capital markets. Every advanced programme in commerce should consist of a course in analysis and evaluation of various instruments traded in capital markets today.

2. Course Objectives:

The course intended to equip students an opportunity to understand:

a) Comprehend the role of capital markets

b) Evaluate the various capital markets instruments like Stock, bonds, etc.

c) The basics of new instruments like futures and options.

3. Pedagogy:

Teaching method comprises of lecture sessions and tutorials. Lecture sessions focus on providing conceptual understanding and analytical setting for select aspects of the course content. Tutorials include writing of assignments, Case study discussions, and seminar presentations.

4. Course Contents:

Module 1:Introduction to Capital Market - Basics ofIndian Financial Markets-Classification-Money Market - Capital Market - Capital Market Instruments- Innovations in capital markets, Unit Linked Insurance Plans, Contemporary issues and challenges in Fixed Income security market, case studies.

Module 2: Valuations – Valuation of Stocks - Dividends Growth Model - Variable growth model – Bonds and Debentures – Types - Valuation of Bonds and Debentures - Convertible Debentures – ADRs - GDRs – Basic features – Benefits to issuing Company – ETFs - Meaning and Importance.

Module 3: Derivatives – Origin - growth and Types of Derivatives – Benefits of Derivatives Market – Forwards and Futures – Basic Features – Classification of Futures-Role of Futures Market – Pricing of Forwards and Futures-Margins – Hedging Using Futures Contract

Module 4: Options and Swaps - Types of Options Contracts – Options Pricing - Options payoff Diagrams - Options Market in India – Swaps – Meaning – Currency Swaps – Interest Rate Swaps

References:-

1. Capital Market Instruments – By G.Kotreshwar, Chandana Publications (2014), Mysore

2. Financial Derivatives – By G.Kotreshwar, Chandana Publications (2014), Mysore

3. Financial Derivatives – By Gupta (PHI)

4. Introduction to Futures and Options Markets – By John Hull (PHI)

5. Derivatives – By D.A.Dubofsky and T.W.Miller (Oxford)

6. Futures and Options – By Edwards and Ma (McGraw Hill)

HC06: HUMAN RESOURCE MANAGEMENT

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours: 5 per week**

1. Course Descriptions:

This course provides the coverage of concept of HRM, Human resources planning and procurement, human resource development and compensational and rewards system.

2. Course Objective:

The objective of this course is to provide the student the knowledge about human resources, their significance and managing them in organizations.

3. Pedagogy:

Teaching method comprises of lecture sessions and tutorials. Lecture sessions focus on providing conceptual understanding and analytical setting for select aspects of the course content.

4. Course Contents:

Module 1: Introduction: Human resource management – concepts - significance – objectives – scope – functions – changing role of Human Resource Manager - Need for studying HRM – Emerging trends in HRM - Human Resource Development (HRD) concept – scope – objectives - HRD techniques.

Module 2: Human Resources Planning and Procurement; Human resource planning - Importance – objectives - factors affecting HRP – requisites for successful HRP- Job analysis – methods - Purposes – Job description – Job specification - Job evaluation – Process and methods of Job evaluation - Job design approaches and process of Job design - factors affecting Job design, Recruitment – source of recruitment – factors governing recruitments, and recruitment process. Selection - process – interview

Module 3: Human Resource Development: Meaning-concepts of HRD - Objectives of training-organization of training programme – methods - advantages and limitations of

training and development- Evaluation of training programme – HRD for total quality management - Transfer policy - Promotion policy and Transfer. Demotion and Discipline-consequences of indiscipline – disciplinary Procedure - Career Planning and Development. Case studies

Module 4: Compensation/Rewards System: Significance of reward system in business organization. Employee motivation; Compensation system in practice - systems of promoting -factors determining employee compensation and rewards-dearness allowance - employee benefits-bonus - laws on wages, bonus and social Security - managerial compensation. Performance Appraisal: concepts - objectives philosophy and process of performance appraisal system - 360 Degree performance appraisal system. E – HRM, Big data and HR Analytics, Artificial Intelligence Core and HRM Practices.HR Practices in Sunrise sector. Case studies.

References:

1. Human Resource Management: Strategies and Action -Armstrong

2. Human Resource Management -Dr. Ashwathappa

3. Personnel and Human Resource Management -D.A. Deonz and F.P. Robins

4. Personnel Management - Edwin Phillip

5. Human Resources Management—L.M. Prasa

HC07: ORGANISATIONAL BEHAVIOUR

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description:

This course provides the coverage of scope of OB, different contributing discipline to OB, foundational of individual behavior, motivational theories and foundations of group behavior.

2. Course Objectives:

The objective of this course is to provide the knowledge about organizations, their constitution and the behavior of people in organizations.

3. Pedagogy:

Teaching method comprises of lecture sessions and tutorials. Lecture sessions focus on providing conceptual understanding and analytical setting for select aspects of the course content.

4. Course Contents:

Module1: Introduction: Meaning-Definitions and scope of organizational behavior – Fundamental Concepts of OB - Key elements of OB- people, Organizational structure, technology and environment; Historical development of Organizational Behavior-Model of Organizational Behavior. Contributing Disciplines to OB-Psychology-Sociology-social psychology- Anthropology- Political science; OB and Management-Comparative roles in organization;- Organizational structure Designs and Culture -Formal and Informal organization - Case studies.

Module 2: Foundations of Individual Behavior: Personal factors, Psychological factors - Organizational factors, Environmental factors - Personality - Personality determinants-personality traits – Authoritarianism - Locus of Control – Machiavellianism - Introversion and Extroversion - Achievement Orientation - Self- Esteem - Risk-taking, Self-Monitoring.-Theories of Personality; Learning – Theories of learning - Perception-meaning and definition, factors influencing perception – Attitudes - formation of attitudes, changing attitudes, attitudes and Job satisfaction – Values - Importance of Values - Sources of Values - Case studies.

Module 3: Motivation: The concept of Motivation - Early Theories of Motivation - Hierarchy of Needs theory - theory X and Theory Y; Hygiene theory; contemporary theories of motivation-ERG Theory-three needs theory - cognitive evaluation theory and others - Work stress - sources of stress - Stress Management – Case studies.

Module 4: Foundations of Group Behavior: Defining and classifying groups-group process-group tasks-cohesive groups - group dynamics -Leadership-nature and importance-functions styles - Communication: Nature and Types - Effective communication - Roles of Formal and Informal communication - Conflict management - The process of conflict - Types of conflict - Functional and Dysfunctional conflict -Resolution of conflict - Case studies.

References:

1. OrganisationalBehaviour - Fred Luthans

2. Organisation Theory and Behaviour - V S P Rao and PS Narayana

3. OrganisationalBehaviour – K. Aswathappa

4. Human Behaviour at Work – Keith Devis

5. Organisational Theory and Behaviour- R. A. Sharma

6. Organisational Psychology – Schein, E.H.

SC04: COMPUTER APPLICATIONS IN COMMERCE

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description:

This course is designed to provide knowledge and skills in computer applications in commerce. It focuses on computer applications in Accounting, Finance, Taxation-GST, Statistics and Operations Research.

2. Course Objectives:

The objective of the course is to enable to students to understand online trading, online banking, and online submission of income tax and indirect tax returns. Tally and XBRL applications in Accounting, SPSS applications in statistical analysis

3. Pedagogy:

Lectures, assignments, presentation, case analysis, online demonstrations and computer practical sessions

3. Course Contents:

Module 1: Computer Applications in Financial Accounting: Features of Tally ERP.9. Setting up a new company and creating Masters in Tally ERP9 - Data Management - security levels and controls - Technological advantages of Tally.ERP9 - Role of XBRL in Business Reporting - Fundamentals of XBRL. Features of XBRL software **- Evolution of extensible Business Reporting Language (XBRL) -** Commercial & Industrial Taxonomy of MCA - Instance Document **- Filling of Financial statements using XBRL Software -** Analysis of XBRL financial statements

Module 2: Computer Applications in Financial Management and Taxation: Using MS Excel to solve financial management problems- Present Value - Future Value - NPV etc - Online Trading of Securities - Online Banking - Filing of Online Application for PAN and TAN - Online submission of Income Tax Returns – Form 49 A From 49 AA Form 49 B, and TDS Return - E-filing of indirect taxes return – GST.

Module 3: Computer Applications in Statistical Analysis: Features of SPSS - Creating files and data entry in SPSS - Preparation of frequency tables and graphs - Computation and interpretation of Mean - Standard Deviation - Standard Error -Simple and multiple correlation – regression - Analysis of variance - t-Test - Chi-Square Test.

Module 4: Computer Applications in Operations Research: Mathematical formulation of Linear Programming and Integer Programming problems and solve them using computer software

Computer Lab Practicals:

1. Computation of Present Value, Future Value, Net Present Value using MS Excel.

2. Filing of online application for PAN, TAN.

3. Online submission of Income Tax Returns and Indirect Tax Returns.

4. E-filing of indirect taxes return – GST.

5. Online Banking

6. Online Trading.

7. Completing accounting cycle using Tally ERP 9.

8. Online submission of Financial Statements using XBRL

9. Computation of descriptive statistics, correlation, regression using SPSS.

10. Solving Linear Programming and Integer Programming problems.

References:

1. Tally.ERP 9 Essentials, 2009, Tally Solutions Pvt. Ltd.

2. Mastering Financial Modeling-Alastair Day.

3. www.xbrl.org.

4. www.iasb.org.

5. www.spss.org

6. www.rbi.org.

7. www.incometax.india.gov.in.

8. www. xbrl.icai.org.

9. www.mca.gov.in

10. www. icai.org.

11. www. bse.org. nse.org.sebi.org.

12. Goods and Services Tax –by Dr. H.C. Mehrotra, Prof. V.P. Agarwal, Dr. S.K. Batra, Sahitya Publications Agra.

SC05: STRATEGIC MANAGEMENT

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description:

This course provides the coverage of concept of strategic management, vision, mission and purpose of business definition, strategic analysis and choice strategic implementation and evaluation.

2. Course Objectives:

Apart from general management, strategic management is acquiring importance in the business due to the increased competition. Students of commerce will have to have the knowledge of Strategic Management. With this objective of this course is introduced to the students at postgraduate level.

3. Pedagogy:

Teaching method comprises of lecture sessions and tutorials. Lecture sessions focus on providing conceptual understanding and analytical setting for select aspects of the course content.

4. **Course Contents**:

Module 1: Strategic Management: An Introduction - Concept of strategic management – Characteristics of strategic management - Defining strategy - Strategy formulation - Stakeholders in business - Vision, mission and purpose - Business definition, objectives and goals – Environmental appraisal - Types of strategies - Guidelines for crafting successful business strategies - Tailoring strategy to fit specific industry, Strategy formulation in disruptive innovation, case studies.

Module 2: Strategic Analysis and Choice: Environmental Threat and Opportunity Profile(ETOP) - Organizational Capability Profile - Strategic Advantage Profile – Corporate Portfolio Analysis - SWOT Analysis - Synergy and Dysergy – GAP Analysis - Porter's Five Forces Model of competition – McKinsey's 7s Framework - GE 9 Cell Model – Distinctive competitiveness - Selection of matrix, Case Study.

Module 3: Strategy Implementation: Issues in implementation - Project implementation –Procedural implementation - Resource Allocation - Budgets - Organization Structure –Matching structure and strategy - Behavioural issues - Leadership style – Corporate culture - Values - Power - Social responsibilities – Ethics, Case Study.

Module 4: Strategy Evaluation: Importance - Symptoms of malfunctioning of strategy –Organization anarchies - Operations Control and Strategic Control - Measurement of performance - Analyzing variances - Role of organizational systems in evaluation,. New Business Models and strategies for Internet Economy - Shaping characteristics of Ecommerce environment -E-Commerce Business Model and Strategies –

Internet Strategies for Traditional Business - Key success factors in E-Commerce, Case Study.

References:

1. A concept of corporate planning-, RusselAckoff, Newyorkwiley
2. Business policy and strategic management- Tokyo, McGraw hill
3. Strategic Management-Text and Cases- V.S.P. Rao and V. Harikrishna
4. Strategic Management-AzarKazmi
5. Strategic Management-Francis Cherunillam
6. Strategic Management-Subba Rao
7. Strategic Planning Formulation of Corporate Strategy - Ramaswamy
8. Strategic Management, 12th Ed. - Concepts and Cases - Arthur A. Thompson Jr. And A.J.Strickland
9. Management Policy and Strategic Management (Concepts, Skills and Practices R.M.Shrivastava
10. Strategic Management – Pearce
11. Strategy & Business Landscape - PankajGhemawat

OE01: STOCK MARKETS AND INVESTEMENT DECISIONS

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description:

Stock markets are more popular today as they provide a wonderful opportunity to the general public to invest their savings. This course provides the coverage of fundamentals of stock markets, indices, instruments and trading in stocks and shares including DEMAT Account.

2. Course Objectives:

The course is designed to meet the expectations of non-commercial graduates and intended to help students to:

1. Comprehend the role of stock markets as an avenue for investments.
2. Understand the different types stock market instruments.
3. Competent the basics relating to trading in stocks.
4. Understand the fundamentals of indices such as SENSEX and NIFTY.

3. Pedagogy:

Teaching method comprises of lecture sessions and tutorials. Lecture sessions focus on providing conceptual understanding and analytical setting for select aspects of the course content. Tutorials include writing assignments and visits to stock exchanges.

4. Course Contents:

Module 1: Stock Markets: Meaning - History- Functions of Stock Exchange - Leading Stock Exchanges in India - NSE and BSE - Role of SEBI - Investor's Protection - Grievance Redressal

Module 2: Stock Market Instruments - Short Term and Long Term Instruments – Shares - Types of Shares – Debentures - Types of debentures - Bonds - Types of Bonds - Benefits of Investments in Stocks - Stock v/s Debenture - Case studies

Module 3: Trading in Stock Market: Trading Mechanism - PAN Card, Speculation- Types of Speculation - Advantages and Drawbacks of Speculation - DEMAT Account - Depository Services - NSDL - CSDL Brokers- Brokerage-Settlement Procedure - Case studies – **Investors** – Brokers - Registration of brokers - Functions of brokers - kinds of broker Brokerage - Clearing house - Case Study.

Module 4: Stock Market Indices and Risk Management: SENSEX – NIFTY - SENSEX S&P - CNX - MID CAP - SMALL CAP - Large CAP - Factors impacting on indices - Recent changes in the Stock Market Volatilities- Risk Management – Systematic and Unsystematic risk, Case studies

References:

1. Capital Markets- By Dr. S. Guruswamy, Mcgraw Hill Publications.
2. Capital Market and Investment Management- By Dr. M.S. Khan, S.M. Farisal, Laxmi Publications, first edition.
3. Capital Market Instruments- By Dr. G. Kotreshwar, Chandana Publications, Mysore.
4. Equity Shares, Preferred Shares and Stock Market Indices- By Sunil, Parameswaran, Mcgraw Hill Publications.

3rd SEMESTER

HC08: BUSINESS RESEARCH METHODS

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description:

This course provides the coverage of business research methods, ethical issues in business research methods, research process, data collection methods, designing of questionnaire, various statistical tools like univariate and bivariate analysis and report writing.

2. Course Objectives:

The course is envisaged to provide the student the knowledge and skill related to conduct of research related to business. This basic course familiarizes the student with the technicalities of executing a research assignment, in particular the applied research domain.

3. Pedagogy:

The lecture sessions focus on providing conceptual understanding and analytical setting for select aspects of the course content. This session focuses on student involved and student driven content study. Identified groups of students make presentations and interact with both the faculty and the other students. The aspects reinforced through lecture and tutorial is taken up for practical study. Here the students would undertake field exercises related to different aspects of the course contents.

4. Course Contents:

Module: 1 **Business Research**: Meaning – types - process of research- management problem - defining the research problem - formulating the research Hypothesis - developing the research proposals - research design formulation - sampling design - planning and collecting the data for research - data analysis and interpretation - Research Application in business decisions - Features of good research study-Ethics in research, Plagiarism, Digital Technologies and falsifications.

Background to Research: Developing research questions-Research paradigms-Contributions of research to theory and practice- Importance of scientific research in business decision making - Types of research and research process

Module: 2 **Types of Business Research Design**: Exploratory and Conclusive Research Design Exploratory Research: Meaning, purpose – methods - secondary resource analysis, comprehensive case methods, expert opinion survey, focus group discussions - Conclusive research Design - Descriptive Research – Meaning - Types-cross sectional studies and longitudinal studies - Experimental research design-Meaning and classification of experimental designs - Pre experimental design, Quasi - experimental design - True

experimental design, statistical experimental design - Observation Research – Meaning – Uses - Participation and Non-participation – Evaluation - Conducting an Observation study - Data collection.

Literature Review: Identifying - accessing and managing information and scholarly literature - Academic writing and referencing - Literature review development- Argumentation and synthesis

Module: 3 Measurement and Data Collection: Primary and Secondary data Primary data collection methods – Observations – survey - Interview and Questionnaire - Qualitative Techniques of data collection. Questionnaire design – Meaning - process of designing questionnaire - Secondary data –Sources- advantages and disadvantages Measurement and Scaling Techniques: Basic measurement scales-Nominal scale - Ordinal scale - Interval scale - Ratio scale. Attitude measurement scale - Likert's Scale - Semantic Differential Scale - Thurston scale - Multi-Dimensional Scale - Data Processing

Sampling: Concepts - Types of Sampling - Probability Sampling - simple random sampling, systematic sampling - stratified random sampling - cluster sampling -Non Probability Sampling - convenience sampling- Judgemental sampling - snowball sampling - quota sampling - Errors in sampling

Module: 4 Preparing the Data for Analysis: Editing, Coding, Classification, Tabulation, Validation Analysis and Interpretation. Errors in Hypothesis Parametric and Non Parametric Test: T-Test, Z-Test, F-Test, U-Test, K-W Test - Statistical Analysis: Bivarate Analysis Multivariate Analysis - ANOVA: One- Way and Two Way Classification. Technology in research.

Test of significance- Report writing and presentation of results: Importance of report writing, types of research report, report structure, guidelines for effective documentation.

References:

1. Business Research Methods, William G. Zikmund, The Dryden Press
2. Research for Development: A Practical Guide, Sophie Laws, VISTAAR Publications
3. Methodology in Social Research, ParthaNath Mukherjee, Sage Publications
4. Research Methodology –Concepts and Cases by SeepakChawla and NeenaSodhi, Vikas Publications.

HC09: INTERNATIONAL BUSINESS

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description:

This course provides the coverage of international marketing, international trade, international global sourcing, international business environment, multinational corporations and India in the global setting.

2. Course Objectives:

This specialization course on International Business is designed to equip the student with policy and practice skills related to international business. Upon completing this course, the student will be able to understand the intricacies of running business across the political territories. He / She would also get an insight in to the policy environment in India regarding the international business.

3. Pedagogy:

The course would be taught under LTP method. The lecture sessions are designed to be interactive with the student expected to come prepared with basic reading suggested before every session. The tutorial sessions are basically group exercises with each designated group handling a prescribed module for presentation and interaction, in a three-way interactive process. It basically involves preparing field reports and presenting them for plenary discussions.

4. Course Contents:

Module 1: Introduction: Nature of International Business-players in International Business- Approaches and need for international Business, International Trade Theories. International Marketing-Trends in International Trade - Reasons for Going International - Global Sourcing and Production Sharing-International Orientations Internationalization Stages and Orientations-Growing Economic Power of Developing Countries-International Business Decision - Case Studies.

Module 2: Regional Trade Blocks: Trading Environment-Commodity Agreements – Unilateral, Bilateral and multilateral stages of Economic integration, Castes - State Trading and Growing Intra-Regional Trade - Other Regional Groupings - GATT / WTO - The Uruguay Round Evaluation – UNCTAI – EFTA – LAFTA – EU – SAARC - World Bank - IMF and other trading blocks and common marketing for international business – case studies.

Module 3: Multinational Corporations: Definition -Organizational Structures - The Role of MNC's and Dominance of MNC's - India as a player in the International market place – its position and prospects - FDI & FII's in India - Code of Conduct - Multinationals in India - Case Studies.

Module 4: India in the global setting and globalization of Indian business: India an Emerging Market-India in the Global Trade- Liberalization and Integration with Global Economy - Foreign Trade Policy 2015-20 - Regulation and Promotion of Foreign Trade in India - Export promotion- Organizational set-up - incentives – EOUs - EPZs and SEZs - export houses and trading houses - an evaluation-One Borderone Road, - Case studies.

References:

1. WTO and Indian Economy: Chadha.G.K
2. International Business: New Trends: G.S.Batra&R.C.Dangwal
3. Global Marketing Strategies: Jean Pierre &H.DavidHennessay
4. International Marketing – SakOnkvisit and John J. Shaw
5. International Marketing – Philip Cateora and John Graham
6. International Business – By Roger Bonnet
7. International Business - Michael Zinkata
8. International Business - John d.Daniels
9. International Business – Richard M.Shaffer
10. Restless Continent – Michael WESley

SC06: MANAGEMENT OF SOCIAL ENTERPRISES

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5 per week**

1. Course Description & Objective:

The course is structured to make the students familiar with the emerging form businesses, often referred to as Social Enterprise or Social Business. The course has a twofold objective – that of invoking the academic interest on social enterprises and of motivating youth to embrace social entrepreneurship as a professional choice. The course is structured to give adequate lead both in academic and professional terms, so that the participants of the course will have clarity in terms of how they need to go ahead if they choose to opt for social entrepreneurship for long time engagement.

2. Pedagogy:

The course work is based on Lecture and Tutorial methods. Case analysis will be extensively used as part of imparting knowledge about the functioning of social enterprises. Students are also expected to visit some social enterprises and make case studies on issues related to their management.

3. Course Contents:

Module 1: Introduction: - Concept of Social Entrepreneurship- Need for social entrepreneurship in developing economies- difference between economic and social entrepreneurship - Distinct features of social enterprises - Importance of social enterprises, Evolution of Social Enterprises - Economic and Social Rationale - Theoretical Perspectives on Social Enterprises -Forms Of Social Enterprises - Factors determining selection of forms of registration - Social Enterprises in India

Module 2: Establishment: – Incorporation,Resource mobilization – challenges and strategies - Strategy formulation – combining the social agenda with business interest - Legal environment for social enterprises

Module 3: Human Resource Management: Leadership in social enterprises and profit enterprises – similarities and differences - Leaders as social change agents to address social issues in India – nature - role and issues of governance; The workforce – finding the right mix of professional competence and social concern - retention strategies - career development- HR practices in social enterprises.

Module 4: Operational Issues: Building the clientele base - Relations with Government and For-profit businesses - Appropriation of surplus - Management of Social Enterprises - Issues and Challenges - Issues of sustainability - expansion and diversification - Facilitating social change – case studies.

References:

1. Understanding Social Enterprise: Theory and Practice, Rory-Ridley Duff and Mike Bull, Sage 2011.
2. Thomas Lyons, Understanding Social Entrepreneurship, Taylor and Francis Group, 2011
3. Martin Clark, The Social Entrepreneur Revolution: Doing Good by Making Money, Making Money by Doing Good, Marshal Cavendish Publishers, 2009.
4. MuhammedYunus, Creating a World without Poverty: Social Businesses and the future of Capitalism, Public Affairs, New York, 2007.
5. Social Enterprise Knowledge Network, Effective Management of Social Enterprises, Harvard University, 2006.
6. Ethical Enterprise and Employment Network, Managing Social Enterprises – from startup to success, CRISIS, UK, 2007
7. Karl Birkholzer, The Role of Social Enterprise in Local Economic Development, EMES, 2009 7. Asian Development Bank, India Social Enterprise Landscape Report, ADB, 2012

SC07: PORTFOLIO MANAGEMENT

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

Portfolio analysis and management is a course in financial management. This includes portfolio investment analysis, risk analysis and optimal combinations of securities which lead to create effective return on investment.

2. Course objectives:

Candidates will be able to apply appropriate portfolio decisions and recommend relevant methods of evaluation techniques taking into account other factors affecting investment decisions.

3. Pedagogy:

Students must work out assigned individual topics, present seminars and participate in case studies or group discussions.

4. Course contents:

Module 1: Efficient Market Concept - Random walk, Levels of efficiency – Weak – semi - strong and strong - Techniques for measuring efficiency - Empirical tests – Behavioral Finance -Case Study.

Module 2: Fundamental and Technical Analysis- economic analysis - Industry analysis - Company analysis - Forecasting company earnings - Valuation of companies - Market indicators - Forecasting individual stock performance – Techniques - Types of charts - Dow Theory - Relative strength - Contrary opinion - Moving average - Conference index - Trading volume - Concept of depth - breadth and resilience of the market -Case Study.

Module 3: Portfolio Analysis – Theory and Practices – Risk Analysis – Types of Risks – Risk Management –Diversification of risk – Analysis of risk –Risk measurement - Markowitz risks return optimization - Capital Asset Pricing Model - Index models and Arbitrage pricing theory and multifactor models of risk and return- Case Study.

Module 4: Portfolio Performance Evaluation - Mutual funds - Geometric mean return – Sharpe - Treynor and Jensen's performance measures - Optimal portfolio selection – importance of computer data analysis of security analysis and portfolio analysis Case Study.

References:

1. Portfolio Analysis and Management – Ballad

2. Modern Portfolio Theory and Investment Analysis – Edwin J. Elton and Martin J.Grubor.

3. Security Analysis and Portfolio Management – Fisher and Gordon

4. Security Analysis and Portfolio Management – V. A. Avdhani

5. Financial Engineering: A complete guide to financial innovation – Marshal / Bansal

6. Security Analysis and Portfolio Management – S. Kevin

SC08: ENTREPRENEURSHIP DEVELOPMENT

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

The course will cover the characteristics of and types of entrepreneurs, identifying problems and opportunities, creative problem solving, developing a viable business model and entrepreneurial supporting system etc.

2. Course Objectives:

- To familiarize the students with the concept and overview of entrepreneurship with a view to enhance entrepreneurial talent.
- To impart knowledge on the basics of entrepreneurial skills and competencies to provide the students with necessary inputs for creation of new ventures.
- To explore new vistas of entrepreneurship in 21st century environment to generate innovative business ideas.

3. Pedagogy:

The subject matter will be presented through lecture, classroom discussion, workshops, special lecture programmes from industry experts, case study analysis and industrial visits.

4. Course Contents:

Module-1 **Introduction:** Meaning of entrepreneur - Evolution of the concept - Types of Entrepreneur - Concept of Entrepreneurship Evolution of Entrepreneurship - Theories of Entrepreneurship - Stages in Entrepreneurial Process- Entrepreneurial Competencies - Role of Entrepreneurship in Economic Development - Factors affecting Entrepreneurship - Problems of Entrepreneurship in India- entrepreneurial policy – culture and entrepreneurship -Case Study.

Module-2 **Establishing Enterprises:** Generating new ideas - Entrepreneurial Motivation - Identifying the Business Opportunities - Business Plan -Meaning of business plan - Business plan process - Advantages of business planning - Marketing plan - Production/operations plan - Organization plan - Financial plan - Final Project Report with

Feasibility Study - preparing a model project report for starting a new venture – case studies.

Module -3 Institutions Supporting System: Role of Government in promoting Entrepreneurship - A brief overview of financial institutions in India - Central level and state level institutions - SIDBI - NABARD - IDBI - SIDCO - Indian Institute of Entrepreneurship - DIC - Single Window - Latest Industrial Policy of Government of India- Start-up India- startups and climate for startups MUDRA Scheme.

Module -4 Managing the Enterprise: Financial Management: Working Capital Management - Financial Planning & Control - Marketing Management - Marketing Plan & Control - CRM – Product Development & Marketing – Production Management: Inventory Control, Productivity, and Break Even Analysis – Human Resource Management: Manpower Planning – Labor Productivity – Industrial Relations. Success and failure stories of social entrepreneurs.

References:

1. Vasant Desai, TheDynamics'of Entrepreneurial Development and Management, Himalaya Publishing House, 2009.
2. Poornima M. Charantimath, 'Entrepreneurial Development And Small Business Enterprises",Pearson Education Licensee, New Delhi 2006.
3. Matthias Fink, Sascha Kraus, The Management of Small and Medium Enterprises, Routledge Studies in Small Business, 2009
4. S. Nagendra, V.S. Manjunath, **"**Entrepreneurship and Management", Pearson Education Licensee, New Delhi 2011.

SC09: ELECTIVE GROUP A-BUSINESS TAXATION

PAPER1: GOODS AND SERVICES TAX AND CUSTOMS DUTY

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

This paper is to educate the taxation students about Indian Tax System, its background, and its operation in the global competitive market. The importance and administration of the indirect taxes in the Indian market oriented economy and its role in achieving the objectives of modern welfare government and to evaluate the impact of GST in the present Indian Tax Scenario.

2. Course Objectives:

After completion of this course the students would be able:

- To understand the importance of indirect taxes (GST) in the Indian and global economy and its contribution for the economic development.

- To comprehend the principles of taxations, objectives of taxes and its impact, shifting and incidence process of indirect taxes in market orientated economy.
- To understand the implications of indirect taxes on the taxable capacity consumers, dealers and of the society at large and its changes.
- To make them to be a tax consultant in preparing the tax planning, tax management. Payment of tax and filling of tax returns.
- To understand the impact of GST on Domestic, National and International Trade and educating the students as a tax audit, consultant and mangers.

3. Pedagogy:

1) Lecture:
2) Tutorial and bridge class (for Non-tax students)
3) Live leading cases: pending and deciding in the high court and supreme courts.
4) Practical works: Tax planning, Tax management, filing of various tax returns and working as consultants and tax adviser for small companies nearby dealers and companies relating to GST and Customs

4. Course Contents:

Module 1: INTRODUCTION TO GST –Background- History- Constitutional Provision for Indian Tax System-structure of Indian Tax System- Different Types of Taxes- Taxes under Indirect tax- Structure of GST -Types of GST – CGST- SGST- IGST- UTGST - Tax as subsumed in GST - Tax is not subsumed in GST- GST council.

Module 2: Taxes under GST- Registration of GST - Levy and Incidence of GST-Rates and Schedules- GST on Exports-Imports and SEZ supplies- E-Commerce- Financial and related services-Value of supply- Input tax credit- Manner of distribution of credit by input service distributor - Recovery of credit distributed in excess- Payment of tax, interest, penalty and other accounts- Utilization of input tax credit.

Module 3: Other Aspects under GST – Tax invoice, Credit and Debit notes-Returns-Payment of tax- Assessment and audit- Appeals and revisions,

Module 4: Customs Duty:

Customs Act-1962 and Rules- Regulations- Circulars and Notifications-Customs Tariff Act-and applicable Rules – authority for advanced ruling - Provisions for levy of Customs Duty- Types of Customs Duties- Basic Principles of Classification of Goods and Valuation of Goods- Special Provisions regarding Baggage, Goods Imported or Exported by Post- and Stores- Duty Draw-Back Schemes- Impact of GST on Customs Duty-Illustrative Problems on Customs Duty - Case Studies.

References:

1. Indirect Taxes- Law and Practice: V.S.Datey
2. Karnataka GST Manuals
3. GST Ready Reckoner
4. Bare Acts of Customs, Customs Tariff Acts, GST
5. Public Finance- B. P. Tyagi
6. Public Finance - Prof.H.Doltan
7. GST Bill/Act 2016
8. CST Law and Practice-SS Gupta
9. Basic of GST-Nitya Tax Association Taxman
10. GST Manual- Taxman Publication
11. Indian GST for Begineers –JayaramHiregange and Deepak Rao
12. CA Practical Manuals
13. www.gstindia.com

SC10: ELECTIVE GROUP B - FINANCIAL ACCOUNTING

PAPER-1: CONTEMPORARY AREAS OF FINANCIAL ACCOUNTING

Total Credits: 4 **Credit Pattern: 3:1:0** **No of hours:5**

1. Course Description:

This course focuses on contemporary areas of financial accounting which are likely to be of interest to a wide range of stakeholders including investors, employees, society, government agencies and public at large. The course provides the coverage of accounting for the interim, segment reporting, accounting for income taxes and goods and services tax, and fair value accounting.

2. Course Objectives:

The aim of this course to provide knowledge and skills relevant in accounting to the students on contemporary areas of financial accounting and to bring attitudinal changes to innovations in accounting and to develop professional knowledge and skills in contemporary areas

3. Pedagogy:

Course activities consist of lectures, case study analysis, group discussions, seminar presentation, assignment writing and tests. Reading and analysis of annual reports of companies is the integral part of instruction.

4. Course Contents:

Module 1: Interim and Segment Reporting: Meaning and relevance of Interim Financial Reporting and Segment Reporting – Recognition - measurement and disclosure requirements under Indian accounting standards - Problems and case study analysis

Module 2: Accounting for Income tax: Conceptual Framework of accounting for Income Tax by companies - Accounting for actual and deferred income tax - Journal Entries - ledger accounts and final accounts, Hybrid securities,

Module 3: Accounting for Goods and Services Tax: Conceptual framework of accounting for Goods and Services Tax by companies - Accounting for Output GST and Input GST credit - Journal Entries - ledger accounts and final accounts

Module 4: Fair Value Accounting: Definition and Relevance – Recognition - measurement and disclosure of fair value - Application of fair value in accounting - Problems and Case Study analysis

References:

1. Indian Accounting Standards.
2. International Financial Reporting Standards
3. Interim and Annual Financial Reports of Companies.
4. IT and GST filings of Companies.
5. Websites: www.iasb.org. www.icai.org.,www.mca.gov.in, www.xbrl.org. www.cbdt.org.

SC 11 - ELECTIVE GROUP C: FINANCIAL MANAGEMENT

PAPER 1: STRATEGIC FINANCIAL MANAGEMENT

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course description:

Financial decisions need to be aligned with overall corporate strategy. This course is introduced to provide an interface of financial policy and strategic management process mainly focusing on financial restructuring, innovative financing strategies and risk management.

2. Course Objectives:

The objective of this course is to acquaint students with the advanced concepts of financial management and the application of the same in developing financial strategies for the organization.

3. Pedagogy:

Method of instruction consists of lectures and tutorials. Lecture session focuses on providing analytical setting for basic financial strategies followed by case study/group discussions and seminar presentations.

4. Course Contents:

Module 1: Financial Policy and Strategic Planning - Changing face of Financial Management - components of financial strategy - objectives and goals - strategic planning process – Corporate strategy, financial policy and shareholder value creation.

Module 2: Expansion and Financial Restructuring: Mergers and Amalgamations-corporate RESTRUCTURING - Types of corporate restructuring - Synergy from an acquisitions - and sources of synergy - calculating value of firm after acquisition - cost to stockholders from reduction in risk - the NPV of merger - defensive tactics - Takeover and Buyouts - angel investors and venture capitalists – case study.

Module 3: Financing Strategy - Hybrid securities namely convertible and non-convertible securities - Deep discount bonds - Secured premium notes - Private equity ANGEL INVESTMENT, VENTURE CAPITAL

Module 4: Real Options Introduction - types of real options abandonment (NPV Method) – Expansion options (NPV method)- Expansion options (Risk Neutral Method)-Expansion options (Black-Scholes Model)-Investment Timing Options- (NPV Method and Black-Scholes Model)

References:

1. An introduction to strategic Financial Management: Allen D. CIMA/ Kogan page, London.
2. Financial Theory and corporate policy: Copeland T.E and J D Weston Addision westerly, NY.
3. Financial Decision Making: HamtonJone, PHI, New Delhi.
4. The Essence of mergers and Acquisitions: Sudarsanm, PS: prentice Hall of India, Hall.
5. Strategic Financial Management: Prasanna Chandra.

SC12 - ELECTIVE GROUP D: HUMANRESOURCE MANAGEMENT

PAPER1: STRATEGIC MANAGEMENT OF HUMAN RESOURCES

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Descriptions:

This course provides the coverage of concept of strategic HRM, strategic human resources planning and procurement, human resource development and strategic compensational and rewards system.

4. Course Objective:

The objective of this course is to provide the student the knowledge about human resources, their significance and managing them strategically in organizations.

5. Pedagogy:

Teaching method comprises of lecture sessions and tutorials. Lecture sessions focus on providing conceptual understanding and analytical setting for select aspects of the course content.

4. Course Contents:

Module – 1: Strategic role of HRM, nature, need for SHRM, Aligning HR strategy with corporate strategy – Vertical fit and horizontal fit – Benefits and short comings of SHRM - planning and implementing strategic HR policies, HR strategies to increase firm performance, Investment perspectives of HR- Investment consideration, investments in training and development, investment practices for improved retention, investments job secure work courses, non-traditional investment approaches. Change Management and knowledge management (only concepts).

Module–2: Managing strategic organizational renewal- managing change and OD - instituting TQM programmes - creating team based organizations - HRE and BPR - flexible work arrangement- establishing strategic pay plans - determining period - establishing period - pricing managerial and professional jobs - compensation trends - objectives of international compensation - Approaches to international compensation - issues related to double taxation - cases

Module -3: Managing Global Human Resources - HR and the internationalization of business - improving international assignments through selections - training and maintaining international employees - developing international staff and multi-national teams

Module -4: Multi-national - global and transnational strategies - strategic alliances - sustainable global competitive advantage - globally competent managers location and production facilities- Repatriation process - current trends in SHRM, virtual teams, global inter dependence, Case Studies.

References

1. Gary Deshler - Human Resource Management, PHI, NewDelhi- 2003.

2. Charles R. Greer, Strategic Human Resource Management , Pearson Education, 2003.

3. Luis R., GOMEZ Mejia, David B., Balkin, Robert L. Cardy, Managing Human Resources, PHI- 2001.

4. Peter j. Dowling, Denice E. Walch, Randell S. Schuler, International Human Resource Management Thomson south – western 2002.

SC13 - ELECTIVE GROUP E: MANAGEMENT ACCOUNTING

PAPER 1: MARGINAL COSTING AND DECISION MAKING

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

This course provides the coverage of concept of cost behavior analysis, break even analysis, multi-product break even analysis, graphs, marginal costing and managerial decisions and direct costing.

2. Course Objectives:

The course in marginal costing and decision making is aimed at equipping the students with the knowledge and skill relating to marginal costing as a tool for evaluating a wide range of managerial decisions involving make-or-buy, pricing, export offers, temporary short-term of operations, discontinuance of a product line, etc,.

3. Pedagogy:

Course activities consist of lectures, case study analysis, group discussions, seminar presentation, assignment writing and tests. Solving problems and evaluating decisions involving the financial and cost data of selected firms will be integral part of instruction.

4. Course Contents:

Module 1: Introduction: Meaning- terminology- Scope & Concepts- Cost Behavior Analysis- Break Even Analysis- Approaches of Break Even Analysis in relation to cost & revenue. Factors- Multiproduct Break Even Analysis- Assumptions Underlying Break Even Analysis- Limitations of Break Even Analysis- Case Studies.

Module 2: Contribution Concepts & Short term Profitability Analysis: Profitability Analysis under Constrained Conditions- Profit- Volume Ratio & its Uses- Profit Volume Graphs – Case Studies.

Module 3: Marginal Costing & Managerial Decisions: Profit Planning- Pricing Decision – Production Decision – Make and Buy Decision Joint & By-product Decision – Distribution Cost Analysis - Case Studies

Module 4: Standard Costing: Objectives – Principles - Determination of Standards for Material – Labor - Direct Expenses & Overhead Costs-Variable and Fixed Costs-Case Studies. Variance Analyses**:** Material – Labor - and Overhead Variances - sales & Profit Variances - Disposition of Variances - Assessing the Significance of Standard Cost Variance - Standard Cost Accounting - Cost Audit standards - Case Studies

References:

1. Management Accountancy: J. Batty : ELBS

2. Cost Accounting- A Manorial Emphasis: C.T.Horngel

3. Cost Analysis for Management Decisions: M.R.S. Murthy : Tata McGraw Hill

4. A Dictionary of Managerial Finance, G. Kotreshwar, Chandana Publications (2014), Mysore

4th SEMESTER

HC 10: INTERNATIONAL ACCOUNTING

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

This course is designed to provide a deeper understanding of international accounting issues related to global financial reporting. It focuses on major diversities and challenges of financial reporting in the global arena, harmonization and international financial reporting standards. It also covers accounting for foreign currency transactions and major translation methods. It focuses on main issues in international financial statement analysis.

2. Course Objectives:

The aim of this course to provide knowledge and skills to the students on areas of accounting at international level and to bring attitudinal changes to meet challenges and issues of international accounting

3. Pedagogy:

Method of instruction consists of lectures, analysis of international financial statements, group discussions, seminar presentations, writing assignments and tests. Reading and analysis of annual reports of multi-national organizations will be integral part of instruction.

4. Course Contents:

Module 1: An Introduction to International Accounting: Definition - need and scope of international accounting - Factors that contribute to accounting diversity at the international level - Harmonization of accounting - International Financial Reporting Standards - Ethical issues in international Accounting - Analysis of annual reports and case studies

Module 2: Accounting for Foreign Exchange Rate Fluctuations: An overview of foreign currency markets and exchange rates - Foreign exchange exposure-transaction, translation and operating - Accounting for foreign currency transaction-spot and forward foreign currency transactions - single-transaction approach and two-transaction approach - Functional versus reporting currency - Foreign currency translation methods- current rate method - current/non-current method - monetary/non-monetary method and temporal method - Problems and Case study analysis

Module 3: International Transfer Pricing: Evolution - meaning and objectives of transfer pricing - Major stakeholders affected by transfer pricing policies - Arm's Length price (ALP) - Steps in the process of computing ALP-ALP methods - Determinants of International Transfer Pricing - Comparable Uncontrolled price method (CUP) -Resale

price method (RPM) - Cost Plus method (CPM) - Profit Split method(PSM) - Transaction Net margin method(TNMM).Problems and Analysis of Case Studies.

Module 4: XBRL for International Financial Reporting: Framework of extensible Business Reporting Language. International XBRL Taxonomy Architecture - the IFRS XBRL Taxonomy - the US GAAP XBRL taxonomy etc - XBRL implementation in countries around the world - Analysis of Case Studies.

References:

1. International Accounting by ShirinRathore, Prentice-Hall of India, New Delhi
2. Comparative International Accounting by Christopher Nubs and Robert Parker, Pearson Education Asia, New Delhi.
3. Timothy Doupnik and Hector Perera. International Accounting, 4th Edition, McGraw-Hill Education. 2015
4. International Accounting: A User Perspective by Shahrokh M. Saudagaran, South-Western Thomson Learning, Australia.
5. International Accounting by A.K.DasMohapatra, Prentice-Hall of India, New Delhi
6. The Analysis and use of Financial Statements by GerladI.White, AshwinipaulC.Sondhi and Dov Fried, John Wiley, New York.
7. The Economic Times, The Business Line and Financial Express daily papers.
8. Journals on International Accounting.
9. Websites: www.iasb.org. www.worldbank.org. www.unctad.org. etc,.w.w.w.xbrl.org.

HC 11: OPERATIONS RESEARCH

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

The course Operations Research covers linear and integer programming, transportation and assignment problems and their applications in decision making in business.

2. Course Objectives:

The objective of the course is to acquaint the students with the use of quantitative models in decision making.

3. Pedagogy:

The lecture sessions focus on providing conceptual understanding and solving problems of the course content. Students would make presentations and interact with both the faculty and the other students during tutorial sessions.

4. Course Contents:

Module -1: Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem – Formulation of LPP - Graphical solution of LPP - Simplex Method - big-M method,

Module -2: Transportation Problem. Formulation – solution - unbalanced Transportation problem - Finding basic feasible solutions – Northwest corner rule - least cost method and Vogel's approximation method - Optimality test: the stepping stone method and MODI method

Assignment Model – Formulation - Hungarian method for optimal solution - Solving unbalanced problem - Traveling salesman problem and assignment problem

Module –3: Sequencing Models. Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines – Processing n Jobs through m Machines**.**

Module- 4 : Games Theory. Competitive games, rectangular game, saddle point - minimax (maximin) method of optimal strategies - value of the game - Solution of games with saddle points - dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games.

Replacement Models- Replacement of Items that deteriorates, whose maintenance costs increase with time without change in the money value - Replacement of items that fail suddenly: individual replacement policy - group replacement policy

References:

1. Operations Research: Frederick S Hillier and Gerald J Lieberman, Tata McGraw- Hill Publishing Company Limited, New Delhi.
2. Operations Research- Theory and Applications: J.K.Sharma, Macmillian India Ltd. New Delhi.1997.
3. Operations Research – Applications and Algorithms: Wayne L. Winston, Thomson Learning, New Delhi.
4. Operations Reserch :Panneeraselvam, Prentice Hall of India, New Delhi.
5. Practical Problems in Operations Research: Chawla, Gupta and Sharma, KalyaniPublisers. New Delhi.
6. Principles of Operations Research with applications to Managerial Decisons :HarveyM.Wagner, Prentice Hall of India.

SC 14: FOREIGN EXCHANGE MANAGEMENT

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

This course focuses on international financial environment, foreign exchange flows, foreign exchange markets and payments.

2. Course Objectives:

The objective of this course is understand the nature and functioning of foreign exchange markets, determination of exchange rates and their forecasting in Indian context. The course enables the students to learn the basic skills required to be part of a foreign exchange division of any financial institution or state department.

3. Pedagogy:

The course is taught through the lecture and discussion mode. Practical exercises including actual calculation of exchange rates as well as interaction with foreign exchange divisions of banks would be part of the learning exercises.

4. Course Contents:

Module -1: International Monetary System, International Financial Markets-Currency basket, Currency convertibility –on capital account and current account. Foreign exchange reserve, Balance of payments, balance of trade, current account deficit, Need for effective FOREX management.

Module -2: Foreign Exchange Markets and Foreign Exchange Rates - Spot and Forward Foreign Exchange Markets, Quotations and Market Rules, direct and indirect quotes, Hedging tools - Currency Forwards, Currency Options, Currency Futures, Currency Swaps - Principles of Exposure management – Hedging against foreign exchange exposure – Forward market – Future Market – Options market – Interest rate swap – Hedging through currency of invoicing – hedging through mixed currency invoicing – Country risk analysis.

Module -3: Foreign Exchange Rate Determination, Theories of Exchange Rate Determination, Fundamental International Parity Conditions – Purchasing Power and Interest Rate Parity, Covered Interest Parity, Forecasting Exchange Rates - Technical Forecasting, Time Series Modeling, Fundamental Forecasting.

Module -4: Foreign Exchange Management in India – FOREX reserve and its composition, Main provisions of FEMA and FCRA, Conservation of foreign exchange reserves, Rupee payment agreements.

References:

1. Foreign Exchange: Concepts, Practice and Control, C. Jeevanandam, Sulthan Chand and Sons, 2016
2. Foreign Exchange Arithmitic, C.Jeevanandam, Sulthan Chand and Company, 2009
3. Foreign Exchange Management, Esha Sharma, Prime Student, 2015
4. Foreign Exchange Management, Subbulakshmi v, Seethapathi K, Institute of Chartered Financial Analyst, 2004
5. Foreign Trade and Foreign Exchange, O.P. Agarwal and P.K. Chaudhury, Himalaya Publishing House, 2015
6. Practitioner's Guide to Foreign Exchange Management, C.A. Sudha and G. Bhushan, Wolters Kluwer, 2016

SC 15: INTERNATIONAL FINANCIAL MANAGEMENT

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

As there has been a significant increase in multinational corporate activities; multinational finance is an added dimension of every advanced course in the area of finance. Hence this course has been designed to highlight the important finance functions of an MNC operating in India.

2. Course Objectives:

To enable students to understand the reasons, problems in internal finance management, foreign currency management, modes of payment, source of finance available etc as far as MNC operations/ firms concerned

3. Pedagogy:

The lecture sessions focus on providing conceptual understanding and analytical setting for select aspects of the course content. This session focuses on student involved and student driven content study. Identified groups of students make presentations and interact with both the faculty and the other students. The aspects reinforced through lecture and tutorial is taken up for practical study. Here the students would undertake field exercises related to different aspects of the course content.

4. Course Contents:

Module-1: Environment of International Financial Management: Introduction - Multinational Enterprise and MNC financial management - Foreign Exchange Market-Participants - Determination of Exchange Rates - Balance of Payments and International Economic Linkages - The J curve- Impact of BOP position on Exchange rate - Arbitrage - types of arbitrage, triangular arbitrage, locational arbitrage and Covered interest arbitrage –

Parity Conditions - Purchasing Power Parity - Fishers effect - International Fishers effect and Interest rate parity.

Module-2: Foreign Exchange Market: Function and structure of the FOREX markets - FOREX Market participants - Types of transactions and settlement dates - Exchange Rate quotations – Nominal - Real and Effective exchange rates - determination of exchange rates in Spot markets - Exchange rates determination in Forward markets - Exchange rate behavior - Cross Rates - Arbitrage profit in FOREX markets - Swift mechanism.

Module- 3: International Capital budgeting and Multinational Working Capital Management: Concept - Evaluation of a project - Factors affecting - Risk evaluation - Multinational Working Capital Management: Short-Term Financing; Financing Foreign Trade; Current Asset Management for the Multinational.

Module- 4: International Project Appraisal: Introduction- A review of the NPV approach - The Adjusted Present Value (APV) Framework- Project appraisal in the international context - Exchange Rate Risk and Cost of Capital – Options approach to Project appraisal – The practice of Cross-border Direct Investment Appraisal – International JV's.

References:

1. Multinational Financial Management: Shapir, Prentice-Hall of India.
2. International Financial Management: Cheol S Eun and Bruce G Resnick.
3. Managerial Finances: Weston and Brigham.
4. International Capital Budgeting- Prentice-: Buckly, Hall, India.
5. International Finance- Prentice : Buckley, Hall, India.
6. International Capital Budgeting: Adrian Buckley.

SC16: PROJECT WORK

Project Work would be commenced fromthe beginningof the fourth semester. Work load for Project Work guidance is 1 hour per batch of 4 students per week. Allotment of Guides shall be made in the beginning of the third semester. Students should select the topic in consultation with the guide during the third semester and complete the project in fourth semester.

SC 17 - ELECTIVE GROUP A: BUSINESS TAXATION

PAPER 1: CORPORATE TAX LAW AND PLANNING

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

This course is focus on different heads of income, taxable in the hands of companies, computation of grass total income, deduction, exemptions, set off and carry forward of loss. Tax planning relating to various managerial decisions for reducing the tax burden, allocation of investments, and maximize the company wealth. As a tax consultant of the corporate tax laws of the company to give advice to the drawing officers regarding TDS, advance payment of tax and remittances of tax, for his employees.

2. Course Objectives:

This course is intended to enable the students to:

- Understand the incidence based and residential status of the companies.
- Understand the deferent types of companies under corporate income tax act.
- Understand the different sources of income for corporate assesses.
- Analyze the basic principal of tax planning to reduce the tax burden of the company
- Understand the role of tax consultant relating to TDS, Advance payment of Tax, remittance of corporate income tax, preparation of various Forms.

3. Pedagogy:

The course content is covered class room lecture, remedial class for non-tax students, student seminar, case discussion, and work out the problem on the company problems as student, as consultant and as a tax authority and also visiting company and tax office for practical exposure.

4. Course Contents:

Module 1: **Introduction:** Definition of Company, Features and Types of Company - Indian Company - Domestic Company - Foreign Company - Widely-Held Company – Closely - Held Company - Residential Status of company - Tax Incidence - Corporate Tax Policy - Corporate Tax Revenue and Expenditure - MoR Statistics.

Module 2: **Computation of Taxable Income-** Computation of taxable income under different heads of income - House property - Profit and Gain from Business or Profession - Capital Gain and Income from Other Sources - Treatment of Corporate Loss - Carry Forward and Set-off of Losses - Deductions, Exemptions and Concisions from Gross Total Income - Sec-115JB - Minimum Alternative Tax - its importance and objectives - Simple calculation on Book Profit calculations -Case Studies.

Module 3: **Tax Planning-** Tax Avoidance and Tax Evasion, Mc. Dowell's Case - Tax planning with Dividend Policy - Bonus Shares, Tax Planning - Tax Management - Tax Planning with reference to specific managerial decisions- Make or Buy - Own or Lease - Purchase by Installment or by Hire – shut down or continue operations - tax planning relating to capital structure - International Taxation - Domestic Tax v/s International Tax - DTAA- Case studies.

Module 4: **Procedure for Assessment-** Assessment Types, Hierarchy of Tax Authority, Deduction of Tax at Source (TDS) and Collection of Tax at Source (TCS) - Remittance of Tax - Advance Payment of Tax (APT), Tax Returns – Refunds - Appeals and Revisions - Duties and Responsibilities of TDS Officer - Preparation and Issue of different forms for tax collection - FORM-16 and FORM 3CA, 3CB and 3CD - Case Studies.

References:

1. Direct Taxes: H.C. Mehrotra and Dr.S.P.GoyalSahityaBhavn New Delhi.

2. Direct Taxes law and practice: Bhagavathi Prasad, VishvaPrakashana, New Delhi.

3. Direct Taxes Aggarval P.K "Tax Planning for Companies" Hind Law Publishers, New Delhi.

4. Corporate Tax Planning and Management: Lakhotia, Vision Publishers.

5. Taxman's Direct Tax Laws and Practice: Dr.Vinod K Singhania and KapilSingania Taxman's Publications (p) Ltd., New Delhi.

SC 18 -ELECTIVE GROUP B: FINANCIAL ACCOUNTING

PAPER 2: INTERNATIONAL FINANCIAL REPORTING STANDARDS

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

The International Financial Reporting Standards (IFRS) issued by International Accounting Standards Board (IASB) are gaining recognition as Global Financial Reporting Standards. This course is designed to provide a deeper understanding of International Financial Reporting Standards issued by IASB.

2. Course Objectives:

The aim of this course is to develop student's knowledge and understanding of the structure of the IASB, its conceptual framework and the main features of International Financial Reporting Standards.

3. Pedagogy:

Method of instruction consists of lectures, group discussions, seminar presentations, writing assignments and tests. Reading and analysis of annual reports of domestic and multi-national corporations will be integral part of instruction.

4. Course Contents:

Module 1: International Accounting Standards Board: The structure, vision and mission of IASB - The standard setting process - Adoption or convergence of IFRS in countries around the world

Module 2: IFRS 1 to 6: The main features of IFRS 1: First Time Adoption of IFRS - IFRS-2: Share Based Payments - IFRS 3: Business Combinations - IFRS 4: Non-current Assets held for sale and Discontinued operations - IFRS 6: Exploration for and evaluation of mineral resources.

Module 3: IFRS 7 to 12: The main features of IFRS 7: Financial Instruments: Disclosures - IFRS 8: Operating Segments - IFRS 9: Financial Instruments - IFRS 10: Consolidated financial statements - IFRS 11: Joint Arrangements and IFRS 12: Disclosure of Interests in Other Entities.

Module 4: IFRS 13 to 17: The main features of IFRS 13: Fair Value Measurement - IFRS 14: Regulatory Deferral Accounts - IFRS 15: Revenue from contracts with customers - IFRS 16: Leases and IFRS 17: Insurance Contracts.

References:

1. IFRS Part A and Part B, Taxmann Publications Pvt. Ltd., New Delhi, 2011.
2. IFRS: A Practical Approach by Jasmine Kaur, Tata McGraw Hill Education Private Ltd., New Delhi, 2011.
3. Wiley IFRS 2010: Interpretation and Application of International Financial Reporting Standards, by Barry J. Epstein, Eva K. Jermakowicz , John Wiley Publications, 2010
4. Financial Accounting: IFRS Edition, 1st Edition by Jerry J. Weygandt, Paul D. Kimmel, Donald E. Kieso,John Wiley Publications, 2010.
5. The Vest Pocket IFRS by Steven M. Bragg by John Wiley Publications, 2010
6. www. iasb.org
7. www.mca.gov.in
8. www.icai.org
9. www.globalreporting.org.

SC 19 -ELECTIVE GROUP C: FINANCIAL MANAGEMENT

PAPER 2: FINANCIAL DERIVATIVES

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

The course is designed to provide basic knowledge about risk management and the new instruments of capital market i.e., financial derivatives used for managing risk. It mainly comprises of a description of the concepts of risk management, forwards/futures, options and swaps along with the trading mechanics and pricing of these instruments.

2. Course Objectives:

Perhaps no course in modern finance will be complete without topics in financial derivatives. Financial derivatives can play an important role in promoting growth of capital markets world over and form an integral part of knowledge base of financial managers. The course aims to help the students in:

- Basic understanding of the role and significance of risk management.
- Critical understanding and appreciation of the role of derivative markets and instruments.
- Understanding the trading mechanics and technology involving derivative contracts.
- Applying the basic valuation models for pricing the derivative assets.

3. Pedagogy:

Class room teaching of basic derivative concepts shall be followed by a series of individual seminar presentations, group seminars, discussions and case study analysis relating to futures, options and swaps. Assigned problems are to be worked on an individual basis, followed by group discussion of case problems.

4. Course Contents:

Module 1: Introduction to Derivatives: forwards - Futures - options – swaps - trading mechanisms - Exchanges - Clearing house - structure and operations - regulatory framework - Floor brokers - Initiating trade - and Liquidating or Future position.

Module 2: Future and Forward Contracts: Structure of future and forward contracts - financial futures - Valuation of forward and future prices - Margins - Initial margins - Variation margins Stock index futures - Valuation of stock index futures - Index futures - heading using stock index future contracts - Adjusting Beta of a portfolio using stock - Interest rate futures and currency futures.

Module 3: **Options: Trading in Options –** factors impacting Option Prices - Pricing of Options - Models of valuation - Binomial and Black-Scholes model Option pricing - The Greeks.

Module 4: **Swaps: Evolution -** Types of Swaps-Currency Swaps-Interest Rate Swaps - Designing Currency and Interest Rate Swaps - Valuation of Swaps.

References:

1. Introduction to Futures and Options Markets – By John Hull (PHI)

2. Derivatives – By D.A.Dubofsky and T.W.Miller (Oxford)

3. Futures and Options – By Edwards and Ma (McGraw Hill)

4. Investments – William Sharpe and others; Bowdie and others

5. Futures and Options by Vohra and Bagri

SC 20 -ELECTIVE GROUP D: HUMAN RESOURCE MANAGEMENT

PAPER 2: INTERNATIONAL HUMAN RESOURCE MANAGEMENT

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Descriptions:

This course provides the coverage of concept of IHRM, Human resources planning and procurement, human resource development and compensational and rewards system in the context of internationalization.

2. Course Objective:

The objective of this course is to provide the student the knowledge about acquiring human resources, their significance and managing them in multi-national organizations.

3. Pedagogy:

Teaching method comprises of lecture sessions and tutorials. Lecture sessions focus on providing conceptual understanding and analytical setting for select aspects of the course content.

Module 1: Nature of international Human Resource Management (HRM) -approaches to HRM differences between domestic HRM and IHRM - challenges of globalization and managing resources - Role of information technology in IHRM. Models of IHRM-Matching model - Harvard Model - Contextual Model, and 5P Model European Model - Role of culture in International HRMHR practices in Japan, US, Europe and India - Country and Regional Cultures - Country Culture versus MNE Culture - Culture and employee management issues/ impact of Country culture on IHRM

Module 2: Role of culture in International HRM - Country and Regional Cultures, Country Culture versus MNE Culture - Culture and employee management issues/ impact

of Country culture on IHRM - Human Resource Planning in HRM: recruitment and selection issues in staff selection of expatriates - Training and development - expatriate training - developing international staff and multinational teams.

Module 3: Performance Management: Factors associated with individual performance and appraisal criteria used for performance appraisal of international employees – appraisal of host country nationals. Compensation - objectives of international compensation approaches of international compensation. Issues and challenges in international performance management - country specific performance management practices.

Module 4: Expatriate Failure: Causes of failure, Repatriation - Repatriation process. Labor relations – Key issues in international relations –strategic choices before firms - strategic choices before unions -union tactics.

References:

1, International Human Resource management –Pipparely, paperback 201l.

2. Principles of HRM—George W. BOhalandarScott.A Snell. November, 2016.

3. Fundamentals of HRM , Person , Garry dessler, October, 2016.

4. HRM , John M.Ivancevich, Indian Edition.

5. Human Resource Development, D.K. Bhattacharya, Himalaya publishing house , 2015.

SC21 - ELECTIVE GROUP E: MANAGEMENT ACCOUNTING

PAPER 2: COST MANAGEMENT

Total Credits: 4 **Credit Pattern:3:1:0** **No of hours:5**

1. Course Description:

This course provides the coverage of a broader framework of various tools and strategies used for cost management and control.

2. Course Objectives:

The course is aimed at helping the students to:

(i).Understand the scope and need for cost control and management.

(ii).Familiarize themselves with the basic cost control and management tools.

(iii).Understand the importance of statistical tools and operation research in cost control and management.

3. Pedagogy:

Course activities consist of lectures, case study analysis, group discussions, seminar presentation, assignment writing and tests.

4. Course Contents:

Module 1: Cost Management-Nature; Cost Management System; Cost Management; Components of CM. Activity-Based Management [ABM]: Concept and Uses; Relationship between Activity – Based Costing and ABM; Operational ABM and Strategic ABM; Techniques of ABM; Implementation Steps in ABM.

Module 2: Pricing Strategies- Factors Influencing Pricing Decisions; Short run Vs. Long Run Pricing Strategy; Cost-Based Pricing; Economic Approach to Pricing; Pareto Analysis in Pricing Decisions. Activity-Based- Budgeting (ABB): ABB and Traditional Budgeting; ABB Process; Capacity Utilization; Role of ABB in Cost Management.

Module 3: Designing Costing Systems for Job and Process Oriented manufacturing environments – Cost Estimation and Regression Analysis – and cost volume profit Analysis.

Module 4: Application of Operation Research and Statistical Tools in cost management: Linear Programming, Network Analysis, Assignment, Transportation and Time Series Analysis- Time series analysis including moving totals and averages.

References:

1. Cost Management: A strategic Emphasis, Blocher,Chen,LinMcGraw Hill
2. Welsh, Glenn A.: Profit, Planning and Control (prentice Hall)
3. Standard Costing: J. Batty
4. Cost Analysis for Management Decisions: M.R.S. Murthy, Tata McGraw Hill
5. Managerial Accounting: Calvin Engler, Irwin Publication
6. Cost Accounting AManagerual Emphasis: Charles T Horngren, Srikant, PHI.
7. Advanced Management Accounting: Robert S Kaplan Anthony A. Alkinson Prentice Hall of India, New Delhi
8. Management & Cost Accounting: Cohn Drury International Thomson Business Press
9. Principles & Practices of Cost Accounting: Ashish K. Bhattacharya A. H. Wheeler Publisher
10. Quantitative Techniques in Management: N.D. Vohra Tata McGraw Hill Book Co. Ltd.
11. Cost Management strategy for business decision: Ronald Hilton and Michal Maher, 3rd Editions, Macgraw Hill.

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DEPARTMENT OF STUDIES IN COMMERCE

Certificate and Diploma in E-Commerce

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

Name of the Programme: Certificate in E-commerce and Diploma in E - Commerce

1. Preamble:

The growth of the Internet continues to have a tremendous influence on business. Organizations of all types and sizes are rethinking their strategies and how they run their operations. This course focuses on electronic commerce applications, technologies, and tools which are used to conduct business on the World Wide Web. It reviews foundations of e-commerce, its infrastructure, current business models in Business-to-Customers (B2C) and Business-to-Business (B2B) transactions, security and quality assurance, web site design strategies, payment systems, and various issues—Internet marketing, legal, regulatory, technological, social, and ethical--which relate to electronic business, systems development issues, electronic data interchange, web-based marketing, e-supply chains, e-procurement, e-marketplace, customer relationship management, and web-enabling mobile. A major part of the course will be devoted to hands-on practices covering client-side (front-end) and server-side (back-end) applications in web-based business information systems. Essentials of contemporary programming tools for e-commerce development such as HTML, XML, ASP (VB/JavaScript) ... will be explored. E-Business case studies are used to demonstrate the advantages and the challenges related to integrating ecommerce applications.

2. Objectives of the Programme:

- To gain knowledge and understanding the theories and concepts underlying e-commerce
- To apply e-commerce theory and concepts to what e-marketers are doing in "the real world".
- To improve familiarity with current challenges and issues in e-commerce.
- To prepare students to exploit opportunities in the field of Ecommerce in the corporate sector.

3. Eligibility:

An applicant seeking admission to this course shall have any Degree or equivalent from the recognized university.

4. Duration of the course:

Certification Course: A candidate must complete 10 credits in the first year (two semesters)

Diploma Course: A candidate has to complete total of 20 credits (including 10 credits in the first year) in the second year.

5. Medium of Instruction:

The medium of Instruction and examination is English only.

6. AWARD OF CERTIFICTE AND DIPLOMA:

The certificate and diploma will be awarded by SBRR Mahajana First Grade (Autonomous)College, Mysuru.

7. STRENGTH OF THE STUDENTS:

Maximum intake is restricted to 60 students only.

8. ATTENDANCE AND CONDUCT:

Minimum attendance of 75% of actual working hours in all the courses is required. A student who does not satisfy the requirements of attendance and conduct shall not be permitted to write the examination.

9. SCHEME OF EXAMINATION

The evaluation of the candidate shall be based on continuous assessment. The structure for evaluation is as follows:

- Assessment and evaluation processes happen in a continuous mode. However for reporting purposes, a semester is divided into 3 discrete components identified as C1, C2 and C3.
- The performance of the candidate in a course will be assessed for a maximum of 100 marks as explained in the course structure.
- The first component (C1) of assessment is for 15 marks. This will be based on test/ assignment/field work/group discussion/seminar.
- The second component (C2) of assessment is for 15 marks. This will be based on test/ assignment/field work/group discussion/seminar.
- At the end of the semester Final examination of 3 hours shall be conducted for each course. This forms the third/ final component of assessment (C3) and the maximum marks for the final component will be 70.

10. MINIMUM MARKS FOR PASS:

In case of a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED the course, and such a candidate is not allowed to appear for C3 in that course.

In case a candidate's class attendance in a course is less than 75% , the candidate is said to have DROPPED that course, and such a candidate is now allowed to appear for C3 in that course.

In case a candidate secures less than 30% in C3, he/she may choose DROP/Make-Up option.

However, the Candidate will have the option to appear for the makeup examination. The candidate will have excess of two semesters to complete either certificate or Diploma programme.

The grade and the grade point earned by the candidate in the subject will be as given below.

Marks	**Grade (G)**	**Grade point GP=V x G**
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

V is the credit value of the course: G is the Grade: GP is the Grade point.

CGPA = sum of GP / Total number of credits

In case of course with practical examination: Practical examination will be conducted, a candidate is assessed on the basis of knowledge of relevant processes, skills and operations involved, result/ products including calculation and reporting. Also C3 component is decided as per the following:

If X is the marks scored by the candidate out of 70 in C3 in theory examination, if Y is the marks scored by the candidate out of 70 in C 3 in practical examination, and if Z is the marks scored by the candidate out of C3 for a course of (L=0:T:(P=0) type that is entirely tutorial [based course, then the final marks Min C3 id decided as per the following table.

L:T:P Distribution	Find mark M in C3
L:T:P	[(L+T)*X] + [(T+P)*Y] ---------- L+2T+P
L:(T=0):P	(L*X) + (P*Y) ---------- L+P
L:T:(P=0)	X
L:(T=0):(P=0)	X
(L=0):T:P	Y
(L=0):(T=0):P	Y
(L=0):T: (P=0)	Z

Classification of Results

The final grade point to be awarded to the student is based on CGPA secured by the candidate and is given as follows,

CGPA	Numerical Index	Qualitative Index
4<= CGPA <5	5	Second Class
5<= CGPA <6	6	
6<= CGPA <7	7	First Class
7<= CGPA <8	8	
8<= CGPA <9	9	Distinction
9<= CGPA <10	10	

11. Structure of the course:

Certificate Programme:

Courses	C1 + C2	Final exam Marks	Total Marks	Credit Pattern	Total No of Credits
Introduction to E-Commerce	**30**	**70**	**100**	**4:1:0**	**5**
World Wide Web and HTML	**30**	**70**	**100**	**3:0:2**	**5**

Diploma Programme:

Courses	C1 + C2	Final exam Marks	Total Marks	Credit Pattern	Total No of Credits
Introduction to E-Commerce	**30**	**70**	**100**	**4:1:0**	**5**
World Wide Web and HTML	**30**	**70**	**100**	**3:0:2**	**5**
E- CRM and Branding	**30**	**70**	**100**	**4:1:0**	**5**
Visual Programming	**30**	**70**	**100**	**3:0:2**	**5**

SYLLABUS

I SEMESTER

Paper -1

Introduction to E-COMMERCE

Credit Pattern: 4:1:0

Objective: The objective of this course is enable students to gain knowledge about e-commerce & its various components.

Unit-I : Introduction to E-Commerce-Meaning and concept of Electronic commerce, Significance of Electronic Commerce, Scope of E – Commerce, Functions of Electronic Commerce, Electronic Commerce Application, Advantages and disadvantages of E-Commerce, Electronic Commerce V/S Traditional Commerce, Prospectus of Electronic Commerce in India.

Unit-II:Electronic Commerce Models- The birth of Portals, Major Modes found in E-Commerce,Matric of E-Commerce Models, E -business Models, Business-to-Customer (B2C), Business to Business (B2B), Consumer to Consumer (C2C), Consumer to Business (C2B).case study.

UNIT – IIIElectronic Payment System – Modern Payment System – PC Banking – Credit Cards – e-Cheques – Micro Payments – Smart Cards – E-Cash – Traditional Payment System – PaymentSecurity. Steps for electronic payment, payment security, Net Banking

UNIT – IV: E-Commerce – **Problems and Prospects in India** – Introduction, Barriers to e-commerce, Future of E-Commerce. Security & Legal Issues, Computer security classification; E-Commerce threats; Security of Clients and sever. Case study

UNIT – V:Legal and Regulatory Framework of E-Commerce – Cyber laws – aims and salient provisions, cyber law in India and their limitations, taxation issues in E-Commerce – laws for E-commerce in India.

Books Recommended-

1. Agrawal K.N. &DeekshaAgrawal : Business on the Net; What's &How's of E-Commerce- Macmillan New Delhi.
2. E-Commerce: Concepts, Models, Strategies C.S.V. Murthy, Himalaya Publishing House.
3. Electronic Commerce- By Bharat Bhaskar, Tata McGraw Hill Publication, New Delhi.
4. ParagDiwan& Sunil Sharma : E-Commerce-A Manager's Guide to E-Business; Excel Books, New Delhi..
5. Minoli and Minal : Web Commerce Technology Books- Tata McGraw Hill, New Delhi.

II SEMESTER

Paper 2

World Wide Web and HTML

Credit Pattern:3:0:2

Course Objectives:

- Students will be able to use a variety of strategies and tools to create websites.
- Students will develop awareness and appreciation of the myriad ways that people access the web and will be able to create standards-based websites that are accessible and usable by a full spectrum of users.

Unit I: Introduction to internet and its applications, E-mail, telnet, FTP, video conferencing, e-business. Internet service providers, domain name server, internet address. Introduction to Web Technologies, Careers in Web Technologies and Job Roles, How the Website Works? Client and Server Scripting Languages, Domains and Hosting, Responsive Web Designing, Types of Websites (Static and Dynamic Websites) , Web Standards and W3C recommendations.

Unit II: What is Markup Language, Basic Structure of HTML, Difference Between HTML and XHTML, Head Section and Elements of Head Section, Meta Tags, CSS Tags, Script Tag, Table Tag, Div Tag, Header Tags, Paragraph, Span, Pre Tags, Anchor Links and Named Anchors, Image Tag, Object Tag, Iframe Tag, Forms, Form Tag, Attributes of Form, POST and GET Method, Fieldset and Legend, Text input, Text area, Checkbox and Radio Button , Dropdown, List and Optgroup, File Upload and Hidden Fields, Submit, Image, Normal, Reset Button, Creating a Live Website Form, HTML Validators.

Unit III: Introduction to Cascading Style Sheets, Color in CSS, Typography in CSS, The Box Model in CSS, The Role of ID and Class in CSS, Page Layout Techniques.

Unit IV: XML: Extensible Markup Language (XML): Introduction-Using User-Defined Tags in Web Pages, Displaying XML Contents, XML DTD.

Unit V: Web Publishing or Hosting- Creating the Website, Saving the Site, working on the Web Site, Creating Website Structure, Creating Titles for Web Pages, Themes-Publishing Web Sites.

References:

1. Internet for Everyone by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., New Delhi.

2. Web Technologies, Uttam K. Roy ,Oxford University Press, USA.

3. HTML, XHTML, and CSS Bible, Steven M. Schafer, Wiley India.

III SEMESTER

Paper 3

E- CRM and Branding

Credit Pattern: 4:1:0

Unit I: E- Customer Relationship Management: Introduction to CRM, definition, Marketing Automation, Enterprise Customer Management- Processes- Component of CRM - **Electronic - CRM** – Introduction, need for Electronic CRM, CRM's goal. E-CRM Architecture, E-CRM market in India.

Unit II: Supply Chain Management: Supply Chain Management (SCM); Goals of SCM; Functions of SCM; Strategies of SCM; Electronic SCM and its benefits; Components of Electronic SCM; Electronic Logistics and its Implementation.

Unit III:.E-Security: Security on the Internet; Network and Website Security Risks – Denial-of-Service attacks, Viruses, Unauthorized access to a computer network; Vulnerability of Internet Sites; Network and Website Security – Transaction security and data protection, Security audits and penetration testing; E-Business Risk Management Issues; Firewall – Network policy, Advanced authentication mechanism, Packet filtering, Application gateways; Defining Enterprise Wide Security Framework.

Unit IV: Impact of Advertising : advertising agency roles, relationship with clients, advertising department; measuring advertising effectiveness; Understanding Social Media Marketing Social Networking (Facebook, Linkedin,Twitter, etc.), Social Media (Blogging, Video Sharing, YouTube, Photo sharing – Instagram, Podcasts).

Unit V: Branding – Introduction to Brands: Products v/s Brands, Anatomy of aBrand, Overview of brand building processCustomers and Brands: Understanding brands from thecustomer's perspective, Brand PositioningBrand Identity: Brand Essence, Brand Personality, BrandCustomer Relationships etc. Articulating the Brand Identity: Logos, Mascots, Taglines,Packagingetc.Brand Equity: Development and Measurement.

.**References:**

1. Marketing Management: An Asian Perspective: Philip Kotler at al. Prentice Hall India, New Delhi 1999.
2. E-Commerce: Concepts, Models, Strategies C.S.V. Murthy, Himalaya Publishing House.
3. Customer Relationship Management, JagdishSheth& G shainesh
4. CRM : Emerging Concepts, Tools and Applications : Jagdish Seth & Parvatiyar
5. CRM Essentials, J W Gosney.

IV SEMESTER

Paper – 4

Visual Programming

Credit Pattern:3:0:2

Course objectives:

1. To understand the concepts of windows Programming.

2. To develop applications using Visual Basic.

Unit - I: Introduction to Visual Basic – GUI – Integrated Development Environment – Introduction to forms, Common Properties, Methods and Events – Introduction to Visual Basic Programming – Variables, Constants and Operators.Intrinsic Controls: Pointer, Label, Frame, Command button, Option button, Check box, Combo box, HSscrollbar, Timer, Dir List box, shape, Image, Picture box, Text box, VS scrollbar, Drive list box, File list box, Line controls – OLE Adding new controls to the form.

Unit – II: Control structures: If/Then, If/Then/Else, Select case- Looping structure: Do..While, Do. Until, For..Next. Arrays – Multidimensional array- control arrays – Sub procedures and function procedures – Strings, dates and Times.

Unit - III: Enterprise controls: Menu editor – SDI and MDI forms – Introduction to database: Visual database Tools – Creating tables in access – data bound controls – DAO, RDO, ADO – validating data.

UNIT IV: Accessing Database File: Using the Data Control ,setting its property, Using Data Control with forms,navigating the database in code (the recordset object using the movenext, moveprevious, move first& movelast methods , checking for BOF & EOF, using listboxes & comboboxes as data bound controls, updating a database file (adding, deleting records)

Unit V:

Advanced data handling Displaying data in grids (grid control, properties of grid) , displaying the record no & record count, opening the database, validation & error trappings (locking text boxes, trap errors with On Error, file open errors) , Recorded , searching for a specific record (findfirst, find next, findlast, findprevious,) , seek method, working with database fields, creating a new dynaset.

References:

1. Visual Basic 6 Black book.
2. Beginning Visual Basic 2012- Bryan Newsome, Wiley Publications.

PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE [AUTONOMOUS]

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

Affiliated to University of Mysore

DEPARTMENT OF STUDIES IN M.C.A

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

CBCS Regulations – 2019-2020

M.C.A.

Preamble

Mahajana Post Graduate Centre is an exclusive PG wing of SBRR Mahajana First Grade College (Autonomous). The centre happens to be the largest PG Centre affiliated to University of Mysore. It was established in July 2003 with the motto "Enter to Learn, Depart to Serve".

The Centre is affiliated to University of Mysore and offers Post Graduation programmes in the areas of direct relevance and value to the current generation of students. The Centre offers Post Graduate degree 12 disciplines and is poised to start new programmes in the years to come.

MCA programme was started in the year 1999. The course is approved by University Grants Commission and affiliated to the University of Mysore. MCA course is accredited by All India Council for Technical Education (AICTE). It is a six semester full- time programme.

1. Definitions

Course

Every course offered will have three components associated with theteaching-learning process of the course, namely

(i) Lecture – L (ii) Tutorial- T (iii) Practical - P, where

L stands Lecture session. **T** stands Tutorial session consisting participatorydiscussion / self study/ desk work/ brief seminar presentations by students andsuch other novel methods that make a student to absorb and assimilate moreeffectively the contents delivered in the Lecture classes.

P stands Practice session and it consists of Hands on experience / LaboratoryExperiments / Field Studies / Case studies that equip students to acquire the muchrequired skill component.

In terms of credits, every one hour session of L amounts to 1 credit per semesterand a minimum of two hour session of T or P amounts to 1 credit per semester,over a period of one semester of 16 weeks for teaching-learning process. The totalduration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components. That means a course mayhave only lecture component, or only practical component or combination of anytwo or all the three components.

The total credits earned by a student at the end of the semester upon successfullycompleting the course are L + T + P. The credit pattern of the course is indicatedas

L: T: P.

If a course is of 4 credits then the different credit distribution patterns in L: T: P format could be

4 : 0 : 0,	1 : 2 : 1,	1 : 1 : 2,	1 : 0 : 3,	1 : 3 : 0,
2 : 1 : 1,	2 : 2 : 0,	2 : 0 : 2,	3 : 1 : 0,	3 : 0 : 1,
0 : 2 : 2,	0 : 4 : 0,	0 : 0 : 4,	0 : 1 : 3,	0 : 3 : 1,

The concerned BoS will choose the convenient credit pattern for every coursebased on the requirement. However, generally, a course shall be of 3 or 4credits.

Different courses of study are labelled and defined as follows:

Core Course

A course which should compulsorily be studied by a candidate as a core requirementis termed as a Core course.

A Core course may be a **Soft Core** if there is a choice or an option for thecandidate to choose a course from a pool of courses from the main discipline /subject of study or from a sister/related discipline / subject which supports themain discipline / subject. In contrast to the phrase Soft Core, a compulsory corecourse is called a **Hard Core** Course.

Elective Course

Generally a course which can be chosen from a pool of courses and which may bevery specific or specialized or advanced or supportive to the discipline / subject ofstudy or which provides an extended scope or which enables an exposure to someother discipline / subject/domain or nurtures the candidate's proficiency/ skill iscalled an Elective Course. Elective courses may be offered by the main discipline/ subject of study or by sister / related discipline / subject of study. A Soft Corecourse may also be considered as an elective.

An elective course chosen generally from an unrelated discipline / subject, withan intention to seek exposure is called an **open elective**.

An elective course designed to acquire a special/advanced knowledge, such assupplement study/support study to a project work, and a candidate studies such acourse on his own with an advisory support by a teacher is called a **Self Study**

A core course offered in a discipline / subject may be treated as an elective byother discipline / subject and vice versa.

Project work/Dissertation work is a special course involving application ofknowledge in solving / analyzing /exploring a real life situation / difficultproblem. A project work up to 4 credits is called Minor Project work. A projectwork of 6 to 8 credits is called Major Project Work. Dissertation work can be of10-12 credits. A Project/Dissertation work may be a hard core or a soft core as decided by the BoS concerned.

2. Eligibility for Admission

Candidates possessing a degree of University of Mysore, or of any other University, equivalent there to and complying with the eligibility criteria:

Admission to MCA course shall be open for candidates who have passed the Bachelor degree examinations with not less than 50% of the marks in the aggregate of all the years of the Degree examinations, except BCA. However, in the case of candidates from Karnataka belonging to SC/ST and Category-I, the aggregate percentage of marks in the qualifying examinations shall not be less than 45%. Provided that for admission to MCA, the candidate shall have passed Bachelor Degree with not less than 50% of marks with Mathematics / Statistics / Computer Science / Computer Programming / Computer Application / Business Mathematics / Business Statistics as one of the optional or electives at degree level. Provided further that in respect of candidates who have studied and passed one of the subjects specified in the first proviso in the Pre-university course with 50% of marks in that subject shall also be considered for admission. However, in the case of candidates belonging to SC/ST and Category-I, 45% of marks in that subject shall also be considered for admission.

The BCA graduates with a minimum of 50% marks in aggregate (45% in case of SC/ST/Cat I candidates) are eligible to direct admission to 2nd year of MCA.

3. Scheme of Instructions

3.1 A Masters Degree program is of 6 semesters-three year's duration for regular candidates and 4 semester- two years duration for lateral entry candidates. A regular candidate can avail a maximum of 12 semesters – 6 years (in one stretch) to complete Masters Degree (including blank semesters, if any) whereas lateral entry candidates can avail a maximum of 8 semesters – 4 years (in one stretch) to complete Masters Degree (including blank semesters, if any). Whenever a candidate opts for blanksemester(s)/DROP in a course or in courses or is compelled to DROP a course orcourses as per the provision of the regulation, he/she has to study theprevailing courses offered by the department as per the prevailing scheme,when he/she continues his/her study.

3.2 A candidate has to earn a minimum of 112 credits, for successful completion of a Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	Credits
Hard Core	60
Soft Core	A minimum of 40, but not exceeding 48
Open Elective	A minimum of 4, but not exceeding 12

Lateral entry students must earn a minimum of 76 credits, for successful completion of aMaster's degree with a distribution of credits for different courses as given in thefollowing table.

Course Type	Credits
Hard Core	40
Soft Core	A minimum of 28, but not exceeding 32
Open Elective	A minimum of 4, but not exceeding 8

Every course including project work, practical work, field work, seminar, self study elective should be entitled as hard core or soft core or open elective by the BoS concerned.

3.3 A candidate can enrol for a maximum of 24 credits per semester with the approval of the concerned department.

3.4 Only such candidates who register for a minimum of 20 credits per semester in the first two semesters and complete successfully 112 credits in total of the 6 semesters be considered for declaration of ranks, medals and are eligible toapply for student fellowship, scholarship, free ships and hostel facilities.

3.5 In excess to the minimum of 112 credits for masters degree in the concerneddiscipline / subject of study, a candidate can opt to complete a minimum of 20 extra credits to acquire **add on proficiency diploma** in that particular discipline /subject along with the masters' degree. In such of the cases wherein, a candidateopts to earn at least 4 extra credits in different discipline / subjects in addition to aminimum of 112 credits at masters level as said above then an **add on proficiencycertification** will be issued to the candidate by listing the courses studied andgrades earned.

3.6 A candidate admitted to Masters Program can exercise an option to exit with Bachelor Honors degree / PG diploma after earning 40 credits successfully.

4. Continuous Assessment, Earning of Credits and Award of Grades

The evaluation of the candidate shall be based on continuous assessment. TheStructure for evaluation is as follows:

4.1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, semesters are divided into 3 discrete components identified as C1, C2, and C3.

4.2 The performance of a candidate in a course will be assessed for a maximum of 100 marks as explained below:

4.2.1 The first component (C1), of assessment is for 25 marks. This will be based ontest/ assignment/seminar/quiz/group discussions. During the first half of the semester, the first 50%of the syllabus will be completed. This shall be consolidated during the 8th weekof the semester. Beyond 8th week, making changes in C1 is not permitted.

4.2.2 The second component (C2), of assessment is for 25 marks. This will be based ontest/ assignment/seminar/quiz/group discussions. The continuous assessment and scores of second half ofthe semester will be consolidated during the 16th week of the semester. During thesecond half of the semester the remaining units in the course will be completed.

4.2.3 The outline for continuous assessment activities for Component-I (C1) and Component-II (C2) will be proposed by the teacher(s) concerned before thecommencement of the semester and will be discussed and decided in therespective Departmental Council. The students should be informed about themodalities well in advance. The evaluated courses/assignments duringcomponent I (C1) and component II (C2) of assessment are immediately returned to the candidates after obtaining acknowledgement in the register maintained by the concern teacher for this purpose.

4.2.4 During the 18th -20th week of the semester, a semester-end examination of 2 hours duration shall be conducted for each course. This forms the third/final component ofassessment (C3) and the maximum marks for the final component will be 50.

4.2.5 In case of a course with only practical component a practical examination will beconducted with two examiners (one internal and one external).

A candidate will be assessed onthe basis of

a) Knowledge of relevant processes.

b) Skills and operations involved

c) Results / products including calculation and reporting.

If external examinerdoes not turn up then both the examiners will be internal examiners. The durationfor semester-end practical examination shall be decided by the departmentalcouncil.

4.2.6 **Scheme of Valuation for Practical Examination:**

The student is evaluated for 50 marks in C3 as per the following scheme:

There will be two questions. A candidate has to prepare procedure for both the questions nd executeany one of examiner's choice:

Procedure Development	:	10 x 2=20 Marks
Implementation	:	15 x 1=15 Marks
Viva	:	10 Marks
Record	:	05 Marks
Total	**:**	**50 Marks**

*For change of question = 5 Marks will be deducted per question.

4.2.7 If **X** is the marks scored by the candidate out of 50 in C3 in theory examination, if**Y** is the marks scored by the candidate out of 50 in C3 in Practical examination,and if **Z** is the marks scored by the candidate out of 50 in C3 for a course of(L=0):T:(P=0)type that is entirely tutorial based course, then the final marks (M) inC3 is decided as per the following table.

L.T.P distribution	Find mark M in C3
L:T:P	$\frac{[(L+T)*X]+[(T+P)*Y]}{L+2T+P}$
L:(T=0):P	$\frac{(L*X)+(P*Y)}{L+P}$
L:T:(P=0)	X
L:(T=0):(P=0)	X
(L=0):T :P	Y
(L=0): (T=0):P	Y
(L=0): T:(P=0)	Z

4.2.8 The details of continuous assessment are summarized in the following table:

Component	Syllabus in a course	Weight age	Period of Continuous assessment
C1	First 50%	25%	First half of the semester To be consolidated by 8th week
C2	Remaining 50%	25%	Second half of the semester. To be consolidated by 16th week
C3	Semester-end examination (All units of the course)	50%	To be completed during 18th-20th Week.
Final grades to be announced latest by 24th week			

4.2.9 A candidate's performance from all 3 components will be in terms of scores, andthe sum of all three scores will be for a maximum of 100 marks (25 + 25 + 50).

4.2.10 **Finally, awarding the grades should be completed latest by 24th week ofthe semester**.

4.3 **Minor/ Major Project Evaluation**

Right from the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his/her progress in the form ofseminars in addition to the regular discussion with the guide. Components ofevaluation are as follows.

Component – I(C1): Periodic Progress and Progress Reports (25%)

Component – II(C2): Results of Work and Draft Report (25%)

Component– III(C3): Final Viva-voce and evaluation (50%).

The reportevaluation is for 30% and Viva-voce examination isfor 20%.

4.4 In case a candidate secures less than 30% in C1and C2 put together in a course, thecandidate is said to have DROPPED that course, and such a candidate isnot allowed to appear for C3 in that course.In case a candidate's class attendance in a course is less than 75%, the candidate is said to have DROPPED that course, and such acandidate is not allowed to appear for C3 in that course.

Teachers offering the courses will place the above details in the DepartmentCouncil meeting during the last week of the semester, before the commencementof C3, and subsequently a notification pertaining to the above will be brought outby the Chairman of the Department before the commencement of C3 examination.

A copy of this notification shall also be sent to the office of the Director & Controller of Examinations.

4.5 In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUPoption.

In case a candidate secures more than or equal to 30% in C3, but his/her grade(G) = 4, as per section 4.7 below, then he/she may be declared to have been conditionally successful in this course, provided that such a benefit of conditional clearance based on G=4 shall not be availed for more than 8 credits for the entireprogramme of Master's Degree of two years.

In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKE-UP option.

The candidate has to exercise his/her option to DROP immediately within 10 daysfrom the date of notification of results. The MAKE UP examination will be conducted within one month of the notification of the results.

If a candidate is still unsuccessful, A MAKE UP Examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with next regular even semester examinations; however, not exceeding double the duration norm in one stretch from the date of joining the course.

4.6 A candidate has to re-register for the DROPPED course when the course is offered again by the department if it is a hard core course. The candidate may choose the same or an alternate core/elective in case the dropped course is soft core / elective course. A candidate who is said to have DROPPED project work has to re-register for the same subsequently within the stipulated period. **Thedetails of any dropped course will not appear in the grade card.**

4.7 The grade and the grade point earned by the candidate in the subject will be as given below.

Marks(M)	Grade	Grade Point (GP = V x G)
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

Here, P is the percentage of marks (P = [(C1+C2)+M] secured by a candidate in acourse which is rounded to nearest integer. V is the credit value of course. G is thegrade and GP is the grade point.

4.8 A candidate can withdraw any course within in ten days from the date ofnotification of final results. Whenever a candidate withdraws a paper, he/she hasto register for the same course in case it is hard core course, the same course oran alternate course if it is soft core/open elective.

A DROPPED course is automatically considered as a course withdrawn.

4.9 Overall cumulative grade point average (CGPA) of a candidate after successful

Completion the required number of credits (112) is given by

CGPA = ΣGP / Total number of credits

5. Classification of Results

The final grade point (FGP) to be awarded to the student is based on CGPAsecured by the candidate and is given as follows.

CGPA	Numerical Index	Qualitative Index
4<= CGPA <5	5	Second Class
5<= CGPA <6	6	
6<= CGPA <7	7	First Class
7<= CGPA <8	8	
8<= CGPA <9	9	Distinction
9<= CGPA <10	10	

Overall percentage = 10* CGPA or is said to be 50% in case CGPA<5

6. Medium of Instruction

The medium of instruction shall be English. However, a candidate will be permitted to write the examinations in either English or Kannada. This rule is not applicable to languages.

7. Provision for Appeal

If a candidate is not satisfied with the evaluation of C1 and C2 components, he / shecan approach the grievance cell with the written submission together with all facts, the assignments, test papers etc, which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty asprescribed by the college on the candidate if his/her submission is found to bebaseless and unduly motivated. This cell may recommend takingdisciplinary/corrective action on an evaluator if he/she is found guilty. The decisiontaken by the grievance cell is final.

For every program there will be one grievance cell.

The composition of the grievancecell is as follows.

1. The Controller of Examinations ex-officio Chairman / Convener
2. One senior faculty member (other than those concerned with the evaluation of the course concerned) drawn from the department/discipline and/or from the sister departments/sister disciplines.
3. One senior faculty member / subject expert drawn from outside the college.

8. Any other issue not envisaged above, shall be resolved by the competent authority of the autonomous college, which shall be final and binding.

9. Any matter which is not covered under this regulation shall be resolved as per the College/Mysore University regulation.

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PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE (Autonomous)

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre.

Affiliated to University of Mysore.

Master of Computer Application

List of HardCore Courses

Sl.No	Courses	Credit Pattern [L:T:P]	Credits
1.	C Programming	3:0:1	4
2.	Discrete Mathematical Structures	3:1:0	4
3.	Operating System	3:1:0	4
4.	Fundamentals of Data Structures	3:0:1	4
5.	Database Management System	3:0:1	4
6.	Object Oriented Programming with C++	3:0:1	4
7.	Advanced Software Engineering	3:1:0	4
8.	Java Programming	3:0:1	4
9.	Web Programming	2:0:2	4
10.	Analysis and Design of Algorithms	2:1:1	4
11.	Python Programming	3:0:1	4
12.	Linux Programming	3:0:1	4
13.	Dissertation Work	0:2:10	12

Master of Computer Application

List of SoftCore Courses

Sl.No	Courses	Credit Pattern [L:T:P]	Credits
1.	Computer Organisation and Architecture	4:0:0	4
2.	Computer Graphics	2:1:1	4
3.	Data Communication and Networks	3:1:0	4
4.	Fundamentals of IoT Technology	3:1:0	4
5.	Communication Skills	3:1:0	4
6.	Mobile Application Development with Android	2:1:1	4
7.	Cloud Computing	3:1:0	4
8.	Advanced Java	2:1:1	4
9.	Machine Learning	2:1:1	4
10.	Graph Theory	3:1:0	4
11.	Distributed Computing	3:1:0	4
12.	Numerical Algorithms	3:0:1	4
13.	Probability and Statistics	3:1:0	4
14.	Theory of Languages and Automata	2:1:1	4
15.	Digital Image Processing	3:0:1	4
16.	Cryptography and Network Security	3:1:0	4
17.	C# Programming	3:0:1	4
18.	Operations Research	3:1:0	4
19.	System Software	3:0:1	4
20.	System Analysis and Design	3:1:0	4
21.	Information Retrieval	3:0:1	4
22.	Big Data Analytics	2:1:1	4
23.	Information Systems Management	3:1:0	4
24.	E – Commerce	3:1:0	4
25.	Simulation and Modeling	3:0:1	4
26.	Artificial Intelligence	3:1:0	4
27.	Pattern Recognition	2:1:1	4
28.	Entrepreneurship Development	3:1:0	4
29.	Cyber Security and Forensic Development	3:1:0	4
30.	Values and Ethics	3:1:0	4
31.	Mobile Communication	3:1:0	4

HC **C PROGRAMMING** **3:0:1**

Objectives:

Students will be able to:

- Obtain knowledge on the need of programming languages, basics of C programming, operators and expressions, Input and output operations.
- Gain the knowledge on Decision making, branching statements and structured data types.
- Understand the need of user defined functions.
- Understand pointers and file handling operations.

Outcomes:

Students will be proficient to:

- Employ the basics of C which enables student to write simple C program.
- Use Branching and looping statements while writing the program.
- Implement user defined functions effectively.
- Apply the concept of pointers and file handling operations.

Unit I: Overview of C

Importance of C, Basic structure of C Programs, Basic programming constructs- Character set, tokens, Constants, Variables, and Data Types, Keywords, Identifiers and symbolic constants.

Operators and Expression – Arithmetic, relational, logical, increment and decrement, conditional, bitwise, Expression, precedence of operators, type conversion and casting, mathematical functions.

Managing Input and Output Operations - Reading a character, writing a character, formatted input/output and unformatted input/output.

Unit II: Decision Making and Branching

Decision Making and Branching – If statement – Different forms of if statement, switch, break and continue, Looping statements in C – for, while, do while, nested loops. Structured data types in C – Array – One dimensional, Two dimensional and Multi dimensional array. Strings, Structures and union

Unit III: User-Defined Functions

Need for user-defined functions, multi-function program and general form of C function. Category of functions, nesting of functions, Recursion, functions with arrays and structures. Storage Classes - scope and lifetime of variables in functions.

Unit IV: Pointers and File Handling

Understanding pointers, accessing the address of a variable, declaring, initializing, assigning values to pointers and accessing a variable through its pointer. File Handling– Definition, need of file, opening and closing a file, Input and output operations on files and random access to files with example.

References

1. C programming Language -Kernigham and Ritchie, 2nd Edition, PHI Publications

2. Programming in ANSI C - E Balaguruswamy, 2nd Edition Tata McGraw Hill.

3. Let Us C – Yashwant Kanetkar, 13th Edition, BPB publication

4. Problem Solving with C - M.T. Somashekara, PHI Learning, New Delhi.

HC **DISCRETE MATHEMATICAL STRUCTURES** **3:1:0**

Objectives:

Students will be able to:

- Analyze to solve problems using simple techniques of counting theory,and set theory
- Learn the fundamentals of logic and Identify the Use of quantifiers, the nature of proofs.
- Learn the basic concepts of mathematical induction, Relations and functions.
- Learn the concepts of graph theory and applications .

Outcomes:

Students will be proficient to:

- Apply the principles of counting and set theory.
- Identify the quantifiers and their uses and Make use of fundamentals of logic theory and proofs.
- Apply the concepts of mathematical induction, relations and functions to solve given problem.
- Make use of basic concepts of graph theory and solve the given problem.

Unit I

Principles of Counting: The Rules of Sum and Product, Permutation, Combinations, combinations with repetition. Problems.

Sets and Subsets: Set Operations ,Membership table method and Venn diagram method and the Laws of Set Theory, Addition principle-Counting and Venn Diagrams, A First Word on Probability.

Unit II

Fundamentals of Logic: Basic Connectives and Truth Tables, Logic Equivalence – The Laws of Logic theory, Logical Implication – Rules of Inference. Argument – Definition, validity and invalidity.

The Use of Quantifiers: Quantifiers, Definitions ,Argument representation using quantifiers, validity.

Proofs of Theorems- Direct and Indirect method - contradiction and contrapositive method.

Unit III

Relations and Functions: Properties of the Integers: Mathematical Induction, The Well Ordering Principle- Mathematical Induction (Alternative form)(problems),Recursive Definitions

Cartesian Products and Relations, Functions – Plain and One-to-One, Onto Functions – Stirling Numbers of the Second Kind, Special Functions, The Pigeon-hole Principle, Function Composition and Inverse Functions.

Unit IV

An Introductions to Graph Theory: Definitions and examples Sub graphs, Complements, and Graph Isomorphism, Vertex Degree : Euler Trails and Circuits, Planar Graphs, Hamiltonian Paths and Cycles.

Graph coloring and Chromatic Numbers. Definitions, Properties and examples Rooted trees, Trees and sorting. Weighted Trees and Prefix codes. Spanning trees- minimal spanning tree by Prim's and Krushkal's Algorithm.

References:

1. Discrete and Combinatorial Mathematics - Ralph P. Grimaldi, Pearson Education,
2. Discrete Mathematics and its Applications - Kenneth H. Rosen, McGraw Hill.
3. Discrete Mathematical Structures with Applications to Computer Science - Tremblay and Manohar , McGraw-Hill Publications.
4. A Treatise on Discrete Mathematical Structures - JayantGanguly, Sanguine-Pearson.
5. Discrete Mathematical Structures – Dr.D.S.Chandrashekaraih.

HC **OPERATING SYSTEM** **3:1:0**

Objectives:

Students will be able to:

- Understand the fundamental principles of operating system, processes and their communication.
- Understand the concepts of process management.
- Understand the concepts of Memory Management.
- Know the concepts of file systems and the disk management in operating systems

Outcome:

Students will be proficient to:

- Understand the usage of the operating system components and its services.
- Employ the concepts of process management.
- Employ the concepts of Memory Management
- Apply the file handling concepts in OS perspective.

Unit I

Introduction -Computer System Organisation – Computer system architecture – Operating system operations - Operating systems services-System calls- Types of system calls – Operating system structure.

Processes-process concept- process scheduling-operation on processes. Multithreaded programming – Multithreading models – Threading issues.

Unit II

Process Scheduling - Scheduling criteria-Scheduling algorithms – Thread scheduling - Multiple-processor Scheduling.

Process Synchronization – Critical Section problem – Peterson's solution - Semaphores-Classical problems of synchronization - critical regions – Introduction to Montors.

Unit III

Deadlocks – System model - Deadlock Characterization - Deadlock handling - Deadlock Prevention - Deadlock avoidance - Deadlock Detection - Deadlock Recovery.

Memory Management – Swapping - Contiguous Memory allocation -Segmentation Paging.

Virtual Memory Management - Demand paging – Copy on write - Page Replacement - Thrashing.

Unit IV

File System – File concept – Access methods – Directory structure – Directory and disk structure - File Systems structures - Directory Implementation - Allocation Methods - Free Space management.

Disk Structures – Disk attachment - Disk Scheduling – Disk management.

References:

1. Operating Systems Concepts - Abraham Silberschalz Peter B Galvin, G.Gagne, 9th Edition, John Wiley & Sons.
2. Modern operating Systems-Andrew S.Tanenbaum, Third Edition, PHI Learning Pvt. Ltd.
3. Operating Systems: A Concept-based Approach - D M Dhamdhere, Second Edition, Tata McGraw-Hill Education
4. Operating Systems-H M Deital, P J Deital and D R Choffnes 3rd edition, Pearson Education
5. Operating Systems: Internals and Design Principles-William Stallings, Seventh Edition, Prentice Hall,

HC **Fundamentals of Data Structures** **3:0:1**

Objectives:

Students will be able to:

- Impart the basic concepts of data structures and algorithms
- Understand concepts about searching and sorting techniques
- Know the basic concepts about stacks, queues, lists, trees and graphs
- Have knowledge of trees and graphs concepts

Outcomes:

Students will be proficient to:

- Analyse algorithms and algorithm correctness.
- Summarize searching and sorting techniques
- Describe stack, queue and linked list operation.
- Solve the problems writing algorithms by using fundamental data structures

Unit I

Introduction – Need for data structures, classification of data structures, Introduction to algorithm- Sequential, Selection and Iteration, Algorithmic notations, Concept and terminology for non-primitive Data structures

Arrays-Memory Representation of 1D and 2D, Operations on Arrays

Stacks- Definitions and Concepts, Operations on stacks, Applications of stacks- Recursion, Infix to postfix, and Evaluating postfix expressions,

Unit II

Queues- Linear, Circular and Priority Queues, Operation on queues, applications

Linked list : Pointers and Linked Allocation, Linked linear lists, Operations on Linear lists

Circular linked lists- Memory Representation

Doubly linked linear lists- Memory Representation.

Unit III

Nonlinear Data Structures

Trees - Definition and concepts, Operations on Binary Trees, Storage Representations of Binary Trees- Sequential and Linked, Tree Traversal,

Binary Search Tree- Creation and Traversal

Unit IV

Sorting and searching

Sorting- Selection sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort, Radix sort

Searching- Sequential and Binary searching

References:

1. An Introduction to Data Structures with Applications 2nd edition - J.P.Trembly and Sorenson, McGraw Hill.
2. Data structures using C , Aaron M Tenenbaum, Yedidyah Langsam, Pearson
3. Data Structures And Program Design In C, Robert L Cruse, Pearson
4. Systematic Approach to Data Structures Using C by Padma Reddy

HC **Database Management System** **3:0:1**

Objectives:

Students will be able to:

- Understand the different issues involved in the design and implementation of a database system.
- Study the physical and logical database designs, database modelling, relational, hierarchical, and network models.
- Understand and use data manipulation language to query, update, and manage a database.
- Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS.

Outcome:

Students will be proficient to:

- Describe the database architecture and system concepts
- Employ the techniques of SQL in Relational database
- Implement simple database system by utilising Data models and schema
- Employ normalization techniques to overcome Database anomalies

Unit I

Introduction to Database System Concepts and Architecture, Databases and Database Users, Characteristics of the Database Approach, Actors on the Scene, Advantages of Using a DBMS

Data Models, Schemas and Instances, DBMS Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment. Data Modeling Using the Entity-Relationship Model

Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types**,** ER Diagrams, Naming Conventions and Design Aspects

Unit II

SQL-The Relational Database Standard

Data Definition, SQL Data Types and Schemas, Constraints, Basic Queries in SQL, Insert, Delete, and Update Statements in SQL, Set Operations, Aggregate functions,

Views (Virtual Tables) in SQL, Joins – Inner, Outer and Self, Additional Features of SQL,DCL-commit, Rollback, Save-point, Grant privileges.

Unit III

Relational Data Model Relational Constraints, and Relational Algebra. Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Basic Relational Algebra Operations, Additional Relational Operations, Examples of Queries in Relational Algebra.

Unit IV

Normalization- Functional Dependencies, Transitive and Multivalued dependency, First Normal form, Second Normal Form, Third Normal Form and Boyce Codd Normal Form, Advantages of RDBMS- Codd's Rules.

Transaction- Concepts, States, ACID properties, Concurrent executions and Serializability.

References:

1. Fundamentals of Database Systems - Navathe and Elmasri –Pearson Education, Fifth Edition.
2. Database Systems Concepts, 3rd edition - Abraham Silberschatz, Henry Korth and S. Sudarshan McGraw Hill International Editions.
3. Introduction to Database systems - CJ Date, Published by Addison-Wesley.
4. Principles of database systems - Ullman, Computer Science press.

HC **OBJECT ORIENTED PROGRAMMING WITH C++** **3:0:1**

Objectives:

Students will be able to:

- Understand how C++ improves C with object-oriented features.
- Learn how to write various C++ functions efficiently.
- Learn the concepts of extended Object oriented programming
- Understand the concepts of files and I/O operations

Outcome:

Students will be proficient to:

- Employ the syntax and semantics of the C++ programming language.
- Usage of function prototyping and different methods involved in function implementation
- Implement extended Object oriented programming techniques
- Describe and implement the significance of files and I/O operations

Unit I : Introduction

Procedure-oriented programming, Concepts of Object-oriented programming, benefits of OOP, Applications of OOP, Structure of C++ program.

Tokens, Keywords, Identifiers and constants, Basic Data Types, User-defined data types, Derived data Types, Symbolic constants, Type compatibility, Declaration of variables, Dynamic initialization of variables, Reference variables, Operators in C++, Scope resolution operator, Member dereferencing operators, Memory management operators, Manipulators, Type cast operator, Expressions and their types, Special assignment expressions, Implicit conversions, Operator overloading, Operator precedence, Control structures.

Unit II : Functions

The main function, Function prototyping, Call by Reference, Return by Reference, Inline functions, Default arguments, const arguments, Function overloading, Friend and Virtual functions.

Classes and Objects

Specifying a Class, Defining member functions, Making an Outside function Inline, Nesting of member functions, Private member functions, Arrays within a Class, Static

data members, Static member functions, Arrays of Objects, Objects as function arguments, friendly functions, Returning Objects, const member functions, Pointers to members.

Constructors and Destructors

Constructors, Parameterized constructors, Multiple constructors in a class, Constructors with default arguments, Dynamic initialization of objects, Copy constructor, Dynamic constructor, Constructing Two-dimensional arrays, const Objects, Destructors.

Unit III : Operator Overloading and Type Conversions

Defining operator overloading, Overloading unary operators, Overloading Binary operators, Rules for overloading operators, Type conversions.

Inheritance and Polymorphism: Introduction, defining derived classes, single inheritance, making a private member inheritable, multilevel inheritance, hierarchical inheritance, hybrid inheritance, virtual base classes, abstract classes, constructors in derived classes, polymorphism – introduction, pointers, pointers to objects, this pointers, pointers to derived classes, virtual functions, pure virtual functions.

Unit IV : Console I/O Operations, Files and Templates

C++ streams, C++ stream classes, Unformatted I/O operations, Formatted I/O operations, managing output with manipulators.

Files: Classes for file stream operations, opening and closing a file, detecting end of file, more about open(): file modes, file pointers and their manipulations, sequential input and output operations.

Templates: Function templates and Class templates

References:

1. Object Oriented Programming with C++ - E. Balagurusamy.
2. Object Oriented Programming with C++ - M.T. Somashekara, D.S. Guru, H.S. Nagendraswamy, K.S. Manjunatha, PHI Learning, New Delhi.
3. Object Oriented Programming in C++ - Robert Lafore Techmedia Publication.
4. The complete reference C – Herbert shieldt Tata McGraw Hill Publication.

HC **ADVANCED SOFTWARE ENGINEERING** **3:1:0**

Objectives:

Students will be able to:

- Understand the importance of domain knowledge and its work around
- Know the importance team work and stewardship.
- Analyze and implement solutions to complex problems involving computers.
- A solid understanding to the methods of modern software engineering.

Outcome:

Students will be proficient to:

- Work in one or more significant application domains.
- Work as an individual and as part of a multidisciplinary team to develop and deliver quality software.
- Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.
- Demonstrate an ability to use the techniques and tools necessary for engineering practice

UNIT I: Requirements

Introduction - Professional and ethical responsibility. Critical systems: Systems dependability, availability, reliability, safety and security. Software processes: Software process models, process iteration, process activities, Project Management: Management activities, project planning and project scheduling. Requirement - Software requirements: Functional and non-functional requirements, user and system requirement. System models: Context, behavioural, data, object and structural method models.

UNIT II: Design

Architectural Design: System organization and control styles. Distributed systems architectures: client-server architectures and Distributed object architectures. Application architectures: Data processing systems and Transaction processing systems. User interface design: Design issues, UI design process, user analysis and interface evaluation.

UNIT III: Development

Rapid software development: Extreme programming, Rapid application development and software prototype. Critical systems development: Dependable processes, Dependable programming, Fault tolerance and Fault-tolerant architecture.

UNIT IV: Verification and Validation

Verification and Validation: Planning verification and validation and Software inspection. Software testing: System testing, Component testing, Test Case design and test automation. Critical system validation: Reliability validation, Safety assurance and Security assessment. Software cost estimation: Software productivity and estimation technique. Quality management: Process and product quality.

References:

1. Software Engineering - Ian Sommerville, 8th Edition, Pearson Education Ltd.,
2. Software Engineering – A practitioners approach, Roger. S. Pressman, Tata-McGraw Hill 6th Edition.
3. Fundamentals of software engineering - Rajib Mall, Phi learning Pvt. Ltd, 3rd edition.

HC **JAVA PROGRAMMING** **3:0:1**

Objectives:

Students will be able to:

- Gain knowledge about basic of Java language syntax and semantics.
- Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
- Gain knowledge on multi-threads programming, applet programming and Graphics Programming.
- Understand networking concepts and connecting Java application with database of Java.

Outcomes:

Students will be proficient to:

- Identify classes, objects, members of a class and relationships among them needed for a specific problem.
- Write Java programs to implement error handling techniques using exception handling
- Demonstrate the concepts of applet and graphics programming.
- Develop a java application to connect with database using JDBC connectivity.

Unit I: Introduction to Java

Origin and features of Java. Java Program Structure, Java Tokens, Java statements, Java Virtual machine, Command Line Parameters, Java Variables and Data Types, Operators, Decision Making, Branching and looping statements.

Classes, Objects and Methods used in Java: Class fundamentals, Methods, Constructors, Overloading, Inheritance, Interfaces, One and two dimensional arrays, Vectors, Strings, Wrapper Classes.

Unit II: Java Packages

API packages, system packages, naming conventions, creating and accessing a package, adding a class to a package, hiding classes.

Multi-threads Programming: Java thread Model, Main Thread, creating a Thread, Creating Multiple Threads, Extending the thread class, Stopping and blocking a thread, Life cycle of a thread, Managing Errors and Exceptions.

Unit III: Applet Programming

Introduction, how applet differ from application, Applet life cycle, Applet tag, passing parameters to applet. Abstract Windows Toolkit: Components, Container, Panel, Label, Button, Checkbox, Checkbox Group, Choice, List, Text Field, Text Area, Scrollbars.

Graphics Programming: The Graphics class, Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets.

Unit IV: Managing Input/output Files in Java

Stream Classes, Byte Stream Classes, Character Stream Classes, Creation of Files, Reading/Writing characters, Reading/Writing Bytes, Handling Primitive Data Types, Concatenating and Buffering Files, Random Access Files.

Networking: InetAddress, TCP/IP Client Sockets, TCP/IP Server Sockets, URL, URLConnectioN, JDBC connectivity

Reference Books:

1. Programming with Java – A PRIMER by E.Balagurusamy, Tata McGraw-Hill 3rd Edition
2. The Complete Reference - Java-2 by Patrick Naughton and Herbert Schildt Published by Tata McGraw-Hill India.
3. The Complete Reference – J2EE by Jim Keogh, published by Tata McGraw-Hill.

HC **WEB PROGRAMMING** **2:0:2**

Objectives:

Students will be able to:

- Understand the fundamentals concepts of Web programming
- Know the different techniques involved in Cascading Style Sheets (CSS)
- Learn to implement the concepts of Javascript
- Learn scripting with perl Perl building blocks

Outcomes:

Students will be proficient to:

- Apply a structured approach to identifying needs, interests, and functionality of a website.
- Modify existing HTML, CSS, and JavaScript code to extend and alter its functionality, and to correct errors.
- Usage of JavaScript to add dynamic content to pages.
- Write scripts using the fundamental Perl building blocks.

UNIT I: Fundamentals of Web

Internet, WWW, Web Browsers, and Web Servers; URLs; MIME; HTTP; Security; the Web Programmers Toolbox. HTML: Origins and evolution of HTML; Basic syntax; Standard HTML document structure; Basic text mark-up, Hypertext Links; Lists; Tables; Forms; Frames.

UNIT II: Cascading Style Sheets (CSS)

Introduction; Levels of style sheets; Style specification formats; Selector forms; Property value forms; Font properties; List properties; Color; Alignment of text; The Box model; Background images; Redefining Tags.

UNIT III: JavaScript

Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; Pattern matching using regular expressions; Errors in scripts; Examples.

UNIT IV: Perl and CGI Programming

Origins and uses of Perl, Scalars and their operations, Assignment statements and simple input and output, Control statements, Fundamentals of arrays, Hashes, References, Functions, Pattern matching, File input and output; Examples.

Using Perl for CGI Programming: The Common Gateway Interface; CGI linkage; Query string format; Cookies.

References:

1. Programming the World Wide Web – Robert W. Sebesta, 4th Edition, Pearson Education.
2. Internet & World Wide Web How to H program – M. Deitel, P.J. Deitel, A. B. Goldberg, 3rd Edition, Pearson Education / PHI.
3. Web Programming Building Internet Applications – Chris Bates, 3rd Edition, Wiley India.
4. The Web Warrior Guide to Web Programming – Xue Bai et al, Thomson.

HC **Analysis and Design of Algorithms** **2:1:1**

Objectives:

Students will be able to:

- Introduce basic concepts of algorithms.
- Learn mathematical aspects and analysis of algorithms.
- Understand sorting and searching algorithms.
- Implement different algorithm design methods.

Outcomes:

Students will be proficient to:

- Model, and analyze a given problem as an algorithm.
- Investigate whether the algorithm found is the most efficient.
- Formulate the space needs, time order analysis for the implementation of an algorithm.
- Apply appropriate approximation algorithms for P and NP type problems.

Unit I

Algorithms- Analysis, Design, Complexity Analysis, Analysis and Profiling, Expressing in Order notations, Establishing Bounds, Iterative and Recursive algorithms, Review of Data Structure based algorithms, Sets-Union and Intersection,

Matrices, Binary tree structures, Heaps-check, insertion, creation, deletion, sorting, Case studies- Base conversion, Prime and Fibonacci numbers, Sorting Algorithms- Selection, Exchange, Insertion, Greater Common Divisor, Least Common Multiple.

Unit II

Divide and Conquer- Binary search, Max-Min search, Merge sort, Quick sort, Transfer and Conquer – solution to simultaneous equations by triangularization, diagonalization algorithms.

Unit III

Greedy Algorithms- Tape filling, Knapsack, Job sequencing, Optimal merge pattern, Single source shortest paths, Minimum spanning trees-Kruskal's algorithm, Prim's algorithm.

Dynamic Programming – multistage graphs, all pairs shortest paths, Traveling salesman problem, 0/1 Knapsack problem

Unit IV

Search and Traversal: BFS; DFS, Backtracking method- 8-queen Problem, sum of subsets problem, Branch and Bound method – 0/1 knapsack problem, traveling salesman problem.

Complexity issues- P type, NP type, two stage algorithm approach for NP problem

References:

1. Computer Algorithms by Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran
2. How to solve it by Computer by R.G.Dromey
3. Introduction to the Design & Analysis of Algorithms by Anany V. Levitin
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein.

HC **Python Programming** **3:0:1**

Objectives:

Students will be able to:

- Introduce the basic concepts Python programming.
- Understand programming paradigms brought in by Python with a focus on Regular Expressions, List and Dictionaries.
- Understand the concepts of image processing.
- Know the techniques of Data mining.

Outcomes:

Students will be proficient to:

- Apply the basic concepts of Python programming.
- Impart the Hands on Regular Expression, Text Processing scripts and file handling scripts.
- Implement Python for Data and Image processing.
- Get hands on experience of Cluster Analysis using Python.

Unit I

Python Fundamentals : Introduction, Python Objects, Built-in Functions, Numbers and Strings, Conditionals and Loops, Functions, Passing Arguments, String Functions

Operators, Built-in Functions, List Type Built-in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules

Unit II

Regular Expressions : Introduction/Motivation, Special Symbols and Characters for REs, REs and Python. Dictionaries : Introduction, Operators, Built-in Functions, Built-in Methods, Dictionary Keys.

Data Processing : Storing in List and Strings, Dispersion, Central Tendency, Mean Median Mode,FrequencyDistribution, Standard Deviation Using Files for large dataset, statistics with real data, reading data from internet, Accessing Stock Market Data, Correlating Stock data

Unit III

Image Processing and Data Mining : Introduction, RGB Color Model, Object for Image Processing, Image Processing (Negative Images, Gray Scale, Resizing, Stretching, Flipping, Edge Detection)

Unit IV

What is Data Mining? Implementing Cluster Analysis on Simple Data, Distance between two points, Clusters and Centroids, File Processing, Visualization.

References:

1. Core Python Programming - Chun, J Wesley, Second Edition, Pearson.

2. Python Programming in Context -Bradley N Miller, David L Ranum, Second Edition.
3. Head First Python - Barry, Paul, 2nd Edition, O Rielly.
4. Learning Python, - Lutz, Mark, 4th Edition, O Rielly.
5. The Python Tutorial at https://docs.python.org/3/tutorial/index.html
6. Beginners Guide to Python at https://wiki.python.org/moin/BeginnersGuide

HC **Linux Programming** **3:0:1**

Objectives:

Students will be able to:

- Understand and make effective use of Linux utilities and Shell scripting language (bash) to solve Problems.
- Implement in C some standard Linux utilities such as ls, mv, cp etc. using system calls.
- Develop the skills necessary for systems programming including file system programming, process and signal management, and interprocess communication.
- Develop the basic skills required to write network programs using Sockets.

Outcomes:

Students will be proficient to:

- Work confidently in Linux environment.
- Work with shell script to automate different tasks.
- Write simple system programs involving file and process management.
- Ability to write simple socket programs.

Unit I

A brief history of Unix and Linux, Architecture, Features.

Unix/Linux Shell :

Linux shell commands for getting help: Commands for getting help : whatis, man, info, apropos.

Useful unix/linux shell commands : pwd, whoami, who, ls, env, echo, history, passwd, cat, more, less, file, chmod, chown, cp, mv, mkdir, rmdir, whereis, which, locate, ln.

Quick overview of basic Linux Utilities: File handling utilities, links: hard and symbolic links, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters: grep, Text processing utilities and Backup utilities.

Shell programming with Bourne again shell(bash)- Introduction, shell responsibilities, tab completion, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples.

Unit II

Sed and Awk:

Sed: Scripts, Operation, Addresses, Commands.

Awk: Execution, Fields and Records, Scripts, Operation, Patterns, Actions, Associative Arrays, String and Mathematical functions, System commands in awk, Applications.

System Calls:

Files and Directories: File Concept, File types, File System Structure, file metadata: inodes, kernel support for files, system calls for file I/O operations: open, create, read, write, close, lseek, dup2, file status information: stat family, fcntl, file permissions: chmod, fchmod, file ownership: chown, lchown, symbolic and hard links: symlink, link, unlink.

Directories: Creating, removing and changing Directories: mkdir, rmdir, chdir, obtaining current working directory: getcwd, Directory contents, Scanning Directories: opendir, readdir, closedir, rewinddir functions.

Unit III

Process : Process concept, Layout of a C program image in main memory. Process environment :environment list, environment variables, getenv, setenv, Kernel support for process, process identification, process control : process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process, system call interface for process management-fork, vfork, exit, wait, waitpid, exec family, Process Groups, Sessions and Controlling Terminal, Differences between threads and processes.

Unit IV

Interprocess Communication: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pies-creation, IPC between related processes using unnamed pipes, FIFO: creation, IPC between

unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes, popen and pclose library functions.

Sockets: Introduction to Berkeley Sockets, IPC over a network, Client-Server model, Socket address structures (unix domain and Internet domain), Socket system calls for connection oriented protocol and connectionless protocol, example: client/server programs-Single Server-Client connection, Comparison of IPC mechanisms.

References:

1. Linux “man” pages and “info” pages.
2. The Linux Documentation Project : http://www.tldp.org/
3. Unix Concepts and Applications - Sumitabha Das, 4th Edition, TMH.
4. Beej's Guide to Network Programming : https://beej.us/guide/bgnet/
5. System Programming using C++ - T. Chan, Unix PHI.
6. Unix Network Programming - W. R. Stevens , PHI.
7. Beginning Linux Programming - N. Mathew, R. Stones, 4th Edition, Wrox, Wiley India Edition.
8. C Programming Language - Kernighan and Ritchie, PHI.

SC **Computer Organization and Architecture** **4:0:0**

Objectives:

Students will be able to:

- Understand the organization of a computer and its principal components.
- Understand the design components of a digital subsystem that required realizing various components such as ALU, Control, etc.
- Understand the memory organization and I/O interface.
- Understand the CPU organization and Computer Arithmetic.

Outcomes:

Students will be proficient to:

- Acquire knowledge and understanding the theory of Digital Design and Computer Organization to provide an insight of how basic computer components are specified.
- Acquire knowledge and understanding the functions of various hardware components and their building blocks.
- Acquire knowledge and understanding Boolean algebraic expressions to digital design.

- Have depth understanding of realization of different combinational / sequential circuits.
- Understand memory hierarchy and design of primary memory.

Unit I: Data and numbers

Data and number representation- binary-complement representation, BCD-ASCII, conversion of numbers from one number system to the other, (r-1)'s & r's complement representation. Binary Arithmetic, Boolean Algebra and Logic Gates, Fundamentals of Boolean algebra, Logic gates (AND, OR, NOT, XOR, NAND, NOR) MINTERM, MAXTERM, truth table, Boolean expression, simplification, Boolean Algebra, K-map up-to 4 variable, Canonical Forms.

Unit II: Combinational Circuits

Adder, subtractor, BCD adder, multiplexer, De-multiplexer, encoder, decoder, Sequential Circuits, Flip-Flop (SR, JK, D, T, Master-slave), Application of flip-flop--Asynchronous counter up-to 4 bit, decade counter, mod-n-counter, Synchronous counter—ring counter, Johnson's count, Up down counter, Register.

Unit III: Memory Organization and I/O Interface

Types of memory-RAM, ROM, EPROM, DRAM, SRAM, Addressing Modes, Associative memory, main memory, virtual memory, Cache memory, secondary memory.

I/O: I/O interface, polling, interrupts, DMA, mode of data transfer.

Unit IV: CPU Organization and Computer Arithmetic

CPU organization, instruction format, addressing mode, RISC, CISC, Von- Neumann Architecture Pipeline & vector processing, Pipeline structure, speedup, efficiency, throughput and bottlenecks, Arithmetic pipeline and Instruction pipeline.

Reference Books:

1. Computer System Architecture - Morris Mano, PHI
2. Computer Architecture - Carter, Schaum Outline Series, TMH
3. Computer Organization - Hamacher, MGH
4. System Architecture - Buad, VIKAS
5. The Fundamentals of Computer Organization - Raja Rao, Scitech

SC **Computer Graphics** **2:1:1**

Objectives:

Students will be able to:

- Provide an overview of various device level algorithms.
- Understand the homogeneous coordinates and various 2D and 3D transformations
- Understand 3D concepts like projections, curves.
- Know how to implement the computer graphics concepts using OpenGL.

Outcomes:

Students will be proficient to:

- Acquire knowledge and understanding of the structure of an interactive computer graphics system, and the separation of system components.
- Acquire knowledge and understanding of device level algorithms that renders various shapes and clipping operations.
- Acquire knowledge and understanding of 2D and 3D geometrical transformations and viewing.
- Acquire knowledge and understanding of techniques for representing 3D geometrical objects.

Unit I

Graphics hardware: Video display devices, Raster-scan systems, Graphics software : Coordinate representations, Graphics functions, standards, Introduction to OpenGL.

Graphics Output Primitives: Coordinate reference frames, Two-Dimensional reference frame in OpenGL, OpenGL Point Functions, Line Functions, Curve functions.

Scan-Conversion : Line-Drawing Algorithms: DDA, Bresenhams, Setting frame-buffer values, Circle-Generating algorithms : Midpoint Circle Algorithm.

Unit II

Scan conversion for solids: Scan-line polygon fill algorithm, Boundary fill algorithm, Flood fill algorithm, Inside-outside tests.

2D geometrical transformations: Basic two-dimensional geometric transformations, Homogeneous Coordinates and Matrix Representation, Inverse Transformations,Brief overview of Composite transformations, Reflection, Shear, OpenGL functions for two-dimensional geometric transformations, Programming examples.

Unit III

2D Viewing: Windows and viewports, Two-dimensional viewing pipeline, clipping window, Normalization and viewport transformations, Brief overview of OpenGL 2D viewing functions.

2D Clipping Algorithms: Point clipping, Line clipping: Cohen- Sutherland and Liang-Barsky Line clipping, polygon fill-area clipping: Sutherland-Hodgman algorithm, Text clipping.

3D geometrical transformations: 3D translation, 3D scaling. 3D rotation: coordinate-axis rotations, general 3D rotations, Other 3D transformations, Affine transformations, OpenGL geometric transformation functions.

Unit IV

Three-dimensional viewing: Overview, Three-dimensional viewing pipeline, Projection transformations, Parallel and Perspective projection matrices. 3D viewing functions.

Spline representations : Interpolation and Approximation splines, parametric and Geometric continuity conditions, Bezier spline curves, B-Spline curves.

References

1. Computer Graphics with OpenGL, Fourth Edition - Donald D. Hearn, M. Pauline Baker, Warren Carithers, Pearson India Education Services.
2. Computer Graphics Principles & Practice in C - Foley, Vandam, Feiner, Hughes, Pearson Education, 2001.
3. Open GL Super Bible: Comprehensive Tutorial and Reference, - Richard S Wright and Jr. Michael Sweet, 7nd Edition, Pearson Education.
4. Computer Graphics- Roy A. Plastock, Gordon Kalley, Schaum's Outlines, McGraw Hill
5. Computer Graphics - Steven Harrington, 2nd Edition (Paperback), Tata McGraw Hill

SC **DATA COMMUNICATION AND NETWORKS** **3:1:0**

Objectives:

Students will be able to:

- Understand the basics of data communication components.
- Learn the protocols of Data link layer.
- Understand different network layer services and routing protocols
- Know the different techniques involved transport layer and application layer

Outcomes:

Students will be proficient to:

- Acquire knowledge on basics of Data communication components.
- Acquire knowledge and Understanding the usage of different protocols of Data link layer.
- Acquire knowledge and Understanding the usage of network layer services and routing protocols.
- Acquire knowledge and Understanding the different techniques involved transport layer and application layer.

UNIT – I: Data Communications

Components – Direction of Data flow – Networks –Network Types, TCP/IP Protocol suite, OSI model, Multiplexing, Transmission media, Circuit Switched Networks.

UNIT – II: Data link layer

Introduction, Framing, Data Link Layer protocols, Flow and error control, Medium Access Sub Layer: ALOHA, CSMA/CD, Wired LAN – Ethernet, Wireless LAN – IEEE 802.11

UNIT – III: Network layer

Services, Packet Switching, Unicast Routing protocols, Multicast routing protocols.

UNIT – IV: Transport Layer and Application Layer

UDP and TCP protocols, Application Layer: client/server programming, WWW, HTTP, FTP, Telnet, email, SSH, DNS.

References:

1. Data Communications and Networking - Behrouz A. Forouzan, Fourth Edition, TMH.
2. Computer Networks - Andrew S Tanenbaum, 5th Edition. Pearson Education, PHI.
3. Data communications and Computer Networks - P.C .Gupta, PHI.
4. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education.
5. Understanding communications and Networks, 3rd Edition, W.A. Shay, Cengage Learning.
6. Computer Networking: A Top-Down Approach Featuring the Internet - James F. Kurose & Keith W. Ross, 3rd Edition, Pearson Education.
7. Data and Computer Communication - William Stallings, Sixth Edition, Pearson Education.

SC **Fundamentals of IoT Technology** **3:1:0**

Objectives:

Students will be able to:

- Learn the impact of IoT applications and architectures in real world.
- Illustrate the various methods of deploying smart objects and connect them to network.
- Infer the role of data analytics in IoT.
- Understand the role of IoT in Smart and Connected Cities and Public Safety.

Outcomes:

Students will be proficient to:

- Interpret the impact of IoT networks in new architectural models.
- Compare and contrast the deployment of smart objects and technologies to connect them as network.
- Elaborate the need of data analytics in IoT.
- Identify the application of IoT in Smart and Connected Cities and Public Safety.

Unit I: Basics of IoT

What is IoT?, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and OT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

Unit II: Smart Objects and Access Technologies

Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies (Any Three)

Unit III: Data Analytics for IoT

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics.

Unit IV: IoT in Industry

IoT in Industry: Smart and Connected Cities-An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples-Smart Traffic Control.

Public Safety-Overview of Public safety, An IoT Blueprint for public safety, Emergency Response IoT Architecture, IoT Public Safety Information Processing, School Bus Safety.

References:

1. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things- David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, 1st Edition, Pearson Education.
2. Internet of Things- Srinivasa K G, CENGAGE Leaning India.
3. Internet of Things (A Hands-on-Approach)-Vijay Madisetti and ArshdeepBahga, 1st Edition, VPT.
4. Internet of Things: Architecture and Design Principles - Raj Kamal, 1st Edition, McGraw Hill Education.

SC **Communication Skills** **3:1:0**

Objectives:

Students will be able to:

- Know how communication style influences how we are perceived by others.
- Learn the factors governing good communication.
- Understand How good communication skills can be developed.
- Know how to use effective communication skills in business.
- Learn the need to modify communication depending on business situation and circumstances.

Outcomes:

Students will be proficient to:

- Apply knowledge of human communication and language processes as they occur across various contexts, e.g., interpersonal, intrapersonal, small group, organizational, media, gender, family, intercultural communication, technologically mediated communication, etc. from multiple perspectives.
- Evaluate key theoretical approaches used in the interdisciplinary field of communication. i.e., students will be able to explain major theoretical frameworks, constructs, and concepts for the study of communication and language, summarize the work of central thinkers associated with particular approaches, and begin to evaluate the strengths and weaknesses of their approaches.
- Find, use, and evaluate primary academic writing associated with the communication discipline.
- Communicate effectively orally and in writing.

Unit – I

Importance of communication, its basic model, formal and informal communications, barriers to communication, feedback and its effectiveness, Non- Verbal communication - Etiquettes.

Unit – II

Oral communication, Speaking: Paralanguage: Sounds, stress, intonation- Art of conversation – Presentation skills, – Public speaking- Expressing Techniques, importance of listening, role of visual aids, persuasive communication.

Unit – III

Written communication – Effective writing – Paragraph – Essay- Reports – Letters- Articles – Notices, Agenda & Minutes.

Unit – IV

Interview sills: Types of Interviews – Preparing for interview – Preparing a CV – Structuring the interview- Mock Interview - Quick Tips.

References:

1. Soft sill: know yourself & Know the world- Dr. Alex K..
2. Communication for results – C Hamilton & Parker
3. Instrument of Communication – P Meredith.
4. Basic Management skills for all – E H McGrath.
5. Managerial Communication – P M Timm.
6. Thesis and Assignment writing – Anderson.

SC Mobile Application Development with Android

2:1:1

Objectives:

Students will be able to:

- Understand the concepts of mobile applications.
- Learn to design mobile applications
- Learn android application development environment.
- Gain knowledge on Google maps and publishing android applications

Outcome:

Students will be proficient to:

- Acquire knowledge on basics of mobile application development.
- Acquire knowledge on mobile application design patterns.
- Implement android application using android application environment.
- Students must independently develop android applications and publish them.

Unit I: Introduction to mobile applications:

Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications, Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures.

Unit II: Advanced Design:

Designing applications with multimedia and web access capabilities Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications – Achieving quality constraints – performance, usability, security, availability and modifiability.

Unit III: Android Establishing the development environment:

Android architecture, Android Application structure, Emulator- Android virtual device, UI design, Fragments, Activity, Services, broadcast Receiver, Intents/Filters, Content provider- SQlite Programming, SQlite Open Helper, SQlite Database, Interaction with server side applications.

Unit IV: Advanced Android:

Using Google Maps, GPS and Wi-Fi Integration, Android Notification, Audio manager, Bluetooth,Camera and Sensor integration, Sending SMS, Phone Calls. Publishing Android Application.

References:

1. Professional Mobile Application Development - Jeff McWherter and Scott Gowell, Wrox.
2. Android in Practice - Charlie Collins, Michael Galpin and Matthias Kappler, ,DreamTech.
3. Beginning Objective C - James Dovey and Ash Furrow, Apress.
4. Android for programmers: An App-Driven Approach - Paul Deitel ,Harvey Deitel, Abbey Deitel and Michael Morgano, Pearson.

SC **Cloud Computing** **3:1:0**

Objectives:

Students will be able to:

- Ability to understand various basic concepts related to Cloud Computing technologies.
- Demonstrate the architecture and concept of different cloud models: IaaS, PaaS, SaaS
- Learn cloud services for individuals.
- Understand the technologies for data security in cloud.

Outcomes:

Students will be proficient to:

- Demonstrate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications.
- Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud.
- Identify the cloud services for the individuals
- Acquire the knowledge on the core issues of cloud computing such as security, privacy, and interoperability.

Unit I

Introduction: Cloud Computing in a Nutshell, Layers and Types of Clouds, Desired Formats of Cloud, Cloud Infrastructure Management, Challenges and Risks. Virtualization: Virtualization of Computing, Storage and Resources.

Unit II

Cloud Services: Introduction to Cloud Services IaaS, PaaS and SaaS.

Software as a Service (SaaS): Evolution of SaaS, Challenges of SaaS Paradigm, SaaS Integration Services, SaaS Integration of Products and Platforms, Business – to Business Integration, B2B Services.

Infrastructure As a Services (IaaS): Introduction, Background & Related Work, Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, VM Provisioning and Migration in Action, Provisioning in a Cloud Context.

Platform As a service (PaaS): Integration of Private and Public Cloud, Technologies and Tools for Cloud Computing, Resource Provisioning Services.

Unit III

Migrating into a Cloud: Cloud Services for Individuals, Cloud Services Aimed at the Mid- Market, Enterprise Class Cloud Offering, Migration.

Unit IV

Management and Monitoring: Accounts Monitoring, User profiles in Cloud, Resource Allocation and Pricing in Cloud.

Security: Introduction, Cloud Storage: from LANs to WANs, Technologies for Data Security in Cloud Computing, Security Concerns, Legal issues and Aspects, Securing the Private and Public Cloud Architecture.

References:

1. Cloud Computing: Principles and Paradigms - Rajkumar Buyya, James Broberg,Andrzej M Goscinski, Wiley publication.

2. Cloud Computing: A Practical Approach - Toby Velte, Anthony Velte, McGraw-Hill Osborne Media.
3. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud - George Reese, O'Reilly Publication.
4. Cloud Computing Explained: Implementation Handbook for Enterprises - John Rhoton, Recursive Press.

SC **Advanced Java** **2:1:1**

Objectives

Students will be able to:

- Define JDBC and describe the various JDBC drivers
- List the advantages and explain the life cycle of a servlet
- Understand various types of properties in Java beans

Outcomes

Students will be proficient to:

- Develop component-based Java software using JavaBeans
- Develop server side programs in the form of servlets
- Implement Entity Java bean in sateless and stateful environment

Unit I: J2EE overview and JDBC

The ABC of Programming Languages, Taking Programming Languages up a notch, Distributive Systems – Real Time Transmissions, Software objects, Web services, The Tier – Clients, Resources and Components, J2EE Multi – Tier Architecture, Client tier implementation, Enterprise Application Strategy, A new Strategy, The Enterprise Application.

Unit II: Servlets

Introduction, Life cycle of servlet, A simple Java servlet, Anatomy of Java servlet – Deployment Descriptor, Reading Data from a client, Reading HTTP Request Headers, Sending Data to a client and writing the HTTP Response Header, Cookies and Tracking Sessions

Unit III: Java Server Pages

Introduction, JSP tags – Variables and Objects, Methods, Control statements, Loops, Tomcat, Request String, User Sessions, Cookies, Session objects

Unit IV: Enterprise JavaBeans

Introduction, EJB containers, classes and interfaces, Deployment Descriptors – Anatomy, Environment Elements, Referencing EJB and other resources, query

element; Session Java Bean-Stateless and stateful, creating a session java bean; Entity Java Bean – Container Managed Persistence, Bean Managed Persistence; The JAR File

References:

1. The Complete Reference J2EE – Jim Keogh
2. Core and Advanced Java, Black Book - Dreamtech Press

SC **Machine Learning** **2:1:1**

Objective:

Students will be able to:

- Understand basics of machine learning techniques.
- Learn to apply the techniques in the area of pattern recognition and data analytics.
- Understand the supervised and unsupervised machine learning algorithms.

Outcomes:

Students will be proficient to:

- Acquire the knowledge on basics of machine learning techniques.
- Implement different supervised and unsupervised machine learning algorithms.
- Choose appropriate techniques for real time problems

Unit I

Introduction to Machine Learning, types of machine learning, examples. Supervised Learning: Learning class from examples, VC dimension, PAC learning, noise, learning multiple classes, regression, model selection and generalization, dimensions of a supervised learning algorithm. Parametric Methods: Introduction, maximum likelihood estimation, evaluating estimator, Bayes' estimator, parametric classification.

Unit II

Dimensionality Reduction : Introduction, subset selection, principal component analysis, factor analysis, multidimensional scaling, linear discriminant analysis. Clustering: Introduction, mixture densities, k-means clustering, expectation-maximization algorithm, hierarchical clustering, choosing the number of clusters. Non-parametric: Introduction, non-parametric density estimation, non-parametric classification.

Unit III

Decision Trees : Introduction, univariate trees, pruning, rule extraction from trees, learning rules from data. Multilayer perceptron: Introduction, training a perceptron, learning Boolean functions, multilayer perceptron, backpropogation algorithm, training procedures.

Unit IV

Kernel Machines : Introduction, optical separating hyperplane, v-SVM, kernel tricks, vertical kernel, defining kernel, multiclass kernel machines, one-class kernel machines. Bayesian Estimation: Introduction, estimating the parameter of a distribution, Bayesian estimation, Gaussian processes.

Introduction to Graphical Models.

References

1. Introduction to Machine Learning - E. Alpaydin. 2nded, MIT Press.
2. Machine Learning: A Probabilistic Perspective - K. P. Murphy, MIT Press.
3. Machine Learning in Action - P. Harrington , Manning Publications.
4. Pattern Recognition and Machine Learning - C. M. Bishop, Springer.
5. Machine Learning: An Algorithmic Perspective -S. Marsland,,1st Ed. Chapman and Hall.
6. Machine Learning T. Mitchell, McGraw-Hill

SC **Graph Theory** **3:1:0**

Objectives:

Students will be able to:

- Have familiarity with the Graph and its application.
- Understand the Tree, circuit and their relation.
- Know how to represent the problem in matrix representation.
- Understand the directed and dual graph.

Outcomes:

Students will be proficient to:

- Demonstrate different matrix problem in Graph.
- Analyze and solve the different graph problems.
- Divide the problem into modules with their relation.

Unit I: Introduction of Graph, Paths and Circuits

Overview of graph, applications, Finite and Infinite Graphs, Incidence and Degree, Isolated Vertex, Pendant Vertex and Null Graph, Brief history of Graph Theory, Isomorphism, Subgraphs, A puzzle with multicolored cubes, Walks, Paths and Circuits, Connected Graphs, Disconnected Graphs and Components, Euler Graphs, Operations on Graphs, More on Euler Graphs, Hamiltonian path & circuits, Travelling salesman problem.

Unit II: Trees and Fundamental Circuits, Cut-sets and Cut-vertices

Trees, Properties of trees, Pendant vertices in a tree, Distance and Centers in Tree, Rooted and Binary trees, On counting trees, Spanning Trees, Fundamental Circuits, Finding all spanning trees of a Graph, Spanning trees in a weighted graph, Cut-sets, Properties of Cut-set, Cut-sets in graph, Fundamental circuits and cut-sets, Connectivity and separability, Network flows

Unit III: Planar and Dual Graphs, Matrix representation of graphs

Combinatorial Vs. Geometric Graphs, Planar Graphs, Kuratowski's Two Graphs, Different representations of planar graph, Detection of Planarity, Geometric Dual, Combinatorial Dual, More on Criteria of Planarity, Thickness and Crossings, Incidence matrix, Submatrices of A(G), Circuit matrix, Fundamental circuit matrix and rank of B, An application to switching network, Cut-set matrix, Relationships among Af, Bf, Cf, Path matrix, Adjacency matrix.

Unit IV: Directed graphs, Graph Theoretic algorithms and computer programs

Directed graphs, Types of diagraphs, Diagraphs and binary relations, Directed paths and connectedness, Euler Digraphs, Trees with Directed Edges, Fundamental circuits in Diagraphs, Matrices A, B and C of diagraphs, Adjacency matrix of a digraph, Algorithms, Some basic algorithms, Shortest-path algorithms, Depth-first search on graph.

References:

1. Graph Theory and Applications - N.Deo. Kluwer Academic Publishers Norwell, MA, USA.
2. Graph Theory and Applications - Hararay. Academic Press Inc. U.S.
3. Algorithm Design, Addison- J. Kleinberg, E.Tardos, Wesley,2005

SC **Distributed Computing** **3:1:0**

Objectives

Students will be able to:

- Get Exposure on both abstraction and details of file systems.
- Introduce concepts related to distributed computing systems.
- Focus on performance and flexibility issues related to systems design decisions.
- Current literature in distributed systems

Outcomes

Students will be proficient to:

- Demonstrate the basic principles of distributed computing
- Develop an idea about balancing techniques and agreement protocols
- Analyze the difference between distributed file system and distributed database

Unit-1:

Introduction to distributed systems (DS), Design goals, transparencies, fundamental issues, interconnection networks, Client server computing

Unit-2:

Naming and binding, Distributed co-ordination, Process synchronization, Inter-process communication

Unit-3:

Dead locks in distributed systems, Load Scheduling and balancing techniques, Agreement protocols

Unit-4:

Distributed file system design, Distributed database system : A Case study

References

1. Distributed Systems: Princples and paradigms - Andrew S Tanenbaum and Maarten van Steen : PHI(2002)
2. Distributed Computing Systems - T.L. Casavant and M. Singhal , IEEE computing society press
3. Distributed algorithms and protocols - M. Raynal and J. Howlett , Wiley and Sons
4.

SC **NUMERICAL ALGORITHMS** **3:0:1**

Objectives:

Students will be able to:

- Introduce the steps involved in numerical computing and its characteristics.
- Understand different methods of numerical integration and Ordinary Differential Equations.
- Learn different methods of solving simultaneous equations.
- Learn different interpolation and statistical methods.

Outcome:

Students will be proficient to:

- Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions.
- Apply numerical methods to obtain approximate solutions to mathematical problems.
- Derive numerical methods for various mathematical operations and task such as solution of nonlinear equations, numerical integration and ordinary differential equations.

Unit – I

Introduction to Numerical Computing

Introduction, Numeric Data, Analog Computing, Digital Computing, Process of Numerical Computing and Characteristics of Numerical Computing.

Approximations and Error in Computing

Introduction, Significant Digits, Inherent Errors, Numerical Errors, Modelling errors, Blunders, Absolute and relative Errors, Blunders and Error Propagation.

Roots of Nonlinear Equations

Bisection method, False position method, Newton Raphson method and Secant method.

Unit – II

Numerical Integration

Trapezoidal rule, Simpson's $1/3^{rd}$ rule and Simpson's $3/8^{th}$ rule.

Ordinary Differential Equations

Euler's method, Modified Euler's method, Runge-Kutta II and IV order methods.

Unit III

Solutions of Simultaneous Linear Algebraic Equations

Gauss Elimination method, Gauss Jordan method and LU Decomposition method.

Iterative methods

Jacobi's iterative method and Gauss-Seidel iterative method.

Unit – IV

Interpolation: Newton-Gregory forward interpolation, Newton-Gregory backward interpolation, Divided differences, Newton's divided difference and Lagrange's interpolation.

Statistical methods: Introduction, Definitions, Classifications, Frequency Distribution, Mean – Arithmetic Mean for grouped and ungrouped data and Geometric Mean for grouped and ungrouped data.

References:

1. Numerical Methods – E Balaguruswamy, Tata McGraw-Hill Publishing Company Limited.
2. Engineering Mathematics - Dr. K.S. Chandrashekar, Sudha Publcations.
3. Computer Oriented Numerical Methods - Rajaraman V.
4. Fundamentals of Mathematical Statistics - Gupta and Kapoor
5. Probability and Statistics for engineers and scientists - Ronald E. Walpole and Raymond H Mayers
6. Mathematical Statistics - John Freund.

SC **PROBABILITY AND STATISTICS** **3:1:0**

Objectives:

Students will be able to:

- Extend and formalize knowledge of the theory of probability and random variables.
- Introduce new techniques for carrying out probability calculations and identifying probability distributions.
- Study elementary concepts and techniques in statistical methodology.

Outcomes:

Students will be proficient to:

- Use axioms and theorems to describe events and compute probabilities.
- Identify the types of random variables involved in a given problem and calculate relevant probabilities.
- Describe an appropriate statistical model for the given data and compute population parameters using appropriate estimators.

Unit I:

Probability: The concept of probability, the axioms and theorems, conditional probability, Independent Event's, Bayes Theorem. Random Variables and Probability Distributions:

Random variables, discrete probability distributions and Distribution functions: Bernoulli, Binomial, Hyper Geometric, Geometric, Poisson, Uniform.

Unit II:

Continuous Probability distribution and Distributions functions: Exponential, Normal, Uniform, Concepts of Chi square, t joint Distributions, Independent random variables, Functions of random Variables.

Unit III:

Mathematical Expectation: Definition, Functions of Random variables. The variance and Standard Deviation, Moments, Moment Generating Functions, Covariance, Correlation Coefficient. Sampling Theory & Estimation: Population and sample, Random Sampling with and without replacement, the sample mean, sampling distribution of means, proportions, differences. The sample variance, the sample distribution of variances, Point estimates, Interval estimates. Variance analysis.

Unit IV:

Tests of Hypotheses and Significance: Statistical Decisions, Statistical hypotheses, Null Hypotheses, Tests of hypotheses and significance, Type I and Type II errors, level of

significance, Tests involving the Normal distribution, One-Tailed and Two-tailed, Special tests of Significance for large and small samples, The Chi-square test for goodness of fit. Introduction to regression and curve fitting.

References:

1. Fundamentals of Statistics - S C Gupta and V K Kapoor.
2. Fundamentals of Statistics - S C Gupta.
3. Probability and Statistics with Reliability, Queuing and Computor Applicsations - Jusgir S Trivedi, Prentics Hall of India.
4. Probability, Random Variables and Stochastic Processes - Papoulis and S. Unnikrishna Pillai, McGraw Hill, 4th Edition.
5. Probability and Statistics for Engineers - Richard A Johnson, Prentice Hall India.

SC **THEORY OF LANGUAGES AND AUTOMATA** **2:1:1**

Objectives:

Students will be able to:

- Introduce concepts in automata theory and theory of computation
- Identify different formal language classes and their relationships
- Design grammars and recognizers for different formal languages
- Prove or disprove theorems in automata theory using its properties

Outcomes:

Students will be proficient to:

- Acquire a fundamental understanding of the core concepts in automata theory and formal languages
- Design grammars and automata (recognizers) for different language classes.
- Identify formal language classes and prove language membership properties.
- Prove and disprove theorems establishing key properties of formal languages and automata.

Unit I

Brief introduction to Formal Proof: Deductive Proofs, Proving equivalences about sets, The contrapositive, Proof by contradiction, Counterexamples, Central concepts of automata theory: Alphabets, strings, languages.

Finite Automata: Deterministic Finite Automata, Nondeterministic Finite Automata, Equivalence of DFA and NFA, Finite Automata with Epsilon transitions.

Unit II

Regular Expressions, Finite Automata and Regular Expressions: Converting DFAs to regular expressions by eliminating states, converting regular expressions to automata, Applications of regular expressions, Brief overview of algebraic laws of regular expressions.

Properties of Regular Languages: The pumping lemma for regular languages, Applications of the pumping lemma, Closure properties and decision properties of regular languages (proofs not necessary), Minimization of DFAs

Unit III

Context-Free Grammars, Parse Trees, Applications of context-free grammars, Ambiguity in grammars and languages.

Pushdown Automata : Definition, Languages of a PDA, Equivalence of PDAs and CFGs, Deterministic Pushdown Automata.

Normal Forms of Context-free grammars

Unit IV

The pumping lemma for context-free languages, Closure properties of context-free languages (proofs not necessary).

Brief introduction to Turing Machine: Notation for Turing Machine, Instantaneous descriptions for Turing Machines, Transition Diagrams for Turing Machine. Definition of Post's Correspondence Problem.

References

1. Introduction to Automata Theory, Languages and Computation - Hopcroft J. E and Ullman,J.D, Narosa Publishing House, Delhi.
2. Introduction to Languages and Theory of Computation, - John C Martin 3rd edition. TMH Publication,

SC **Digital Image Processing** **3:0:1**

Objectives:

Students will be able to:

- Understand the fundamentals of digital image processing.
- Learn the different Image enhancement techniques.
- Understand the image segmentation techniques.

Outcome:

Students will be proficient to:

- Demonstrate the fundamentals of digital image processing.
- Impart image enhancement in spatial and frequency domains.
- Implement the techniques of image segmentation.

Unit I: Introduction and Digital Image Fundamentals

What is Digital Image Processing?, The Origins of Digital Image Processing, Examples of Fields that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of Image Processing System, Elements of Visual Perception, Image Sampling and Quantization, Some Basic Relationships Between Pixels, Linear and Nonlinear Operations

Unit II: Image Enhancement in the Spatial Domain

Some Basic Gray Level Transformations, Histogram Processing, Enhancement using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.

Unit III: Image Enhancement in the Frequency Domain

Introduction to the Fourier Transform and the Frequency Domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering.

Unit IV: Image Segmentation

Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-based Segmentation, Segmentation by Morphological Watersheds.

Reference:

1. Digital Image Processing – Rafel C. Gonzalez and Richard E. Woods, 2nd Edition, Pearson Education.

SC **Cryptography and Network Security** **3:1:0**

Objectives:

Students will be able to:

- Understand the principles Computer Security.
- Learn conventional cryptosystem.
- Know public key cryptosystem
- Have a detailed knowledge about authentication, hash functions and application level security mechanisms.

Outcomes:

Students will be proficient to:

- Implement the principles and practices of cryptographic techniques.
- Build simple cryptosystems by applying encryption algorithms.
- Comprehend secure identity management (authentication), message authentication, and digital signature techniques.
- Employ the authentication protocol and web security methods.

Unit I: Computer Security Concepts and Classical Encryption Techniques

Introduction-computer security concepts, attacks, security services, security mechanisms; Classical encryption techniques-symmetric cipher models, substitution techniques, transposition techniques, rotor machines

Unit II: Block Ciphers-DES and Introduction to Public Key Cryptography

Symmetric ciphers-Block cipher principles; DES-Algorithm, strengths and weaknesses of DES, attacks on DES and defense, multiple encryptions; Asymmetric ciphers-Essential mathematics, public key cryptography,

Unit III: RSA, MAC and Digital Signatures

RSA, Diffie Hellman key exchange, random number generation, Data integrity and authentication Hash functions; MAC; Digital signatures;

Unit IV: Key Management, Authentication and System Security

Key management; Authentication, Web and system security, Web security; IP security; E mail security; System security-intruders, malicious software, firewalls

References:

1. Cryptography and Network Security - Principles and Practice - William Stallings, PEARSON
2. Cryptography and Network Security -Atul Kahate, Tata McGraw HillSC

C# Programming **3:0:1**

Objectives:

Students will be able to:

- Understand Object-Oriented Paradigm using C# programming.
- Learn extended OOP's concept in C# environment.
- Understand the concepts of interfaces and multithreading.

Outcome:

Students will be proficient to:

- Acquire the knowledge on .NET framework and basics of C#.
- Implement the extended the OOP's concept in C# environment.
- Develop an applications using standard C# libraries

Unit – I

Understanding .NET: The C# Environment

The .Net Strategy, The Origins of .Net Technology, The .NET Framework, The Common Language Runtime, Framework Base Classes, Benefits of the .NET Approach.

Overview of C#

Introduction, A Simple C# Program, Namespaces, Adding Comments, main Returning a Value, Using Aliases for Namespace Classes, passing String Objects to WriteLine Method, Command Line Arguments, Main with a Class, Providing Interactive Input, Using mathematical Functions, Multiple main Methods, Compile Time Errors, Program Structure, Program Coding Style.

Methods in C#

Introduction, Declaring Methods, The Main Method, Invoking Methods, Nesting of Methods, Method Parameters, Pass by Value, Pass by Reference, The Output Parameters, Variable Argument Lists, Method Overloading.

Arrays, Strings, Structures and Enumerations.

Unit – II

Classes and Objects

Introduction, Basic Principles of OOP, Defining a Class, Adding Variables, Adding Methods, Member Access Modifiers, Creating Objects, Accessing Class members, Constructors, Static Members, Static Constructors, Private Constructors, Copy Constructors, Destructors, Member Initialization, The this Reference, Nesting of Classes, Constant Members, Read-only Members, Properties, Indexers.

Operator Overloading

Introduction, Overloadable Operators, Need for Operator Overloading, Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overloading Comparison Operators.

Unit - III

Inheritance

Introduction, Classical Inheritance, Containment Inheritance, Defining a Subclass, Visibility Control, Defining Subclass Constructors, Multilevel Inheritance, Hierarchical Inheritance.

Run-Time Polymorphism

Overriding methods, Hiding Methods, Abstract Classes, Abstract Methods, Sealed Classes, Sealed Methods.

Managing Errors and Exceptions

Introduction, What is Debugging?, Types of Errors, Exceptions, Syntax of Exception handling Code, Multiple Catch Statements, Using Finally Statements, Nested Try Blocks, Throwing Our Own Exceptions, Checked and Unchecked Operators.

Unit - IV

Interfaces

Introduction, Defining an Interface, Extending an Interface, Implementing Interfaces, Interfaces and Inheritance, Abstract Class and Interfaces.

Multithreading in C#

Introduction, Understanding the System.Threading Namespace, Creating and Starting a Thread, Scheduling a Thread, Synchronizing Threads, Thread Pooling.

Delegates and Events

Introduction, Delegates, Delegate Declaration, Delegate Methods, Delegate Instantiation, Delegate Invocation, Multicast Delegates, Events.

References:

1. PROGRAMMING IN C# - A PRIMER by E Balaguruswamy, Third Edition, Tata McGraw-Hill Publications, New Delhi.
2. C# 4.0: The Complete Reference by Herbert Schildt, Tata McGraw-Hill Edition.

SC **Operations Research** **3:1:0**

Objectives:

Students will be able to:

- Understand the scientific methods of providing various departments of an organization with a quantitative basis of decision making.
- Know the importance of various tools and techniques in finding optimal solutions to problems.
- Understand the concept and importance of Transportation problems.

Outcomes:

Students will be proficient to:

- Understand the meaning, definitions, scope, need, phases and techniques of operations research.
- Formulate as L.P.P and derive optimal solutions to linear programming problems by graphical method, Simplex method, Big-M method and Dual Simplex method.
- Implement Transportation and Assignment problems and derive optimum solutions for transportation, Assignment and travelling salesman problems.

Unit I:

Definition of the term Operations Research – Nature , Management Application , Modeling , Principles of modeling , features , Different Phases , scope , Advantages and Limitations of O.R. General method for solving O.R models and Role o O.R in decision making. Some important definitions – solutions to LPP, feasible solution, basic solutions, Basic feasible solution, Optimum basic feasible solution, unbounded solution. Assumptions in LPP, Limitations of LPP, Applications of LPP and advantages of LPP.

Unit-2

Linear Programming – Formulation of a Linear Programming Solving L.P.P. by Graphical Method Problem and Simplex Method.

Artificial Variable Technique – Two phase method and Big M method,

Duality – Meaning, definitions of primal problem, General rules for converting any primal problem into its dual. Characteristics of Dual problem, Advantages of Duality, Dual formulation procedure and Problems to obtain the dual of LPP. Fundamental Duality theorems, Primal and Dual correspondence.

Unit 3:

Transportation Problems – Initial basic notations, North West corner method, least cost method, Vogel's approximation method- Solution for transportation problem, Assignment problem using Hungarian method.

Unit-4

Sequencing Problems – Definitions, terminology and notations, Principle assumptions, Processing 'n' jobs through two machines

Travelling Salesman (Routing) Problems - Formulations of TSP as an assignment problem

Reference Books:

1. Quantitative Techniques - N D Vohra.
2. Operations Research - Hamdy Taha.
3. Operations Research - S.D.Sharma Kedarnath Ramnath Publishers 16th edition.
4. Operations Research - J.K Sharma, 5th Edition, MacMillan Publishers.
5. Operations Research - S.K. Kumar, First Edition, Khataria and Sons Publishers

SC **System Software** **3:0:1**

Objectives:

Students will be able to:

- Understand the design of an assembler for a simple machine architecture.
- Understand the need and design of a macro processing facility.
- Learn about loading, different loading schemes and issues related to it, and implementation of a loader.
- Get an overview of compiler functions and learn about basic lexical analysis and parsing.

Outcomes:

Students will be proficient to:

- Demonstrate the design of assembler.
- Impart various issues related to processing macros.
- Employ different loaders schemes, and related issues.

- Implement simple lexical analyser and parser with Lex and Yacc.

Unit I

Introduction, general machine structure, general approach to a new machine, assemblers, general design procedure, design of assembler- statement of problem, data structure, format of data bases, algorithm, look for modularity.

Unit II

Macro language and the macro processor – macro instructions, features of a macro facility, macro instruction arguments, conditional macro expansion, macro calls within macros, macro instructions defining macros, implementation of a restricted facility.

Unit III

Loaders, Loader schemes, design of an absolute loader, design of a direct linking loader- specification of problem, specification of data structures, format of data bases, algorithm.

Unit IV

Introduction to Compilers : Language Processors, Structure of a Compiler.

Introduction to Lex and Yacc: The Simplest Lex Program, Recognizing Words With LEX, Symbol Tables, Grammars, Parser-Lexer Communication, A YACC Parser, The Rules Section, Running LEX and YACC, Using LEX, Using YACC – Grammars, What YACC Cannot Parse, A YACC Parser - The Definition Section, The Rules Section, Symbol Values and Actions

References

1. Systems Programming - John J. Donovan, Tata McGraw-Hill Edition.
2. Compilers: Principles, Techniques, and Tools - Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, 2nd Edition, Pearson.
3. Lex & Yacc - John R. Levine, Tony Mason, Doug Brown, 2nd Edition, O'Reilly, 2012
4. System Software: An introduction to system programming - Leland L.Beck and D.Manjula, 3rd edition.
5. Systems Programming and Operating Systems - D. M. Dhamdhere, , Second Revised Edition, Tata McGraw-Hill.

SC **System Analysis and Design** **3:1:0**

Objectives:

Students will be able to:

- Understand the basics of system concepts and learn the feasibility study of the system.
- Learn the data analysis of a new system and tools associated in structured analysis.
- Understand the concepts of system testing and standards related to Documentation and management
- Understand the concepts of system security and recovery management

Outcomes:

Students will be proficient to:

- Gather data for analysis and specify the requirements of a system.
- Design system components and environments.
- Build general and detailed models that assist programmers in implementing a system.
- Design a user interface for data input and output, as well as controls to protect the system and its data.

Unit I:

System Concept: Definition, Characteristics, Elements of system, Physical and abstract system, open & closed system and man-made information systems.

System Development Life Cycle: Various phases of system development, Considerations for system planning and control for system success.

Initial Investigation: Determining user's requirements and analysis, fact finding process and techniques.

Feasibility study: Determination of feasibility study, Technical, Operational & Economic Feasibilities, System performance constraints, identification of system objectives and feasibility report.

Unit II:

Cost/Benefit Analysis: Data analysis, cost and benefit analysis of a new system and categories determination.

Tools of structured Analysis: Logical and Physical models, context, diagram, data dictionary, data diagram, IPO and HIPO charts, Gantt charts and pseudo codes. Flow charts- system flow chart, run flow charts etc., decision tree and decision tables.

Unit III:

Input/ Output and Form Design: Input and output form design methodologies, menu, screen design and layout consideration.

Management standards: Programming and operating standards.

Documentation standards: User and programming manual.

System testing & quality: System testing, quality assurance and software maintenance.

Unit IV:

System security: Data Security, Disaster/ recovery and ethics in system development.

Organization of EDP: Introduction, Job Responsibilities & duties of EDP Personnel- EDP manager, System Analyst, Programmers, Operators etc. Selection of Data Processing Resources: purchase, lease, rent-advantages and disadvantages.

References:

1. System Analysis and Design - Awad, Elias M- 2nd Edition, Galgotia Publication Pvt.Ltd.
2. System Analysis & Design - V K Jain, Dreamtech Press
3. Modern System Analysis &Design - A Hoffer, F George, S Valaciah Low Priced Edition, Pearson Education.
4. Information Technology & Computer Applications - V.K.Kapoor, Sultan Chand & Sons, New Delhi.
5.

SC **Information Retrieval** **3:0:1**

Objectives:

Students will be able to:

- Become familiar with difference between Information retrieval and data Base Management Systems.
- Learn different indexing techniques used in retrieval system.
- Understand the concepts of cluster analysis.
- Understand the text classification techniques.

Outcomes:

Students will be proficient to:

- Locate relevant information in large collections of data
- Impart features of retrieval systems for Text data
- Analyze the performance of retrieval systems using test collection.
- Implement different clustering algorithms

Unit I : Boolean retrieval and classical models

An example information retrieval problem, A first take at building an inverted index, Processing Boolean queries; The term vocabulary and postings lists: Document delineation and character sequence decoding, Determining the vocabulary of terms, Faster posting list intersection via skip pointers, Positional postings and phrase queries. Index construction – Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, other types of indexes .

Unit-II: Computing scores in a complete search system

Efficient scoring and ranking, components of an information retrieval system, vector space scoring and query operator interaction, information retrieval system evaluation, Standard test collections, Evaluation of unranked and ranked retrieval results, Assessing relevance, A broader perspective: System quality and user utility, Results snippets

Unit-III: Data Cluster analysis

What is Cluster Analysis, Different Types of clusterings, Different types of clusters, Kmeans – the basic K-means algorithm, additional Issues, K – means and different types of clusters, Strengths and weaknesses, K – means as an optimization Problem, DBSCAN – Center based approach, The DBSCAN Algorithm, Strengths and weaknesses, Fuzzy Clustering, Minimum spanning tree clustering

Unit-IV: Text classification and naive bayes

The text classification problem, Naive bayes text classification, properties of Naive bayes, feature selection, Evaluation of text classification; Support vector machines and machine learning on documents – Support vector machines and machine learning on documents - Support vector machines: The linearly separable case, Issues in the classification of text documents, Machine – learning methods in ad hoc information retrieval; Web search basics – Background and history, Web characteristics, Advertising as the economic model, The serach user experience;

References:

1. Introduction to information Retrieval – Christopher D.Manning, Prabhakar Raghavan, Hinrich Schutze
2. Introduction to Data Mining – Pang – Ning Tan, Vipin Kumar, Michael Steinbach
3. Information Retrieval: Algorithms and Heuristics - David A. Grossman, Ophir FriederSecond Edition, The Information Retrieval Series, Vol. 15, Springer.
4. Algorithms for Clustering Data - Anil K Jain, R. C. Dubes

SC **Big Data Analytics** **2:1:1**

Objectives:

Students will be able to:

- Identify the characteristics of datasets and compare the trivial data and big data for various applications
- Introduce students the concepts and challenges of big data
- Know the implementation of parallel processing with Map Reduce
- Teach students in applying skills and tools to manage and analyze the big data

Outcomes:

Students will be proficient to:

- Understand the concept and challenge of big data and why existing technology is inadequate to analyze the big data
- Collect, manage, store, query, and analyze various forms of big data
- Map the impact of big data for business decisions and strategy
- Understand the significance of No SQL databases over RDBMS

Unit I: Wholeness of Big Data

Introduction; Understanding Big Data,; Caselet: IBM Watson : A Big Data system; Capturing Big Data; Benefitting, Management, Organizing and Analyzing Big data; Technology Challenges for Big Data; Big Data Sources and Applications

Unit II: Big Data Architecture and Distributed Computing Using Hadoop

Google query Architecture; Standard Big Data Architecture; Big data Architecture Examples – IBM Watson, Ebay, Netflix, Paypal; Introduction to Hadoop Framework, HDFS Design Goals, Master Slave Architecture; Installing HDFS – Reading and Writing Local files into HDFS, Reading and Writing Data Streams into HDFS

Unit III: Parallel Processing with Map Reduce:

Introduction, How Google search Works, Map Reduce overview; Sample Map Reduce Application: Wordcount, Map Reduce Programming, Map Reduce Jobs Execution, Hive and Pig Language capabilities

Unit IV:No SQL databases

Introduction, RDBMS Vs NOSQL, Types of NoSQL Databases, Architecture of No SQL, CAP theorem; HBase – Architecture Overview, Reading and Writing Data; Cassandra – Architecture Overview, Protocols, Data Model, Cassandra Writes and Reads, Replication

References:

1. Big Data Made Accessible - Anil Maheshwari
2. Big Data Analytics - M. Vijayalakshmi Radha Shankarmani
3. Data Science and Analytics - VK Jain

SC Information Systems Management 3:1:0

Objectives:

Students will be able to:

- Understand the role information system in business.
- Learn different functional business management systems.
- Understand e-commerce applications and decision support systems.
- Analyzing security and ethical challenges in IT.
- Understand security management of IT.

Outcomes:

Students will be proficient to:

- Acquire the knowledge on role of ISM in business.
- Identify the applications of e-commerce and issues of e-commerce.
- Identify the security and ethical issues in IT.
- Developing security in IT by using security management tools.

UNIT I: Information System Concepts

Information Systems in Business: Introduction, The real world of Information Systems, The fundamental role of IS in business, Trends in IS, Types of Information systems, Managerial challenges of IT.

System Concepts: A foundation, Components of an Information System, Information System Resources, Information System activities, Recognizing Information Systems.

UNIT II: Enterprise Business Systems and Functional Business System

Enterprise Business Systems: Introduction, Cross-functional enterprise applications, Enterprise application integration, Transaction processing systems, Enterprise collaboration systems.

Functional Business Systems: Introduction, Marketing systems, Manufacturing systems, Human resource systems, Accounting systems, financial management systems.

Customer relationship management: Introduction, What is CRM? The three phases of CRM, Benefits and challenges of CRM, Trends in CRM, Enterprise resource planning: Introduction, What is ERP? Benefits and challenges of ERP, Trends in ERP. Supply chain Management: Introduction, What is SCM? The role of SCM, Benefits and challenges of SCM, Trends in SCM

Unit III: Electronic Commerce and Decision Support Systems

Electronic commerce fundamentals: Introduction, The scope of e-commerce, Essential e-commerce, processes, Electronic payment processes.

e-Commerce applications and issues: E-commerce application trends, Business-to-Consumer e-commerce, Web store requirements, Business-to-Business e-commerce, e-commerce marketplaces, Clicks and bricks in ecommerce.

Decision Support Systems- Decision support in business: Introduction, Decision support trends, Decision support systems (DSS), Management Information Systems, On-line analytical processing, Using DSS, Executive information systems, Enterprise portals and decision support, Knowledge management systems, Business and Artificial Intelligence (AI), An overview of AI, Expert systems.

Unit IV: Security and Ethical Challenges , Security Management in IT

Security and Ethical Challenges: Security, Ethical and societal challenges of IT: Introduction, Ethical responsibility of business professionals, Computer crime, Privacy issues, other challenges, Health issues, societal solutions. Security management of IT: Introduction, Tools of security management, Internetworked security defenses, other security measures, System Controls and audits.

References:

1. Management information systems: Managing information technology in the internet worked enterprise - Jams. A O'brien TMH publishing company limited.
2. Management information systems – Laudon and Laudon Publishers.
3. Management information systems - S Sadogopan, PHI
4. Information systems for modern management - G.R. Murdick, 2nd edition PHI.

SC **E-Commerce** **3:1:0**

Objectives:

Students will be able to:

- Impart knowledge on E-Commerce, Various applications connected with E-Commerce.
- Enable the learner for aiming careers in special software development involving E-Commerce technologies.
- Understand the security issues in E - commerce

Outcomes:

Students will be proficient to:

- Analyze the impact of E-commerce on business models and strategy
- Describe Internet trading relationships including Business to Consumer, Business-to-Business, Intra organizational structures.
- Assess electronic payment systems and its securities.
- Recognize and discuss global E-commerce issues

Unit I: Introduction to E-Commerce

Definition, Scope of E-Commerce, Hardware requirements, E-Commerce and Trade Cycle,

Electronic Markets, Electronic Data Interchange and Internet Commerce.

Unit II: Business to Business E-Commerce

Electronic Markets, Electronic Data Interchange (EDI): Technology, Standards (UN/EDIFACT),Communications, Implementations, Agreements, Security, EDI and Business, Inter-Organizational Ecommerce. Business models for E-commerce, Business Process Re-Engineering.

Unit III: Business to Consumer E-Commerce and E-Business

Consumer trade transaction, Web metrics, Elements of E-Commerce, Industry impacts of E-business. Integrating Intranet and internet web applications across multiple networks. Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the net, E-Diversity, Case studies through internet.

Unit IV: Security Issues

How criminals plan attacks, passive attack, Active attacks, cyber stalking, SecureElectronic Transaction (SET) Protocol, Electronic cash over internet, Internet Security, Search engines, Intelligent agents in E-Commerce Electronic payment systems

References:

1. E-Commerce: Strategy, Technologies & Applications - David Whitley, Mcgraw Hill.
2. E-commerce: The Cutting Edge of Business - K. K. Bajaj and Debjani Nag, 2nd Edition, Mcgraw Hill.
3. Handbook of Electronic Commerce - Shaw et al.,Springer,.
4. Global Electronic Commerce: Theory and Case Studies - C. Westland and T. H. K. Clark, University Press.
5. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives - SunitBelapure and Nina Godbole, Wiley India.

SC **Simulation and Modeling** **3:0:1**

Objectives:

Students will be able to:

- Know the basic principles of Simulation
- Learn basic components of a system with classification and examples
- Understand different methods for random number generation
- Know different types of simulations with respect to output analysis

Outcomes:

Students will be proficient to:

- Implementation of different algorithms associated with generation of Random numbers
- Analyzing the real time problems with respect to verification and validation of Simulation Models
- Understanding the output analysis for different types of Simulations

Unit I: Introduction to Simulation

Definition of Simulation, Simulation as a Appropriate and In appropriate tool, Applications of Simulation; Systems and System Environment, Components of a system Model of a system, types and examples; discrete and continuous systems;

Unit II: Random Number Generation

Properties of Random Numbers, Generation of Pseudo-Random Numbers, Techniques for Generating Random Numbers, Tests for Random Numbers(Algorithms and Problems)- Frequency tests, Runs Tests, Gap tests.

Unit III: Random Variate Generation

Inverse Transform Technique; Direct Transformation for the normal Distribution; Convolution Method, Acceptance-Rejection Technique

Unit-IV: Verification and Validation of Simulation Models

Model Building, Verification and Validation, Verification of Simulation Models, Calibration and Validation of models – Validating Input – Output Transformations; Output Analysis for a Single Model – Types of Simulations with Respect to Output Analysis, Output Analysis for Terminating Simulations, Output Analysis for steady state Simulations – Replication Method

References:

1. Discrete System Simulation - Jerry Banks, John S Carson II, Barry L Nelson, David M Nicol, Pearson Education Asia

2. System Simulation - Geoffrey Gordon, Prentice Hall India
3. System Simulation with Digital Computers - N. Deo, PHI

SC **ARTIFICIAL INTELLIGENCE** **3:1:0**

Objectives:

Students will be able to:

- Know an overview of artificial intelligence (AI) principles and approaches.
- Have a basic understanding of the building blocks of AI in terms of intelligent agents like Search, Knowledge representation, inference, logic, and learning.
- Understand expert systems, learning and planning which plays a considerable role in certain applications.

Outcomes:

Students will be proficient to:

- Understand different types of AI agents.
- Know the task domains of Artificial Intelligence.
- Represent the artificial knowledge using different techniques.
- About the concepts of expert system, leaning, planning and making use of these concepts further in real time environment.

Unit I: Introduction

AI Problems, AI Techniques, Defining the Problem as State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

Unit II : Heuristic Search Techniques and Knowledge Representation

Generate and Test, Hill climbing, BFS, DFS, problem reduction, constraints satisfaction, means-ends analysis, Knowledge Representation Issues, Approaches to Knowledge Representation, Issues in Knowledge Representation, Representing simple facts in logic using predicate logic, Procedural Versus Declarative Knowledge, Inferential Versus Inheritable Knowledge, Normal Forms in Predicate Logic and Clausal Forms, Introduction to Non-monotonic Reasoning, Logics for Non-monotonic Reasoning.

Unit III: Knowledge Representational Structures

Weak Slot and Filler Structures: Semantic Nets, Frames. Strong Slot and Filler Structure: Conceptual Dependency, Scripts.

Unit IV: Game Playing, Planning and Expert Systems

Game Playing: Minimax Search Procedure, Adding Alpha-Beta Cut Offs, iterative deepening, Planning –components of a planning systems, Goal Stack Planning, Non linear planning using constraint hosting, Hierarchical planning, Learning, rote learning, learning by taking advice, learning by problem solving, learning from examples Expert Systems: Representing and using domain knowledge, Expert system shells, explanation, Knowledge Acquisition.

References:

1. Artificial Intelligence - Rich Elaine Knight Kevin , Tata McGraw Hill .
2. Introduction to Artificial Intelligence and Expert system - Patterson W Dan, Prentice Hall.

SC **Pattern Recognition** **2:1:1**

Objective:

Students will be able to:

- Understand the basics of pattern recognition systems
- Learn the different techniques of estimations and component analysis.
- Learn the different supervised leaning techniques.
- Learn the different unsupervised leaning techniques.

Outcome:

Students will be proficient to:

- Acquire the knowledge on basics of pattern recognition systems
- Demonstrate the techniques of estimations and component analysis.
- Implement different supervised leaning techniques.
- Implement different unsupervised leaning techniques.

Unit I: Introduction

Machine perception, Pattern recognition systems, Design cycle, Learning and adaptation.

Introduction, Bayesian decision theory - Continuous features, Classifiers Discriminate functions and Decision surfaces, Normal density and Discriminant functions for the Normal Density, Bayes decision theory- Discrete features

Unit II: Maximum Likelihood and Bayesian Parametric Estimation

Introduction, Maximum likelihood estimation, Bayesian estimation, Bayesian parametric estimation, Sufficient statistics, Problems of dimensionality, Component Analysis and Discriminates

Unit III: Nonparametric Techniques

Introduction, Density estimation, Parzen windows, K-Nearest Neighbour estimation, The nearest neighbour rule, Metrics and Nearest Neighbor Classification, Fuzzy Classification, Basics of Neural networks, Support vector machines

Unit IV Unsupervised Learning

Mixture Densities and Identifiability, Maximum – Likelihood Estimates, Application to Normal Mixtures, Unsupervised Bayesian Learning, Data Description and Clustering, Criterion Functions for Clustering, Hierarchical clustering, Online clustering, Graph Theoretic Methods,

References

1. Pattern Classification, 2nd Edition - R.O Duda, P.E. Hart and D.G. Stork, Wiley publications
2. Pattern Recognition and Image Analysis - Earl Gose, Richard, Johnsonbaugh, Steve Jost, Prentice Hall of India, Pvt Ltd.

SC **Entrepreneurship Development** **3:1:0**

Objective:

Students will be able to:

- Understand the basic concepts in the area of entrepreneurship.
- Have the knowledge on the role and importance of entrepreneurship for economic development.
- Develop a personal creativity and entrepreneurial initiative, adopting of the key steps in the elaboration of business idea.
- Develop the stages of the entrepreneurial process and the resources needed for the successful development of entrepreneurial ventures.

Outcome:

Students will be proficient to:

- The students will gain sufficient knowledge and confidence to explore the various Entrepreneurial opportunities.
- Analyze the business environment in order to identify business opportunities.
- Evaluate the effectiveness of different entrepreneurial strategies.
- Specify the basic performance indicators of entrepreneurial activity.

Unit 1: Entrepreneurship: Definition, requirements to be an entrepreneur, Characteristics of entrepreneur, intrapreneur, entrepreneur vs. manager, growth of entrepreneurship in India, Women entrepreneurship, Social Entrepreneurship.

Unit II: Entrepreneurial Motivation: motivating factors, motivation theories-McClelland's Need Achievement Theory, Government's policy actions towards entrepreneurial motivation in the form of Subsidies and Training, Entrepreneurship development programmes.

Unit III: Business Plan: Identification and Selection of projects; Project report: contents and formulation, concept of projectevaluation. Feasibility study report. Detailed Project Report.

Types of Enterprises: Small scale, Medium scale and Large scale enterprises as per MSME Act 2006. Role of small enterprises in economic development, proprietorship, partnership, Limited Liability Partnership and Public Limited companies, Formation, Capital structure and Source of finance. Venture Capital, Angel Capital.

Unit IV: Institutional Support and Policies: Institutional Support towards the development of entrepreneurship in India, technical consultancy organizations, government policies forsmall scale enterprises. Role of EDII, DIC, NIESBUD,NASSCOM and IFCI. Make in India, Skill India and Newstart-ups. Case Studies: Successful and Failed Entrepreneurs.

References:

- Dynamics of Entrepreneurship Development – Vasant Desai.
- Entrepreneurship: New Venture Creation – David H. Holt
- Entrepreneurship Development New Venture Creation – Satish Taneja, S.L.Gupta
- Project management – K. Nagarajan.
- Entrepreneurship: Strategies and Resources – Marc J. Dollinger

SC Cyber Security and Forensic Development 3:1:0

Objectives:

Students will be able to:

- Provide an understanding of Information security fundamentals.
- Learn various computer forensics technologies.
- Understand the concepts of ethical hacking.
- Acquire knowledge about IPR in cyberspace.

Outcomes:

Students will be proficient to:

- Acquire the knowledge on definition of information security fundamentals.
- Describe the types of computer forensics technology.
- Analyze various ethical hacking systems.
- Summarize concepts of IPR in cyberspace

UNIT-I: Introduction to Information Systems

Types of information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Security Investigations. Security threats - Sources of security threats- Motives - Target Assets and vulnerabilities – Consequences of threats- E-mail threats - Web-threats - Intruders and Hackers, Insider threats, Security Threats to E-Commerce, Cyber-crimes.

UNIT-II: Cyber Forensics

Cyber Security, Cyber Security roles, Cyber Security Principles, Difference between information Security and Cyber Security, Types of Computer Forensics Technology, Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised Internet Tracing Methods, Security and Wireless Technologies, Avoiding Pitfalls with Firewalls Biometric Security Systems.

UNIT-III: Ethical Hacking

Essential Terminology, Hacking windows – Network hacking – Web hacking – Password hacking, Malware, Scanning, Cracking. Digital Evidence in Criminal Investigations: The Analog and Digital World, Training and Education in digital evidence, Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence,

General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody, Reconstructing the Attack, The digital crime scene, Investigating Cybercrime, Duties Support Functions and Competencies.

UNIT-IV: Cyber Crimes and Cyber Security Standards

Crime incident Handling Basics: Cyber activism, Tracking hackers, clues to cyber-crime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations, Information Technology Act 2000: Scope, jurisdiction, offense and contraventions, powers of police, adjudication, Intellectual property issues in cyberspace, ISO, Copyright Act, Patent Law, Cyber Laws in India.

References:

1. Cryptography and Information Security - V.K. Pachghare, PHI Learning Private Limited, India.
2. Computer Security: Principles and Practice - William Stallings and Lawrie Brown, Prentice Hall.
3. Threat Modeling - Swiderski, Frank and Syndex, Microsoft Press.
4. Cyber Security Operations Handbook - John W. Rittinghouse, William M. Hancock, ElsevierPub.
5. Computer Ethics - Deborah G Johnson, 4th Edition, Pearson Education Publication.
6. "Ethical Decision making and IT: An Introduction with Cases - Earnest A. Kallman, J.P Grillo, McGraw Hill Publication.
7. Introduction to Information Security and Cyber Law - Dr. Surya Prakash Tripathi, RitendraGoyal, Praveen Kumar Shukla, WilleyDreamtech Press.
8. Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions, Kenneth J. Knapp, IGI Global.
9. Cyber Laws and Its Protection, Cahnder, Harish, PHI Learning Private Limited, Delhi,India.
10. Principles of Information Security - Michael E. Whitman, Herbert J. Mattord, Cengage Learning Pub.
11. Analyzing Computer Security, Charles P. Pfleeger, Shari LawerancePfleeger, Pearson Education India.
12. Computer Network Security - Joseph M Kizza, Springer Verlag.

SC **Values & Ethics** **3:1:0**

Objectives:

Students will be able to:

- Creating awareness about the importance of professional ethics.
- Understand the effect of technology on the social issues.
- Build an awareness how to develop technologies that do not disturb the psychological wellbeing of the society.

Outcomes:

Students will be proficient to:

- Know the importance of ethics and methods of developing technologies
- Describe the structure and function of an ethical society.
- Identify the values and ethics of professional development.
- Explain the causes, effects and control measures for various types of societal failures.
- Get knowledge about various ethical management methods

Unit I: Effects of Technological Growth

- Science, Technology and Engineering as Knowledge and as Social and Professional Activities.
- Rapid Technological growth and depletion of resources. Related latest Reports, Limits of growth; sustainable development.
- Energy Crisis; Renewable Energy Resources.
- Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations.Environmental Ethics.
- Appropriate Technology Movement of Schumacher: later developments.
- Technology and developing nations. Problems of Technology transfer. Technology assessment,impact analysis.
- Human Operator in Engineering projects and industries. Problems of man machine interaction.Impact of assembly line and automation. Human centered Technology.

Unit II: Profession and Human Values:

- Nature of values: Value Spectrum of a ‘good’ life.
- Value Crisis in contemporary society.

- Psychological values: Integrated personality; mental health Societal values: The modern search for a ‘good’ society, justice, democracy, secularism, rule of law; values in Indian Constitution.
- Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity.
- Moral and ethical values: Nature of moral judgments; canons of ethics; Ethics of virtue; ethics of duty; ethics of responsibility.

Unit III: Ethics of Profession

- Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical Responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond. Case studies

Unit IV: IPR

- Introduction to IPR, IPR Laws in India

References:

1. Blending the best of the East & West - Dr.Subir Chowdhury, EXCEL.
2. Ethics & Management. & Indian Ethos - Ghosh ,VIKAS.
3. Business Ethics- Pherwani,EPH.
4. Ethics, Indian Ethos & Management. - Balachandran,Raja,Nair, Shroff Publishers.
5. Values & Ethics of Profession & Business - S.K.Sarangi, Asian Books Private Limited.

SC **MOBILE COMMUNICATION** **3:1:0**

Objectives:

Students will be able to:

- Make students familiar with fundamentals of mobile communication systems.
- Choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties etc.
- Identify the requirements of mobile communication as compared to static communication.
- Identify the limitations of 2G and 2.5G wireless mobile communication and use design of 3G and beyond mobile communication systems.

Outcomes:

Students will be proficient to:

- Understand the concept of cellular communication.
- Understand the basics of wireless communication.
- Have knowledge of GSM and CDMA mobile communication standard, its architecture, logical channels, advantages and limitations.
- To understand multicarrier communication systems.

Unit I:

Introduction - Introduction to Mobile Communication, History of wireless communication, A simplified reference model.

Wireless transmission - Signals, Antennas, Signal propagation: Path loss of radio signals, Additional signal propagation effects and Multi-path propagation. Multiplexing: Space, Frequency, Time and Code division multiplexing. Modulation: Amplitude, Frequency and Phase shift keying.

Spread spectrum: Direct sequence spread spectrum & Frequency hopping spread spectrum and cellular system.

Unit II:

Medium access control - Motivation for specialized MAC: Hidden and exposed terminals &Near and far terminals. SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha and Slotted Aloha, CDMA and Comparison SDMA/FDMA/TDMA/CDMA.

Unit III:

Telecommunication systems - GSM: System architecture, Protocols and Handover.

DECT: System architecture and Protocol architecture, TETRA, UMTS: UMTS releases and standardization & UMTS system architecture and IMT-2000.

Satellite systems - History, Applications, Basics: GEO, LEO and MEO, Routing, Localization and Handover.

Unit IV:

Broadcast systems: Overview, Cyclical repetition of data, Digital audio broadcasting, digital video broadcasting: DVB data broadcasting and DVB for high-speed internet access & convergence of broadcasting and mobile communication.

Wireless LAN: Infra red vs radio transmission, IEEE 802.11: System architecture. Bluetooth: User scenarios & Architecture.

References:

1. Mobile Communications - Jochen Schiller, 2nd Edition, Pearson Education.
2. Introduction To Digital Mobile Communication - Yoshihiko Akaiwa, Wiley India Pvt Ltd
3. Mobile Cellular Communication - Rao, Pearson Education.

PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE [AUTONOMOUS]

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

Affiliated to University of Mysore

DEPARTMENT OF STUDIES IN

COMPUTER SCIENCE

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

CBCS Regulations – 2019-2020

M.Sc. in Computer Science

Preamble

Mahajana Post Graduate Centre is an exclusive PG wing of SBRR Mahajana First Grade College (Autonomous). The centre happens to be the largest PG Centre affiliated to University of Mysore.

It was established in July 2003 with the motto "Enter to Learn, Depart to Serve". The Centre is affiliated to University of Mysore and offers Post Graduation programmes in the areas of direct relevance and value to the current generation of students. The Centre offers Post Graduate degree 12 disciplines and is poised to start new programmes in the years to come.

M.Sc. in Computer Science was started in the year 2008. The programme is approved by University Grants Commission and affiliated to the University of Mysore. It is a four semester full time programme.

1. Definitions

Course

Every course offered will have three components associated with the teaching-learning process of the course, namely

(i) Lecture – L (ii) Tutorial- T (iii) Practical - P, where

L stands Lecture session. **T** stands Tutorial session consisting participatory discussion / self study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands Practice session and it consists of Hands on experience / Laboratory Experiments / Field Studies / Case studies that equip students to acquire the much required skill component.

In terms of credits, every one hour session of L amounts to 1 credit per semester and a minimum of two hour session of T or P amounts to 1 credit per semester, over a period of one semester of 16 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components. That means a course may have only lecture component, or only practical component or combination of any two or all the three components.

The total credits earned by a student at the end of the semester upon successfully completing the course are L + T + P. The credit pattern of the course is indicated as

L: T: P.

If a course is of 4 credits then the different credit distribution patterns in L: T: P format could be

4 : 0 : 0,	1 : 2 : 1,	1 : 1 : 2,	1 : 0 : 3,	1 : 3 : 0,
2 : 1 : 1,	2 : 2 : 0,	2 : 0 : 2,	3 : 1 : 0,	3 : 0 : 1,
0 : 2 : 2,	0 : 4 : 0,	0 : 0 : 4,	0 : 1 : 3,	0 : 3 : 1,

The concerned BoS will choose the convenient credit pattern for every course based on the requirement. However, generally, a course shall be of 3 or 4credits.

Different courses of study are labelled and defined as follows:

Core Course

A course which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

A Core course may be a **Soft Core** if there is a choice or an option for the candidate to choose a course from a pool of courses from the main discipline /subject of study or from a sister/related discipline / subject which supports the main discipline / subject. In contrast to the phrase Soft Core, a compulsory core course is called a **Hard Core** Course.

Elective Course

Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline / subject of study or which provides an extended scope or which enables an exposure to some other discipline / subject/domain or nurtures the candidate's proficiency/ skill is called an Elective Course. Elective courses may be offered by the main discipline/ subject of study or by sister / related discipline / subject of study. A Soft Core course may also be considered as an elective.

An elective course chosen generally from an unrelated discipline / subject, with an intention to seek exposure is called an **open elective**.

An elective course designed to acquire a special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher is called a **Self Study.**

A core course offered in a discipline / subject may be treated as an elective by other discipline / subject and vice versa.

Project work/Dissertation work is a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A project work up to 4 credits is called Minor Project work. A project work of 6 to 8 credits is called Major Project Work. Dissertation work can be of 10-12 credits. A Project/Dissertation work may be a hard core or a soft core as decided by the BoS concerned.

2. Eligibility for Admission

Candidates possessing a degree of University of Mysore, or of any other University, equivalent there to and complying with the eligibility criteria:

The candidates who have passed B.Sc with Computer Science / Computer Applications / Vocational Computer Applications / Computer Maintenance / Computer Systems as an optional course / BCA with minimum 45% marks in Cognate subject are eligible (relaxed to 40% in case of SC, ST and Category I Candidates). The candidates should have also studied Mathematics as a major or a minor subject in their B.Sc. / BCA degree.

3. Scheme of Instructions

3.1 A Masters Degree program is of 4 semesters-two year's duration for regular candidates. A regular candidate can avail a maximum of 8 semesters – 4 years (in one stretch) to complete Masters Degree (including blank semesters, if any). Whenever a candidate opts for blank semester(s)/DROP in a course or in courses or is compelled to DROP a course or courses as per the provision of the regulation, he/she has to study the prevailing courses offered by the department as per the prevailing scheme, when he/she continues his/her study.

3.2 A candidate has to earn a minimum of 76 credits, for successful completion of a Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	**Credits**
Hard Core	A minimum of 42, but not exceeding 52
Soft Core	A minimum of 16
Open Elective	A minimum of 4

Every course including project work, practical work, field work, seminar, self study elective should be entitled as hard core or soft core or open elective by the BoS concerned.

3.3 A candidate can enrol for a maximum of 24 credits per semester with the approval of the concerned department.

3.4 Only such candidates who register for a minimum of 18 credits per semester in the first two semesters and complete successfully 76 credits in total of the 4 semesters be considered for declaration of ranks, medals and are eligible to apply for student fellowship, scholarship, free ships and hostel facilities.

3.5 In excess to the minimum of 76 credits for masters degree in the concerned discipline / subject of study, a candidate can opt to complete a minimum of 18 extra credits to acquire **add on proficiency diploma** in that particular discipline /subject along with

the masters degree. In such of the cases where in, a candidate opts to earn at least 4 extra credits in different discipline / subjects in addition to a minimum of 76 credits at masters level as said above then an **add on proficiency certification** will be issued to the candidate by listing the courses studied and grades earned.

3.6 A candidate admitted to Masters Program can exercise an option to exit with Bachelor Honors Degree / PG diploma after earning 40 credits successfully.

4. Continuous Assessment, Earning of Credits and Award of Grades

The evaluation of the candidate shall be based on continuous assessment. The Structure for evaluation is as follows:

4.1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified as C1, C2, and C3.

4.2 The performance of a candidate in a course will be assessed for a maximum of 100 marks as explained below:

4.2.1 The first component (C1), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions. During the first half of the semester, the first 50% of the syllabus will be completed. This shall be consolidated during the 8th week of the semester. Beyond 8th week, making changes in C1 is not permitted.

4.2.2 The second component (C2), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions. The continuous assessment and scores of second half of the semester will be consolidated during the 16th week of the semester. During the second half of the semester the remaining units in the course will be completed.

4.2.3 The outline for continuous assessment activities for Component-I (C1) and Component-II (C2) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective Departmental Council. The students should be informed about the modalities well in advance. The evaluated courses/assignments during component I (C1) and component II (C2) of assessment are immediately returned to the candidates after obtaining acknowledgement in the register maintained by the concern teacher for this purpose.

4.2.4 During the 18th -20th week of the semester, a semester-end examination of 3 hours duration shall be conducted for each course. This forms the third/final component of assessment (C3) and the maximum marks for the final component will be 70.

4.2.5 In case of a course with only practical component a practical examination will be conducted with two examiners (one internal and one external).

A candidate will be assessed on the basis of

a) Knowledge of relevant processes

b) Skills and operations involved

c) Results / products including calculation and reporting.

If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the departmental council.

4.2.6 **Scheme of Valuation for Practical Examination:**

The student is evaluated for 70 marks in C3 as per the following scheme:

There will be two questions. A candidate has to prepare procedure for both the questions and execute:

Procedure Development	:	10 x 2=20 Marks
Implementation	:	15 x 2=30 Marks
Viva	:	10 Marks
Record	:	10 Marks
Total	**:**	**70 Marks**

*For change of question, 10 Marks will be deducted per question.

4.2.7 If **X** is the marks scored by the candidate out of 70 in C3 in theory examination, if **Y** is the marks scored by the candidate out of 70 in C3 in Practical examination, and if **Z** is the marks scored by the candidate out of 70 in C3 for a course of (L=0):T:(P=0)type that is entirely tutorial based course, then the final marks (M) in C3 is decided as per the following table.

L.T.P distribution	Find mark M in C3
L:T:P	$\frac{[(L+T)*X]+[(T+P)*Y]}{L+2T+P}$
L:(T=0):P	$\frac{(L*X)+(P*Y)}{L+P}$
L:T:(P=0)	X
L:(T=0):(P=0)	X
(L=0):T :P	Y
(L=0): (T=0):P	Y
(L=0): T:(P=0)	Z

4.2.8 The details of continuous assessment are summarized in the following table:

Component	Syllabus in a course	Weightage	Period of Continuous assessment
C1	First 50%	15%	First half of the semester To be consolidated by 8th week
C2	Remaining 50%	15%	Second half of the semester. To be consolidated by 16th week
C3	Semester-end examination (All units of the course)	70%	To be completed during 18th-20th Week.
Final grades to be announced latest by 24th week			

4.2.9 A candidate's performance from all 3 components will be in terms of scores, and the sum of all three scores will be for a maximum of 100 marks (15 +15 + 70).

4.2.10 **Finally, awarding the grades should be completed latest by 24th week of the semester**.

4.3 **Minor/ Major Project Evaluation**

Right from the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his/her progress in the form of seminars in addition to the regular discussion with the guide. Components of evaluation are as follows:

Component – I (C1): Periodic Progress and Progress Reports (15%)

Component – II (C2): Results of Work and Draft Report (15%)

Component– III (C3): Final Viva-voce and evaluation (70%).

The report evaluation is for 40% and Viva-voce examination is for 30%.

4.4 In case a candidate secures less than 30% in C1and C2 put together in a course, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course. In case a candidate's class attendance in a course is less than 75%, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

Teachers offering the courses will place the above details in the Department Council meeting during the last week of the semester, before the commencement of C3, and subsequently a notification pertaining to the above will be brought out by the Chairman of the Department before the commencement of C3 examination.

A copy of this notification shall also be sent to the office of the Director & Controller of Examinations.

4.5 In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUP option.

In case a candidate secures more than or equal to 30% in C3, but his/her grade(G) = 4, as per section 4.7 below, then he/she may be declared to have been conditionally successful in this course, provided that such a benefit of conditional clearance based on G=4 shall not be availed for more than 8 credits for the entire programme of Master's Degree of two years.

In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKE-UP option.

The candidate has to exercise his/her option to DROP/MAKE UP immediately within 10 days from the date of notification of results. The MAKE UP examination will be conducted within one month of the notification of the results.

If a candidate is still unsuccessful, A MAKE UP Examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with next regular even semester examinations; however, not exceeding double the duration norm in one stretch from the date of joining the course.

4.6 A candidate has to re-register for the DROPPED course when the course is offered again by the department if it is a hard core course. The candidate may choose the same or an alternate core/elective in case the dropped course is soft core / elective course. A candidate who is said to have DROPPED project work has to re-register for the same subsequently within the stipulated period. **The details of any dropped course will not appear in the grade card.**

4.7 The grade and the grade point earned by the candidate in the subject will be as given below.

Marks(M)	Grade	Grade Point (GP = V x G)
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

Here, P is the percentage of marks (P = [(C1+C2)+M] secured by a candidate in a course which is rounded to nearest integer. V is the credit value of course. G is the grade and GP is the grade point.

4.8 A candidate can withdraw any course within in ten days from the date of notification of final results. Whenever a candidate withdraws a paper, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is soft core/open elective.

A DROPPED course is automatically considered as a course withdrawn.

4.9 Overall cumulative grade point average (CGPA) of a candidate after successful Completion the required number of credits (76) is given by:

CGPA = ΣGP / Total number of credits

5. Classification of Results

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	Numerical Index	Qualitative Index
4<= CGPA <5	5	Second Class
5<= CGPA <6	6	
6<= CGPA <7	7	First Class
7<= CGPA <8	8	
8<= CGPA <9	9	Distinction
9<= CGPA <10	10	

Overall percentage = 10* CGPA or is said to be 50% in case CGPA<5

6. Medium of Instruction

The medium of instruction shall be English. However, a candidate will be permitted to write the examinations in either English or Kannada. This rule is not applicable to languages.

7. Provision for Appeal

If a candidate is not satisfied with the evaluation of C1 and C2 components, he / she can approach the grievance cell with the written submission together with all facts, the assignments, test papers etc., which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty as prescribed by the college on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she is found guilty. The decision taken by the grievance cell is final.

For every program there will be one grievance cell.

The composition of the grievance cell is as follows.

1. The Controller of Examinations ex-officio Chairman / Convener

2. One senior faculty member (other than those concerned with the evaluation of the course concerned) drawn from the department/discipline and/or from the sister departments/sister disciplines.

3. One senior faculty members / subject experts drawn from outside the college.

8. Any other issue not envisaged above, shall be resolved by the competent authority of the autonomous college, which shall be final and binding.

9. Any matter which is not covered under this regulation shall be resolved as per the College/Mysore University regulation.

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Scheme and Syllabi for M.Sc.(Computer Science) - 2019-20

I Semester

Sl. No	Course Title	Type	Credits		
			L	T	P
1	Discrete Mathematical Structures	HC	3	1	0
2	Advanced Data Structures	HC	3	1	0
3	Data Communication	HC	4	0	0
Soft Core Courses (Choose at most 2 Courses)					
1	Java Programming	SC	3	0	1
2	Operating Systems	SC	3	1	0
3	Principles of Programming and Problem Solving	SC	3	0	1
4	Communication Skills	SC	4	0	0
5	Computer Architecture	SC	4	0	0
6	Numerical Algorithms	SC	4	0	0

II Semester

Sl. No	Course Title	Type	Credits		
			L	T	P
1	Design And Analysis of Algorithms	HC	2	1	1
2	Computer Networks	HC	3	1	0
3	Data Base Management Systems	HC	3	0	1
Soft Core Courses (Choose at most 2 Courses)					
1	System Software	SC	3	0	1
2	Computer Graphics	SC	2	1	1
3	Professional Ethics and Values	SC	3	1	0
4	Pattern Recognition	SC	3	1	0
5	Web Technologies	SC	3	0	1
	World Wide Web	**OE**	2	2	0

III Semester

Sl. No	Course Title	Type	Credits		
			L	T	P
1	Theory of Languages	HC	3	1	0
2	Python Programming	HC	3	0	1
3	Software Engineering	HC	3	1	0
Soft Core Courses (Choose at most 2 Courses)					

1	Artificial Intelligence	SC	3	1	0
2	Digital Image Processing	SC	3	0	1
3	C# Programming	SC	3	0	1
4	Android Programming	SC	3	1	0
5	Big Data Analytics	SC	3	1	0
	E-Commerce	**OE**	3	1	0

IV Semester

Sl. No	**Course Title**	**Type**	**Credits**		
			L	**T**	**P**
1	Dissertation	HC	0	2	10
Soft Core Courses (Choose at most 2 Courses)					
1	Compiler Construction	SC	3	1	0
2	Advanced Data Base Management System	SC	2	1	1
3	Data Mining	SC	3	1	0
	Office Automation	**OE**	**2**	**2**	**0**

HC **DISCRETE MATHEMATICAL STRUCTURES** **[3:1:0]**

Objectives:

- Learn the fundamentals of counting theory, set theory, logic, quantifiers, and relations.
- Learn different proof techniques like direct or indirect, proof by contradiction, check the validity of a given argument.
- Understand the concepts of functions and relations to solve a given problem.
- Learn the concepts of graph theory and applications.

Outcomes:

- Apply the concepts of set theory, logic, quantifiers and relations in specifying and solving problems.
- Identify the quantifiers and their uses and Make use of fundamentals of logic theory.
- Apply the mathematical induction principle and different methods to solve the given problem.
- Make use of basic concepts of graph theory and solve the given problem.

Unit I

Principles of Counting: The Rules of Sum and Product, Permutation, Combinations, combinations with repetition and Problems.

Sets and Subsets: Set Operations, Membership table method and Venn diagram method and the Laws of Set Theory, Addition principle-Counting and Venn Diagrams, A First Word on Probability.

Unit II

Fundamentals of Logic: Basic Connectives and Truth Tables, Logic Equivalence – The Laws of Logic theory, Logical Implication – Rules of Inference. Argument – Definition, validity and invalidity.

The Use of Quantifiers: Quantifiers, Definitions, Argument representation using quantifiers, validity.

Proofs of Theorems- Direct and Indirect method - contradiction and contra positive method.

Unit III

Relations and Functions: Properties of the Integers: Mathematical Induction, The Well Ordering Principle- Mathematical Induction (Alternative form)(problems),Recursive Definitions

Cartesian Products and Relations, Functions – Plain and One-to-One, Onto Functions – Stirling Numbers of the Second Kind, Special Functions, The Pigeon-hole Principle, Function Composition and Inverse Functions.

Unit IV

An Introductions to Graph Theory: Definitions and examples Sub graphs, Complements, and Graph Isomorphism, Vertex Degree : Euler Trails and Circuits, Planar Graphs, Hamiltonian Paths and Cycles.

Graph coloring and Chromatic Numbers. Definitions, Properties and examples rooted trees, Trees and sorting. Weighted Trees and Prefix codes. Spanning trees- minimal spanning tree by Prims and Krushkal's Algorithm.

References

1. Discrete and Combinatorial Mathematics, Ralph P. Grimaldi, 5th Edition, Pearson Education.
2. Discrete Mathematics and its Applications, Kenneth H. Rosen, 7th Edition, McGraw Hill.
3. Discrete Mathematical Structures with Applications to Computer Science by Tremblay and Manohar, McGraw-Hill Publications.
4. A Treatise on Discrete Mathematical Structures, Jayant Ganguly, Sanguine-Pearson.
5. Discrete Mathematical Structures –by Dr. D.S. Chandrashekaraih.

HC **Advanced Data Structures** **[3:1:0]**

Objectives:

- Learn about and understand different data structures like dictionaries, hash tables, priority queues, and different types of search trees.
- Understand how the above data structures can be represented.
- Understand how different operations like insertion, deletion, searching, etc. can be implemented in the above mentioned data structures.
- Understand string matching algorithms and operations on tries.

Outcomes:

- Understand the ADT specification of dictionary data structure, priority queue and binary search trees.
- Perform insertion, deletion and searching operation on dictionary, priority queue and binary search trees.
- Perform the sorting using external sorting.
- Identify the applications of string matching algorithms and tries.

Unit I

Dictionaries, linear list representation, skip list representation, operations insertion, deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, comparison of hashing and skip lists.

Unit II

Priority Queues — Definition, ADT, Realizing a Priority Queue using Heaps, Definition, insertion, Deletion, External Sorting- Model for external sorting, Multi-way merge, Poly-phase merge.

Unit III

Search Trees , Binary Search Trees, Definition, ADT, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations — Insertion, Deletion and Searching, Introduction to Red —Black and Splay Trees, B-Trees, B-Tree of order m, Comparison of Search Trees

Unit IV

Pattern matching and Tries: Pattern matching algorithms-Brute force, the Boyer —Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries and Suffix tries.

References

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India), 2nd edition, Universities Press Orient Longman.
2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.
3. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education, Second Edition.
4. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson.
5. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

HC **DATA COMMUNICATION** **[4:0:0]**

Objectives:

- To learn the principles of data communication
- Understand the need for protocol architectures and the design of different protocol models.
- Understand different signal encoding techniques.
- Understand different link layer design issues and protocols.

Outcomes:

- Understand the terminologies used in data transmission and physical and transmission characteristics of transmission media.
- Understand the signal encoding techniques and digital data communication techniques.
- Familiarize oneself with data link control protocols and different types of multiplexing.
- Comprehend the different switching techniques.

Unit I : Overview and Data Communication

Data communication and networking: communication model, data communications, networks, internet, the need for protocol architecture, the TCP/IP protocol, OSI model, data transmission concepts and terminology (simples and duplex modes), Analog and Digital transmission, transmission impairments, channel capacity, guided transmission media(twisted pair, co-axial cable, fibre optic cable, satellite links), Wireless transmission, wireless propagation, line-of-sight transmission.

Unit II : Signal Encoding Techniques and Digital Data Communication Techniques

Digital data-digital signals, analog signals-analog data, digital signals-analog data, analog signals.

Asynchronous and synchronous transmission, types of errors, error detection, error correction, line configurations.

Unit III : Data link Control Protocols and Multiplexing

Flow control, error control (LRC/EDC/ARQ), High-Level Data Link Control (HDLC)

Multiplexing: Frequency Division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, asymmetric digital subscriber line, XDSL.

Unit IV : Circuit Switching, Packet Switching and Asynchronous Transfer Mode

Switched communication networks, circuit switching networks, circuit switching concepts, soft switch architecture, packet switching principles, X.25, frame relay, protocol architecture, ATM cells and transmissions.

References

1. Data and Computer Communication – William Stallings, Eighth Edition, PHI.
2. Data Communications and Networking by Behrouz A Forouzan

SC **Java Programming** **[3:0:1]**

Objectives:

- To gain an understanding of the object oriented paradigm and concepts in general.
- Learn the basics of the Java environment and the programming language.
- To learn how to implement different object oriented concepts in Java.
- To learn about using files and creating packages.

Outcomes:

- An understanding of different aspects of object oriented paradigm.
- Able to model problems and solutions using java.
- Able to utilise inheritance, polymorphism and other principles to model solutions.
- Able to create and use packages.

Unit 1: Object-Oriented Programming (OOPS) concepts:

Classes & Objects, Pillars Of Object Oriented Programming, OOPS concepts and terminology, Encapsulation & Examples, Abstraction & Examples, Inheritance: Advantages of OOPS, What is Java?, Execution Model Of Java, Bytecode, First Java Program, Compiling and Interpreting Programs, The JDK Directory Structure, Data types and Variables: Primitive & non-Primitive Datatypes & Declarations, Variables & Types, Numeric & Character Literals, String formatting and Parsing, String Literals, The Dot Operator.

Unit 2: Methods:

What are Methods? Method Structure, Declaration Of Methods, Calling Of Methods, Defining Methods, Method Parameters Scope, static methods, Operators and Expressions:

Expressions, Operator Precedence, The Cast Operator, Control Flow Statements, While and do-while Loops, for Loops, The continue Statement, The break Statement, Objects and Classes: Defining a Class, Creating an Object, Accessing Class Members, Instance Data and Class Data, Defining Methods, Constructors, Access Modifiers, Inheritance & Polymorphism:

Inheritance in Java, Types Of Inheritance, Method Overloading, Run-time Polymorphism, Method Overriding, super keyword.

Unit 3 : Java Files and I/O:

What is a Stream?, Reading and Writing to Files (only txt files), Input and Output Stream classes, using the file class, Using Streams, creation of files, reading/writing characters, bytes, Interfaces and Abstract Classes: What is an Interface, Defining Interfaces, Separating Interface and Implementation, Implementing and Extending Interfaces, Abstract Classes.

Unit 4 : Packages:

What is a Package?, Advantages of using a Package, Types Of Packages, Naming Convention, Steps For Creating Packages, The import Statement, Static Imports, CLASSPATH and Import, Defining Packages, Package Scope, Exception Handling: Exceptions Overview, Exception Keywords, Catching Exceptions, The finally Block, Exception Methods, Declaring Exceptions, Defining and Throwing Exceptions, Errors and Runtime Exceptions, Assertions.

References

1. Programming with JAVA- A Primer, E. Balagurusamy, Tata Mc-Graw-Hill.
2. JAVA for you- P Koparkar, Tata Mc-Graw-Hill.

SC **Operating Systems** **[3:1:0]**

Objectives:

- To learn about the fundamental principles of operating system, processes and their communication
- To learn about various operating system issues related to process management management like threads, process scheduling, synchronisation and deadlocks.
- To learn about various memory management techniques, including virtual memory, paging and segmentation.
- To know about disk and file management and the distributed file system concepts.

Outcomes:

- Able to comprehend the operating system components and its services
- Able to understand how process is created and various process related components of the operating system.
- Able to comprehend how memory management and virtual memory management is done.
- Able to understand different file and directory structures and how files are stored in secondary storage.

Unit I

Introduction -Computer System Organisation – Computer system architecture – Operating system operations - Operating systems services-System calls- Types of system calls – Operating system structure.

Processes-process concept- process scheduling-operation on processes.Multithreaded programming – Multithreading models – Threading issues.

Unit II

Process Scheduling - Scheduling criteria-Scheduling algorithms – Thread scheduling - Multiple-processor Scheduling.

Process Synchronization – Critical Section problem – Peterson's solution - Semaphores-Classical problems of synchronization - critical regions – Introduction to Montors.

Unit III

Deadlocks – System model - Deadlock Characterization - Deadlock handling - Deadlock Prevention - Deadlock avoidance - Deadlock Detection - Deadlock Recovery.

Memory Management – Swapping - Contiguous Memory allocation -Segmentation Paging.

Virtual Memory Management - Demand paging – Copy on write - Page Replacement - Thrashing.

Unit IV

File System – File concept – Access methods – Directory structure – Directory and disk structure - File Systems structures - Directory Implementation - Allocation Methods - Free Space management.

Disk Structures – Disk attachment - Disk Scheduling – Disk management.

References

1. "Operating Systems Concepts", Abraham Silberschalz Peter B Galvin, G.Gagne, 9th Edition, John Wiley & Sons.
2. "Modern operating Systems", Andrew S.Tanenbaum, Third Edition, PHI.
3. "Operating Systems: A Concept-based Approach", D M Dhamdhere, Second Edition, Tata McGraw-Hill.
4. "Operating Systems", H M Deital, P J Deital and D R Choffnes, 3rd edition, Pearson Education.
5. "Operating Systems: Internals and Design Principles", William Stallings, Seventh Edition, Prentice Hall.

SC **PRINCIPLES OF PROGRAMMING AND PROBLEM SOLVING** **[3:0:1]**

Objectives:

- To introduce the steps involved problem solving and attributes of software design.
- To introduce notations to describe syntax and semantics of programming languages
- To analyzethe behaviour of simple programs in imperative languages using concepts such as binding, scope, control structures, subprograms and parameter transmission techniques.
- To introduce the concepts distributed computing and network programming.

Outcomes:

- Learn the steps involved in problem solving and the stages involved in translation.
- Learn elementary data types and structured data types.
- Comprehend the need of inheritance and its various types.
- Learn the various conditional statements, control structures and different types of parameter transmission techniques.

Unit I

Language Design Issues: Why study programming languages?, The impact of programming paradigms: Problem solving, What is a programming language?, Software design, C overview.

Language Translation Issues: Programming Language Syntax: General syntactic criteria, Syntactic elements of a language.

Stages in translation: Analysis of the source program, Synthesis of the object program.

Elementary data types: Properties of types and objects: Data objects, Variables and constants, Data types, Declarations, Assignment and initialization. Scalar data types: Numeric data types, Enumerations, Booleans, Characters. Composite data types: Files and Input-Output.

Unit II

Encapsulation:

Structured data types: Structured data objects and data types, Specification of data structure types, Declaration and type checking for data structures, Vectors and Arrays, records, Lists, Sets.

Abstract data types: Evolution of the data type concept, Information hiding. Encapsulation and good program design, Type definitions.

Inheritance: Derived classes, Methods.

Unit III

Sequence control: Implicit and explicit sequence control, sequencing with arithmetic expressions: Tree-structure representation, Execution-time representation. Sequence control between statements: Basic statements, Structured sequence control.

Subprogram control: Subprogram sequence control: Simple call-return subprograms, Recursive subprograms. Parameter transmission: Actual and formal parameters, Methods for transmitting parameters, Transmission semantics.

Unit IV

Distributed Computing: Variations on subprogram control: Exceptions and exception handlers. Parallel programming: Principles of parallel programming. Hardware developments: Processor design, System design.

Network Programming: The World Wide Web, Evolution of scripting languages, Applets, XML.

References

1. "Programming languages – Design and Implementation" – 4th Edition by Terrence W Pratt, Marvin V Zelkowitz and T.V. Gopal.
2. Fundamentals of Programming languages by Ellis Horowitz

SC **Communication Skills** **[4:0:0]**

Objectives:

- The factors governing good communication and how good communication skills can be developed.
- How good communication skills are a critical building block to both personal and business success.
- How to use effective communication skills in business.
- The need to modify communication depending on business situation and circumstances.

Outcomes:

- Students will be able to understand and apply knowledge of human communication and language processes as they occur across various contexts from multiple perspectives.
- Students will be able to understand and evaluate key theoretical approaches used in the interdisciplinary field of communication.

- Students will be able to find, use, and evaluate primary academic writing associated with the communication discipline.
- Students will be able to communicate effectively orally and in writing.

Unit I

Importance of communication, its basic model, formal and informal communications, barriers to communication, feedback and its effectiveness, Non- Verbal communication - Etiquettes.

Unit II

Oral communication, Speaking: Paralanguage: Sounds, stress, intonation- Art of conversation – Presentation skills, – Public speaking- Expressing Techniques, importance of listening, role of visual aids, persuasive communication.

Unit III

Written communication – Effective writing – Paragraph – Essay- Reports – Letters- Articles – Notices, Agenda & Minutes.

Unit IV

Interview sills: Types of Interviews – Preparing for interview – Preparing a CV – Structuring the interview- Mock Interview - Quick Tips.

References

1. Soft skills: know yourself & know the world, Dr. Alex K.
2. Communication for results – C Hamilton & Parker.
3. Instrument of Communication – P Meredith.
4. Basic Management skills for all – E H McGrath.
5. Managerial Communication – P M Timm.
6. Thesis and Assignment writing – Anders

SC **Computer Architecture** **[4:0:0]**

Objectives:

- To conceptualize the basics of organizational and architectural issues of a digital computer.
- To analyse performance issues in processor and memory design of a digital computer.
- To comprehend various data transfer techniques in digital computer.
- To analyse processor performance improvement using instruction level parallelism

Outcomes:

- Develop an ability to understand the concept of cache mapping techniques.
- Develop an ability to understand basics of organizational and architectural issues of a digital computer.
- Acquire knowledge and understanding the theory of Digital Design and Computer Organization to provide an insight of how basic computer components are specified.
- Develop an ability to conceptualize instruction level parallelism.

Unit I : Parallel Computer Models

The state of Computing - Evolution of Computer Architecture, System Attributes to Performance. Multiprocessors and Multicomputer Shared Memory Multiprocessors, Distributed – Memory Multicomputer Multivector and SIMD Computers – Vector Supercomputers, SIMD supercomputers conditions of Parallelism – Data and Resource Dependencies, Hardware and software parallelism.

Unit II : Processor and Memory Hierarchy

Process Technology – Instruction Pipelines, Processors and Coprocessors, Instruction Set Architectures, Representative CISC Processors, Representative RISC Processors, Superscalar Processors. Memory Technology, Inclusion, Coherence and Locality. Cache Memory organization – Cache Addressing modes, Direct mapping and Associative caches, Set Associative Cache. Shared – Memory organizations – Interleaved Memory organization

Unit III : Pipelining

Linear Pipeline processors – Asynchronous and Synchronous Models, Instruction Pipeline Design – Mechanisms for instruction Pipelining, Arithmetic Pipeline Design – Computer Arithmetic Principles, Arithmetic Pipeline Stage, Multifunctional Arithmetic Pipelines

Unit IV : Multiprocessors

Multiprocessor system Interconnects – Hierarchical Bus system, Cache Coherence Problem. Message – Passing Mechanisms – Message – Routing Schemes, Deadlock and Virtual Channels, Multithreaded Architecture – Multithreading Principles, Issues and Solutions

References

1. Advanced Computer Architecture – Kai Hwang – Tata McGraw Hill.
2. Parallel Computer Architecture, David E Culler, J.P.Singh and AnoopGuptha.
3. Computer Architecture and Organization – John. P. Hayes – Third Edition –Tata McGraw Hill.

SC **NUMERICAL ALGORITHMS** **[4:0:0]**

Objectives:

- To introduce the different types of errors in computing
- Finding the roots of the non-linear equations, Numerical integration and Ordinary differential equations.
- Finding solutions of simultaneous linear algebraic equations.
- Introducing interpolation and statistical methods .

Outcomes:

- Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions.
- Apply numerical methods to obtain approximate solutions to mathematical problems.
- Derive numerical methods for various mathematical operations and tasks such as solution of non-linear equations, numerical integration and ordinary differential equations.
- Gain an understanding of interpolation and statistical methods.

Unit I

Introduction to Numerical Computing: Introduction, Numeric Data, Analog Computing, Digital Computing, Process of Numerical Computing and Characteristics of Numerical Computing.

Approximations and Error in Computing: Introduction, Significant Digits, Inherent Errors, Numerical Errors, Modelling errors, Blunders, Absolute and relative Errors, Blunders and Error Propagation.

Roots of Nonlinear Equations: Bisection method, False position method, Newton Raphson method and Secant method.

Unit II

Numerical Integration: Trapezoidal rule, Simpson's 1/3rd rule and Simpson's 3/8th rule.

Ordinary Differential Equations: Euler's method, Modified Euler's method, Runge-Kutta II and IV order methods.

Unit III

Solutions of Simultaneous Linear Algebraic Equations: Gauss Elimination method, Gauss Jordan method and LU Decomposition method.

Iterative methods: Jacobi's iterative method and Gauss-Seidel iterative method.

Unit IV

Interpolation: Newton-Gregory forward interpolation, Newton-Gregory backward interpolation, divided differences, Newton's divided difference and Lagrange's interpolation.

Statistical methods: Introduction, Definitions, Classifications, Frequency Distribution, Mean – Arithmetic Mean for grouped and ungrouped data and Geometric Mean for grouped and ungrouped data.

References

1. Numerical Methods – E Balaguruswamy, Tata McGraw-Hill.
2. Engineering Mathematics Vol. III - A by Dr. K.S. Chandrashekar, SudhaPublcations.
3. Computer Oriented Numerical Methods by Rajaraman V.
4. Fundamentals of Mathematical Statistics by Gupta and Kapoor
5. Probability and Statistics for engineers and scientists by Ronald E. Walpole and Raymond H Mayers
6. Mathematical Statistics by John Freund.

HC Design and Analysis of Algorithms [2:1:1]

Objectives:

- Comprehend the performance analysis of an algorithm.
- Understand time and space complexity of various data structures.
- Comprehend time and space complexities of an algorithm.
- Learn different design strategies like divide and conquer, transfer and conquer, greedy, dynamic programming, backtracking and branch and bound

Outcomes:

- Compare between different data structures. Pick an appropriate data structure for a design situation.
- Analyze Performance of algorithms using asymptotic analysis.
- Model problems and solutions using different design paradigms.
- Synthesize algorithms, and analyze them.

Unit I : Introduction

Algorithms, structured algorithms, analysis of algorithms, complexity analysis and profiling, asymptotic complexity, review of stack, queues, Recursion, heaps and heap sort, case studies(complexity analysis and profiling)- prime and Fibonacci numbers, GCD and LCM, sorting algorithms- selection sort, bubble sort and insertion sort.

Unit II : Divide and conquer & Transfer and conquer

Divide and conquer general method, binary search, Maximum and minimum element in list, merger sort, quick sort. Transfer and Conquer – solution to simultaneous equations by triangularization, diagonalization algorithms.

Unit III : Greedy method and Dynamic programming

Greedy method-General method, optimal storage on tapes, knapsack problem, job sequencing with deadlines, optimal merge pattern, Minimum cost spanning trees(prim's algorithm and Kruskal’s algorithm),single source shortest paths. Dynamic Programming-General methods, multistage graphs, all pair’s shortest paths, Travelling salesman problem, 0/1 Knapsack problem

Unit IV : Backtracking and Branch and Bound

General method for backtracking, 8-queen Problem, sum of subsets problem.

Branch and Bound general method, 0/1 knapsack problem, travelling salesman problem.

References

1. “Fundamentals of Computer Algorithms” Ellis Horowitz, SartajSahni and Sanguthevar, RajasekaranGalgotia Publications.
2. ”Introduction to the Design & Analysis of Algorithms”, Anany V. Levitin Pearson Education, 3rd edition.
3. “Introduction to Algorithms”, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein.

HC **COMPUTER NETWORKS** **[3:1:0]**

Objectives:

- To understand fundamental principles of design of network architectures and software.
- To analyze the function and design strategy of medium access control sub layer.
- To understand the design and implementation of network layer and transport layer.
- To acquire basic knowledge of various application protocol for internet security issues and services.

Outcomes:

- Able to comprehend the functionalities needed for network communication into layers
- Able to choose the required functionality at each layer for given application.
- Able to comprehend different algorithms used in different layers.
- Able to understand the working principles of various application protocols.

Unit I

Network Software: Protocol hierarchies, Design issues for the layers, Connection Oriented and Connection less Services, Service Primitives; Reference Models: OSI, TCP/IP, Comparison of OSI and TCP reference models.

Medium Access Control Sublayer : The Channel Allocation problem, Multiple access protocols: ALOHA, Pure ALOHA, Slotted ALOHA, Carrier Sense Multiple Access protocols, Persistent and Non persistent CSMA, CSMA with collision detection, Collision-Free protocols: Bit map protocol, Binary countdown; Limited Contention protocols; Brief introduction to IEEE 802 standards; Ethernet MAC address, Brief introduction to Wireless LAN's, Brief introduction to Bluetooth.

Unit II

Network layer design issues, Routing Algorithms: Optimality principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing; Congestion Control Algorithms: Congestion Prevention Policies, Jitter Control, Techniques for achieving good quality of service, Congestion control for multicasting; Internetworking, The Network layer in the Internet.

Unit III

Transport Layer : The Transport service, Elements of Transport protocols: Addressing, Connection Establishment, Connection Release, Error control and Flow control, Multiplexing, Crash recovery; The Internet Transport protocols: UDP, TCP.

Unit IV

Introduction to Application Layer, The Domain Name System, Electronic Mail : Brief overview of Architecture, Service, Message Formats, and Message delivery, Brief architectural overview of the World Wide Web.

Streaming Audio and Video : Digital Audio and Digital Video, Streaming stored media and live media.

References

1. Computer Networks, Andrew S Tanenbaum ,5th Edition, PHI publications.
2. Computer Networks:A Top-Down Approach, Forouzan, Behrouz A., MosharrafFirouz., TaTa McGraw Hill publications, First Edition.
3. Data & Computer Communications, Stallings, William, Pearson Education Asia, 6th Edition.
4. Data communications and Computer Networks, Prakash C. Gupta, 1st Edition, 5th Reprint, PHI.

HC **Database Management Systems** **[3:0:1]**

Objectives:

- Learn and practice data modelling using the entity-relationship and developing database designs.
- Understand the use of Structured Query Language (SQL) and learn SQL syntax.
- Apply normalization techniques to normalize the database.
- Comprehend the needs of database processing and learn techniques for controlling the consequences of concurrent data access.

Outcomes:

- Comprehend data models and schemas in DBMS.
- Use SQL- the standard language of relational databases.
- Understand the functional dependencies and design of the database.
- Understand the concept of Transaction and Query processing.

Unit I

Overview of Database Systems and Entity- Relationship Model

A historical perspective, file system versus a DBMS, advantages of a DBMS, levels of abstraction in a DBMS, structure of a DBMS, people who work with databases, entity, entity types, entity sets, attributes, keys, relationships, relationship sets and additional features of ER-model-key constraints, participation constraints and weak entities.

Unit II

Relational model, Relational Algebra and Structured Query Language

Relational model- Concepts, relational constraints and relational database schemas.Relational algebra - Basic and additional relational operations with examples. Data definition, constraints and schema changes in SQL, Basic queries in SQL: insert, delete and update statements and joins in SQL, views in SQL.

Unit III

Database Design, Overview of storage and indexing

Informal design guidelines for relational schemas, functional dependencies, normal forms, general definitions of first, second, third and boyce-codd normal forms.

File organization and indexing: sequential file organization, heap file organization, clustered indexes primary and secondary indexes, hash based indexing and B+ tree-based indexing.

Unit IV

Overview of transaction management

The ACID properties, consistency and isolation, atomicity and durability, transaction on schedules, concurrent execution of transactions, motivation for concurrent execution, serializability, anomalies due to interleaved execution, lock-based concurrency control, strict two phase locking and performance of locking.

References

1. Fundamentals of Database Systems by Navathe and Elmasri –Pearson Education, Fifth Edition.
2. Database Systems Concepts, 3rd edition by Abraham Silberschatz, Henry Korth and S. Sudarshan, Tata McGraw Hill.
3. Principles of database systems by Ullman, Computer Science press.
4. DBMS by Prof.S.Nandagopalan, 7th Revised Edition.

SC **System Software** **[3:0:1]**

Objectives:

- To understand the design of an assembler for a simple machine architecture.
- To understand the need and design of a macro processing facility.
- To learn about loading, different loading schemes and issues related to it, and implementation of a loader.
- To get an overview of compiler functions and learn about basic lexical analysis and parsing.

Outcomes:

- Develop an Ability to master the design of assembler.
- Able to understand various issues related to processing macros.
- Able to understand different loaders schemes, and related issues.
- Develop ability to write simple lexical analyser and parser with Lex and Yacc.

Unit I

Introduction, general machine structure, general approach to a new machine, assemblers, general design procedure, design of assembler- statement of problem, data structure, format of data bases, algorithm, look for modularity.

Unit II

Macro language and the macro processor – macro instructions, features of a macro facility, macro instruction arguments, conditional macro expansion, macro calls within macros, macro instructions defining macros, implementation of a restricted facility.

Unit III

Loaders, Loader schemes, design of an absolute loader, design of a direct linking loader-specification of problem, specification of data structures, format of data bases, algorithm.

Unit IV

Introduction to Compilers : Language Processors, Structure of a Compiler.

Introduction to Lex and Yacc: The Simplest Lex Program, Recognizing Words With LEX, Symbol Tables, Grammars, Parser-Lexer Communication, A YACC Parser, The Rules Section, Running LEX and YACC, Using LEX, Using YACC – Grammars, What YACC Cannot Parse, A YACC Parser - The Definition Section, The Rules Section, Symbol Values and Actions

References

1. "Systems Programming", John J. Donovan, Tata McGraw-Hill.
2. Compilers: Principles, Techniques, and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, 2nd Edition, Pearson.
3. Lex &Yacc, John R. Levine, Tony Mason, Doug Brown, 2nd Edition, O'Reilly.
4. System Software: An introduction to system programming, Leland L.Beck and D.Manjula, 3rd edition.
5. Systems Programming and Operating Systems, D. M. Dhamdhere, Second Revised Edition, Tata McGraw-Hill.

SC **Computer Graphics** **[2:1:1]**

Objectives:

- To provide an overview of various device level algorithms.
- To provide an understanding of homogeneous coordinates and various 2D and 3D transformations
- To provide an introduction to 3D concepts like projections, curves.
- To make the students understand how to implement the computer graphics concepts using OpenGL.

Outcomes:

- Acquire knowledge and understanding of the structure of an interactive computer graphics system, and the separation of system components.
- Acquire knowledge and understanding of device level algorithms that renders various shapes and clipping operations.
- Acquire knowledge and understanding of 2D and 3D geometrical transformations and viewing.
- Acquire knowledge and understanding of techniques for representing 3D geometrical objects.

Unit I

Graphics hardware: Video display devices, Raster-scan systems, Graphics software : Coordinate representations, Graphics functions, standards, Introduction to OpenGL.

Graphics Output Primitives: Coordinate reference frames, Two-Dimensional reference frame in OpenGL, OpenGL Point Functions, Line Functions, Curve functions.

Scan-Conversion: Line-Drawing Algorithms: DDA, Bresenhams, Setting frame-buffer values, Circle-Generating algorithms : Midpoint Circle Algorithm.

Unit II

Filled area primitives: Scan-line polygon fill algorithm, Boundary fill algorithm, Flood fill algorithm, Inside-outside tests. Brief overview on Ant aliasing methods.

2D geometrical transformations: Basic two-dimensional geometric transformations, Homogeneous Coordinates and Matrix Representation, Inverse Transformations, Brief overview of Composite transformations, Reflection, Shear, OpenGL functions for two-dimensional geometric transformations, Programming examples.

2D viewing: Windows and viewports, Two-dimensional viewing pipeline, clipping window, Normalization and viewport transformations, Brief overview of OpenGL 2D viewing functions.

Unit III

2D Clipping Algorithms: Point clipping, Line clipping: Cohen- Sutherland and Liang-Barsky Line clipping, polygon fill-area clipping: Sutherland-Hodgman algorithm, Text clipping.

3D geometrical transformations: 3D translation, 3D scaling. 3D rotation: coordinate-axis rotations, general 3D rotations, Other 3D transformations, Affine transformations, OpenGL geometric transformation functions.

Unit IV

Three-dimensional viewing: Overview, Three-dimensional viewing pipeline, Projection transformations, 3D viewing functions.

Spline representations : Interpolation and Approximation splines, parametric and Geometric continuity conditions, Bezier spline curves, B-Spline curves.

Visible surface detection : Classification of visible surface detection algorithms, Back- Face detection, Depth buffer method.

References

1. Computer Graphics with OpenGL, Donald D. Hearn, M. Pauline Baker, Warren Carithers, Fourth Edition, Pearson India Education Services.
2. Computer Graphics Principles & Practice in C, Foley, Vandam, Feiner, Hughes, Pearson Education.
3. Open GL Super Bible : Comprehensive Tutorial and Reference, Richard S Wright and Jr. Michael Sweet, 7th Edition, Pearson Education.
4. Computer Graphics, Roy A. Plastock, Gordon Kalley, Schaum's Outlines, McGraw Hill.
5. Computer Graphics 2nd Edition (Paperback) by Steven Harrington, Tata McGraw Hill.

SC **PROFESSIONAL ETHICS AND VALUES** **[3:1:0]**

Objectives:

- Create awareness among technical students about the importance of professional ethics.
- The effect of technology on the societal issues.
- How to develop technologies that do not disturb the psychological well-being of the society.
- To learn about the pros and cons of intellectual property laws.

Outcomes:

- Know the importance of ethics and methods of developing technologies.
- Identify the values and ethics of professional development.
- Understand the causes, effects and control measures for various types of societal failures.
- Gain knowledge about various ethical management methods.

Unit I : Effects of Technological Growth:

- Science, Technology and Engineering as Knowledge and as Social and Professional Activities.
- Rapid Technological growth and depletion of resources. Related latest Reports, Limits of growth; sustainable development.
- Energy Crisis; Renewable Energy Resources.
- Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations. Environmental Ethics.
- Appropriate Technology Movement of Schumacher: later developments.
- Technology and developing nations. Problems of Technology transfer. Technology assessment, impact analysis.
- Human Operator in Engineering projects and industries. Problems of man machine interaction. Impact of assembly line and automation. Human centred Technology.

Unit II : Profession and Human Values:

- Nature of values: Value Spectrum of a 'good' life.
- Value Crisis in contemporary society.
- Psychological values: Integrated personality; mental health Societal values: The modern search for a 'good' society, justice, democracy, secularism, rule of law; values in Indian Constitution.
- Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity.
- Moral and ethical values: Nature of moral judgments; canons of ethics; Ethics of virtue; ethics of duty; ethics of responsibility.

Unit III : Ethics of Profession:

- Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical Responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond. Case studies

Unit IV : IPR:

- Introduction to IPR, IPR Laws in India

References:

1. Blending the best of the East & West, Dr.Subir Chowdhury, EXCEL.
2. Ethics & Management. & Indian Ethos, Ghosh, VIKAS.
3. Business Ethics, Pherwani, EPH.
4. Ethics, Indian Ethos & Management., Balachandran, Raja, Nair, Shroff Publishers.
5. Values & Ethics of Profession & Business, S. K. Sarangi, Asian Books Private Limited.

SC **Pattern Recognition** **[3:1:0]**

Objectives:

- Understand pattern recognition systems.
- Learn the different techniques of estimations and component analysis.
- Learn the different supervised &unsupervised learning techniques.

Outcomes:

- Acquire the knowledge on basics of pattern recognition systems
- Demonstrate the techniques of estimations and component analysis.
- Implement different supervised & unsupervised learning techniques.

Unit I : Introduction

Machine perception, Pattern recognition systems, Design cycle, Learning and adaptation.

Introduction, Bayesian decision theory - Continuous features, Classifiers Discriminate functions and Decision surfaces, Normal density and Discriminant functions for the Normal Density, Bayes decision theory- Discrete features

Unit II : Maximum Likelihood and Bayesian Parametric Estimation

Introduction, Maximum likelihood estimation, Bayesian estimation, Bayesian parametric estimation, Sufficient statistics, Problems of dimensionality, Component Analysis and Discriminants

Unit III : Nonparametric Techniques

Introduction, Density estimation, Parzen windows, K-Nearest Neighbour estimation, The nearest neighbor rule, Metrics and Nearest Neighbour Classification, Fuzzy Classification, Basics of Neural networks, Support vector machines

Unit IV : Unsupervised Learning

Mixture Densities and Identifiability, Maximum – Likelihood Estimates, Application to Normal Mixtures, Unsupervised Bayesian Learning, Data Description and Clustering, Criterion Functions for Clustering, Hierarchical clustering, Online clustering, Graph Theoretic Methods,

References

1. Pattern Classification, R.O Duda, P.E. Hart and D.G. Stork, 2nd Edition, Wiley publications
2. Pattern Recognition and Image Analysis, Earl Gose, Richard, Johnsonbaugh, Steve Jost, PHI.

SC **Web Technologies** **[3:0:1]**

Objectives:

- To help students understand the basis of Internet and how communication happens over the World Wide Web.
- To help students understand the basic building blocks of web pages using HTML and CSS.
- To help students understand and use Java script and PHP.
- To help students understand how data driven, dynamic web pages can be created using database connectivity.

Outcomes:

- Develop an ability to implement HTML5 pages using fundamental tags.
- Able to develop style sheet using CSS for a given problem.
- Able to extend JavaScript to validate a form with event handler for a given problem.
- Able to develop a dynamic website with database backend.

Unit I

Introduction to Internet, WWW, Web Browsers, and Web Servers, URLs, MIME, HTTP, Security.

Quick introduction to HTML5 : Creating simple web page, basic text formatting, presentation elements, phrase elements, lists, font, grouping elements, basic links, internal document links, email link, Image, Audio and Video, image maps, image formats, Adding flash content and video, Tables – attributes, nested tables, Forms – Attributes, form controls, Frames – Frame set, nested frames, attributes. Introduction to HTML 5 - New tags of HTML 5 – embedding Media content, building input forms, painting on canvas.

Cascading Style Sheet : Introduction, Levels of Style Sheet and specification formats, embedded style sheet, External Style Sheet, inline Style Sheet, Class and ID method, DIV and SPAN tags, Inheritance with CSS, Introduction to CSS 3, HTML 5 and CSS3.

Unit III

JavaScript: JavaScript in HTML, Language Basics – Variables, operators, statements, functions, Data type conversions, reference types, Document object Model - browser object model - window object, location object, navigator object, screen object, history object, Events and Event handling, Button elements, Navigator object, validations with regular expressions. Introduction to Dynamic documents, Positioning elements, moving elements, elements

visibility, changing colors and fonts, dynamic content, Locating mouse cursor, reacting to a mouse click, dragging and dropping of elements.

Unit III

PHP : Introduction to Server side Programming, Introduction to PHP , PHP and HTML, essentials of PHP, Why Use PHP, Installation of Web Server, WAMP Configurations, Writing simple PHP program, embedding with HTML, comments in PHP, Variables, Naming Conventions, Strings, String Concatenation, String functions, float functions, Arrays, Array – Key pair value, Array functions, is SET, UNSET, gettype(), settype(), control statements (if, switch), Loops, User Defined Functions (with argument, return values), global variable, default value, GET - POST method, URL encoding, HTML Encoding, Cookies, Sessions, Include statement. File:read and write from the file. Ethical use of features of PHP.

Unit IV

PHP with MySQL, Creating Connection, Selecting Database, Perform Database (query), Use returned data, close connections, file handling in PHP – reading and writing from and to FILE. Using MySQL from PHP (Building a Guestbook).

References

1. Beginning HTML, XHTML, CSS, and JavaScript, Jon Duckett, Wiley Publishing.
2. JavaScript Step by Step, Microsoft Press, Steve suehring, 2nd Edition, PHI.
3. Beginning PHP 5.3, Matt Doyle, Willey Publishing.

OE **WORLD WIDE WEB** **[2:2:0]**

Objective:

- To provide the conceptual and technological development in the field of Internet and web designing.
- To provide a comprehensive knowledge of Internet, its applications and the TCP/IP protocols widely deployed to provide Internet connectivity worldwide.
- To understand how the World Wide Web with its widespread usefulness has become an integral part of the Internet.
- To provide an overview of basic concepts of web design.

Outcomes:

- Understand the working scheme of the Internet and World Wide Web.
- Understand fundamental tools and technologies used for web design.
- Comprehend the technologies for Hypertext Mark-up Language (HTML).
- Figure out the various security hazards on the internet and need of security measures.

Unit I

Introduction to Internet: What is Internet?, Evolution and History of Internet, Growth of Internet, Internet Services, How does the Internet Work?, Anatomy of Internet, Internet addressing, Internet vs. Intranet, and Impact of Internet.

Internet Technology and Protocol: ISO-OSI Reference Model, TCP/IP Protocol Suit, Data Transmission, Switching, Routers and Gateways, and Network Protocols.

Unit II

Internet Connectivity: Getting connected, Different types of connections, Levels of Internet Connectivity and Internet Service Provider.

Internet Tools and Multimedia: Current trends on Internet, Interactivity tools, Multimedia and Animation.

WWW and Web Browser: WWW, Evolution of Web, Basic Elements of WWW, Web Browsers and Search Engines.

Unit III

Web Publishing: Web Publishing, Standard Generalized Mark-up Language(SGML), Web Page Design.

HTML: An Introduction, HTML Categories, HTML Lists, HTML Tables, HTML Links, HTML Forms, HTML Frames, Style Sheets, Adding Pictures and Image Attributes.

Unit IV

Computer Networks: Computer Networks, Network Components, Network Topologies, Types of Network Architecture, Networks, Medium of Communication and Network Security.

Internet and Web Security: Overview of Internet Security, Aspects and Need of security, E-Mail Threats and Secure E-Mail, Web Security and Privacy concepts, Firewall, Cryptography, Digital Signature, Authentication, Authorization and Access Control, Copyright issues and Virus.

References

1. INTERNET TECHNOLOGY AND WEB DESIGN by Instructional Software Research and Development (ISRD) Group, Tata MC Graw Hill.
2. Programming the World Wide Web, 4th Edition by Robert W. Sebesta.

HC **Theory of Languages** **[3:1:0]**

Objectives:

- To learn about the core concepts of automata theory and formal languages.
- To learn fundamentals of Regular and Context Free Grammars and Languages.
- To understand the relation between Regular Language and Finite Automata.
- To understand the relation between Contexts free Languages and PDA.

Outcomes:

- Acquire a fundamental understanding of the core concepts in automata theory and formal languages
- Develop ability to model grammars and automata (recognizers) for different language classes.
- Develop an ability to identify formal language classes and prove language membership properties.
- Develop an ability to prove and disprove theorems establishing key properties of formal languages and automata.

Unit I: Introduction to Automata and Languages

Brief introduction to Formal Proof: Deductive Proofs, Proving equivalences about sets, the contra positive, Proof by contradiction, Counterexamples, Central concepts of automata theory: Alphabets, strings, languages.

Finite Automata: Deterministic Finite Automata, Nondeterministic Finite Automata, Equivalence of DFA and NFA, Finite Automata with Epsilon transitions.

Unit II: Regular Expression and Regular Languages

Regular Expressions, Finite Automata and Regular Expressions: Converting DFAs to regular expressions by eliminating states, converting regular expressions to automata, Applications of regular expressions, Brief overview of algebraic laws of regular expressions.

Properties of Regular Languages : The pumping lemma for regular languages, Applications of the pumping lemma, Closure properties and decision properties of regular languages (proofs not necessary), Minimization of DFAs

Unit III: Context Free Grammars

Context-Free Grammars, Parse Trees, Applications of context-free grammars, Ambiguity in grammars and languages.

Normal Forms of Context-free grammars

Unit IV: Pushdown Automata and Context Free Languages

Pushdown Automata : Definition, Languages of a PDA, Equivalence of PDAs and CFGs, Deterministic Pushdown Automata.

The pumping lemma for context-free languages, Closure properties of context-free languages (proofs not needed).

References

1. "Introduction to Automata Theory, Languages and Computation", Hopcroft J.E and Ullman,J.D, Narosa Publishing House, Delhi.
2. "Introduction to Languages and Theory of Computation", John C Martin ,Yd edition, TMH Publication.
3. "Formal Languages and Automata theory", Basavaraj S. Anami, Karibasappa K G, Wiley India.
4. "Formal Languages and Automata Theory", C K Nagpal, Oxford University press.

HC **PYTHON PROGRAMMING** **[3:0:1]**

Objectives:

- Understand programming paradigms brought in by Python.
- To learn to use python for text processing and file handling, with a focus on Regular Expressions, List and Dictionaries.
- Learn how to use python for Data mining with a case study.
- Learn how to use python for Image processing with a case study.

Outcomes:

- Develop ability to program in Python with hands on Regular Expression, and write Text Processing scripts.
- Write file handling scripts.
- Learn to use Python for Data and Image processing.
- Get hands on experience of Cluster Analysis using Python.

Unit I

Python Fundamentals: Introduction, Python Objects, Built-in Functions, Numbers and Strings, Conditionals and Loops, Functions, Passing Arguments, String Functions

Operators, Built-in Functions, List Type Built-in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules

Unit II

Regular Expressions: Introduction/Motivation, Special Symbols and Characters for REs, REs and Python. Dictionaries: Introduction, Operators, Built-in Functions, Built-in Methods, Dictionary Keys.

Data Processing: Storing in List and Strings, Dispersion, Central Tendency, Mean Median Mode, Frequency Distribution, Standard Deviation Using Files for large dataset, statistics with real data, reading data from internet, Accessing Stock Market Data, Correlating Stock data

Unit III

Image Processing and Data Mining: Introduction, RGB Color Model, Object for Image Processing, Image Processing (Negative Images, Gray Scale, Resizing, Stretching, Flipping, Edge Detection)

Unit IV

What is Data Mining? Implementing Cluster Analysis on Simple Data, Distance between two points, Clusters and Centroids, File Processing, Visualization.

References

1. Core Python Programming, Chun, J Wesley, Second Edition, Pearson.
2. Python Programming in Context, Bradley N Miller, David L Ranum, Second Edition.
3. Head First Python, Barry, Paul, 2nd Edition, ORielly.
4. Learning Python, Lutz, Mark, 4th Edition, O Rielly.
5. "The Python Tutorial" at https://docs.python.org/3/tutorial/index.html
6. "Beginners Guide to Python" at https://wiki.python.org/moin/BeginnersGuide

HC **Software Engineering** **[3:1:0]**

Objectives:

- Understand the phases in a software project.
- Understand the fundamental concepts of requirements engineering and Analysis Modelling.
- Understand the major considerations for enterprise integration and deployment.
- Learn various testing and maintenance measures.

Outcomes:

- Identify the key activities in managing software project and compare different process models.
- Understand the Concepts of requirements engineering and Analysis Modelling.
- Apply systematic procedure for software design and deployment.
- Compare and contrast the various testing and maintenance.

Unit I: SOFTWARE PROCESS AND PROJECT MANAGEMENT

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models – Software Project Management: Estimation – LOC and FP Based Estimation, COCOMO Model – Project Scheduling – Scheduling, Earned Value Analysis – Risk Management.

Unit II: REQUIREMENTS ANALYSIS AND SPECIFICATION

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

Unit III: SOFTWARE DESIGN

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

Unit IV: TESTING AND IMPLEMENTATION

Software testing fundamentals-Internal and external views of Testing-white box testing- basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques: Coding practices-Refactoring.

References

1. "Software Engineering – A Practitioner's Approach", Roger S. Pressman, Seventh Edition, Mc Graw-Hill.
2. "Software Engineering", Ian Sommerville, 9th Edition, Pearson Education Asia.
3. "Fundamentals of Software Engineering", Rajib Mall, Third Edition, PHI.
4. "Software Engineering - A Precise Approach", Pankaj Jalote, Wiley India.
5. "Software Engineering", Kelkar S.A.,PHI.

SC **Artificial Intelligence** **[3:1:0]**

Objectives:

- To provide an overview of artificial intelligence (AI) principles and approaches.
- To develop a basic understanding of the building blocks of AI in terms of intelligent agents like Search, Knowledge representation, inference, logic, and learning.
- To provide an overview of knowledge representational structures like slot and fillers.
- To have knowledge of expert systems, learning and planning which plays a considerable role in some applications.

Outcomes:

- Understand the basic concepts of AI.
- Understand the fundamentals of knowledge representation, inference and theorem proving.
- Represent knowledge of the world using logic and infer new facts from that knowledge.
- Explain how Artificial Intelligence enables capabilities that are beyond conventional technology.

Unit I: Introduction

AI Problems, AI Techniques, Defining the Problem as State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

Unit II: Heuristic Search Techniques and Knowledge Representation

Generate and Test, Hill climbing, BFS, DFS, Knowledge Representation Issues, Approaches to Knowledge Representation, Procedural Versus Declarative Knowledge, Inferential Versus Inheritable Knowledge, Normal Forms in Predicate Logic and Clausal Forms, Introduction to Non-monotonic Reasoning, Logics for Non-monotonic Reasoning.

Unit III: Knowledge Representational Structures

Weak Slot and Filler Structures: Semantic Nets, Frames.

Strong Slot and Filler Structure: Conceptual Dependency, Scripts.

Unit IV: Game Playing, Planning and Expert Systems

Game Playing: Minimax Search Procedure, Adding Alpha-Beta Cut Offs, Planning-Goal Stack Planning, Expert Systems: Expert System Versus Conventional Computer, Expert System Shells, and Explanation Based Learning.

References

1. "Artificial Intelligence", Rich Elaine Knight Kevin – Tata McGraw Hill.
2. "Introduction to Artificial Intelligence and Expert system", Patterson W Dan – Prentice Hall.

SC **Digital Image Processing** **[3:0:1]**

Objectives:

- Understand the fundamentals of digital image processing.
- Learn the different Image enhancement techniques.
- Understand the image segmentation techniques.

Outcomes:

- Demonstrate the concepts of digital image processing.
- Impart knowledge about image enhancement in spatial and frequency domains.
- Implement the techniques of image segmentation.

Unit I: Introduction and Digital Image Fundamentals

What is Digital Image Processing?, The Origins of Digital Image Processing, Examples of Fields that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of Image Processing System, Elements of Visual Perception, Image Sampling and Quantization, Some Basic Relationships Between Pixels, Linear and Nonlinear Operations

Unit II: Image Enhancement in the Spatial Domain

Some Basic Gray Level Transformations, Histogram Processing, Enhancement using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.

Unit III: Image Enhancement in the Frequency Domain

Introduction to the Fourier Transform and the Frequency Domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering.

Unit IV: Image Segmentation

Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-based Segmentation, Segmentation by Morphological Watersheds.

Reference

1. Digital Image Processing – Rafel C. Gonzalez and Richard E. Woods, 2nd Edition, Pearson Education.

SC **C# Programming** **[3:0:1]**

Objectives:

- To provide an overview of the .NET framework.
- Understand Object-Oriented Paradigm using C# programming.
- Learn extended OOP's concept in C# environment.
- Understand the concepts of interfaces and multithreading.

Outcomes:

- Acquire the knowledge of .NET framework.
- Develop an ability to write programs in C#.
- Implement the extended OOP's concept in C# environment.
- Develop applications using standard C# libraries.

Unit I

Understanding .NET: The C# Environment: The .Net Strategy, The Origins of .Net Technology, The .NET Framework, The Common Language Runtime, Framework Base Classes, Benefits of the .NET Approach.

Overview of C#: Introduction, A Simple C# Program, Namespaces, Adding Comments, main Returning a Value, Using Aliases for Namespace Classes, passing String Objects to Write Line Method, Command Line Arguments, Main with a Class, Providing Interactive Input, Using mathematical Functions, Multiple main Methods, Compile Time Errors, Program Structure, Program Coding Style.

Methods in C#

Introduction, Declaring Methods, The Main Method, Invoking Methods, Nesting of Methods, Method Parameters, Pass by Value, Pass by Reference, The Output Parameters, Variable Argument Lists, Method Overloading.

Arrays, Strings, Structures and Enumerations.

Unit II

Classes and Objects: Introduction, Basic Principles of OOP, Defining a Class, Adding Variables, Adding Methods, Member Access Modifiers, Creating Objects, Accessing Class members, Constructors, Static Members, Static Constructors, Private Constructors, Copy Constructors, Destructors, Member Initialization, The this Reference, Nesting of Classes, Constant Members, Read-only Members, Properties, Indexers.

Operator Overloading: Introduction, Over loadable Operators, Need for Operator Overloading, Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overloading Comparison Operators.

Unit III

Inheritance: Introduction, Classical Inheritance, Containment Inheritance, Defining a Subclass, Visibility Control, Defining Subclass Constructors, Multilevel Inheritance, Hierarchical Inheritance.

Run-Time Polymorphism: Overriding methods, Hiding Methods, Abstract Classes, Abstract Methods, Sealed Classes, and Sealed Methods.

Managing Errors and Exceptions: Introduction, What is Debugging?, Types of Errors, Exceptions, Syntax of Exception handling Code, Multiple Catch Statements, Using Finally Statements, Nested Try Blocks, Throwing Our Own Exceptions, Checked and Unchecked Operators.

Unit IV

Interfaces: Introduction, Defining an Interface, Extending an Interface, Implementing Interfaces, Interfaces and Inheritance, Abstract Class and Interfaces.

Multithreading in C#: Introduction, Understanding the System. Threading Namespace, Creating and Starting a Thread, Scheduling a Thread, Synchronizing Threads, Thread Pooling.

Delegates and Events: Introduction, Delegates, Delegate Declaration, Delegate Methods, Delegate Instantiation, Delegate Invocation, Multicast Delegates, Events.

References

1. PROGRAMMING IN C# - A PRIMER by E Balaguruswamy, Third Edition, and Tata McGraw-Hill.
2. C# 4.0: The Complete Reference by Herbert Schildt, Tata McGraw-Hill.

SC **Android programming** **[3:1:0]**

Objectives:

- Learn to build simple android applications.
- Get an understanding of essentials of application design and user interface design.
- Understand different android APIs used to store and manage the data through SQLite.
- Understanding different android networking and web APIs to share the data between the applications.

Outcomes:

- Build sample android application.
- Develop user interfaces for android applications.
- Develop android applications to share data between different applications.
- Deploy android applications.

Unit I: Introduction to Android

History of Mobile Software Development, The Open Handset Alliance, The Android Platform Android SDK, Building a sample Android application, Anatomy of Android applications, Android terminologies.

Unit II: Android Application Design Essentials

Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings , Using Intent Filter, Permissions , Managing Application resources in a hierarchy , Working with different types of resources.

Unit III: Android User Interface Design Essentials

User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

Unit IV: Using Android APIs

Using Android Data and Storage APIs, Managing data using SQLite, Sharing Data between Applications with Content Providers , Using Android Networking APIs , Using Android Web APIs , Using Android Telephony APIs , Deploying (selling) your Android application

References:

1. "Android Wireless Application Development", Lauren Darcey and Shane Conder, 2nd edition, Pearson Education.
2. "Professional Android 2 Application Development", Reto Meier, Wiley India.
3. "Beginning Android", Mark L Murphy, Wiley India.
4. "Pro Android", Sayed Y Hashimi and Satya Komatineni, Wiley India.

SC **Big Data Analytics** **[3:1:0]**

Objectives :

- To identify the characteristics of datasets and compare the trivial data and big data for various applications
- To introduce students the concept and challenge of big data
- To know the implementation of parallel processing with Map Reduce
- To teach students in applying skills and tools to manage and analyze the big data

Outcomes :

- Understanding the concept and challenge of big data and why existing technology is inadequate to analyze the big data
- Develop an ability to collect, manage, store, query, and analyze various form of big data
- Understanding the significance of No SQL databases over RDBMS
- Map the impact of big data for business decisions and strategy

Unit I: Wholeness of Big Data

Introduction; Understanding Big Data, Caselet: IBM Watson : A Big Data system; Capturing Big Data; Benefitting, Management, Organizing and Analyzing Big data; Technology Challenges for Big Data; Big Data Sources and Applications

Unit II: Big Data Architecture and Distributed Computing Using Hadoop

Google query Architecture; Standard Big Data Architecture; Big data Architecture Examples – IBM Watson, Ebay, Netflix, Paypal; Introduction to Hadoop Framework, HDFS Design Goals, Master Slave Architecture; Installing HDFS – Reading and Writing Local files into HDFS, Reading and Writing Data Streams into HDFS

Unit III: Parallel Processing with Map Reduce:

Introduction, How Google search Works, Map Reduce overview; Sample Map Reduce Application: Wordcount, Map Reduce Programming, Map Reduce Jobs Execution, Hive and Pig Language capabilities

Unit IV: No SQL databases

Introduction, RDBMS Vs NOSQL, Types of NoSQL Databases, Architecture of No SQL, CAP theorem; HBase – Architecture Overview, Reading and Writing Data; Cassandra – Architecture Overview, Protocols, Data Model, Cassandra Writes and Reads, Replication

References

1. Big Data Made Accessible by Anil Maheshwari.
2. Big Data Analytics by M. VijayalakshmiRadhaShankarmani
3. Data Science and Analytics by VK Jain

OEE- Commerce [3:1:0]

Objectives:

- To impart knowledge on E-Commerce.
- To provide an overview of various applications connected with E-Commerce.
- To enable the learner for aiming careers in special software development involving E-Commerce technologies.
- Understand the security issues in E – commerce.

Outcomes:

- Analyse the impact of E-commerce on business models and strategy
- Describe Internet trading relationships including Business to Consumer, Business-to-Business, Intra-organizational structures.
- Assess electronic payment systems and its securities.
- Recognize and discuss global E-commerce issues

Unit 1: Introduction to E-Commerce

Definition, Scope of E-Commerce, Hardware requirements, E-Commerce and Trade Cycle,

Electronic Markets, Electronic Data Interchange and Internet Commerce.

Unit 2: Business to Business E-Commerce

Electronic Markets, Electronic Data Interchange (EDI): Technology, Standards (UN/EDIFACT), Communications, Implementations, Agreements, Security, EDI and Business, Inter-Organizational Ecommerce. Business models for E-commerce, Business Process Re-Engineering.

Unit 3: Business to Consumer E-Commerce and E-Business

Consumer trade transaction, Web metrics, Elements of E-Commerce, Industry impacts of E-business. Integrating Intranet and internet web applications across multiple networks. Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the net, E-Diversity, Case studies through internet.

Unit 4: Security Issues

How criminals plan attacks, passive attack, Active attacks, cyber stalking, Secure Electronic Transaction (SET) Protocol, Electronic cash over internet, Internet Security, Search engines, Intelligent agents in E-Commerce Electronic payment systems

References

1. E-Commerce: Strategy, Technologies & Applications, David Whitley, McGraw Hill.

2. E-commerce: The Cutting Edge of Business, K. K. Bajaj and Debjani Nag, 2nd Edition, McGraw Hill.
3. Handbook of Electronic Commerce, Shaw et al., Springer.
4. Global Electronic Commerce- Theory and Case Studies, C. Westland and T. H. K. Clark, University Press.
5. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, SunitBelapure and Nina Godbole, Wiley India.

SC **COMPILER CONSTRUCTION** **[3:1:0]**

Objectives:

- To introduce principal structure of compiler, basic theories and methods used for different parts of compiler.
- To impart knowledge of fundamentals of language translator, structure of a typical compiler, parsing methods etc.
- To design various phases of compiler such as Lexical analyser, parser etc.
- To distinguish different optimization techniques in the design of compiler.

Outcomes:

- Gain an understanding of how compilers translate source code to machine executable.
- Utilize tools to automate compiler construction.
- Comprehend how to perform parsing (top down and bottom up) and understand how compilers generate code to manage memory during runtime.
- Be familiar with techniques for simple code optimizations.

Unit 1

Introduction and Lexical Analysis (Scanning)

What is a compiler? A high level view of compilation, General Structure of a compiler, an overview of compilation technology.

Regular Languages/Expressions, finite state machines, building regular expressions from finite automation.

Unit 2

Syntax Analysis (Parsing)

Expression Syntax, Context Free Grammers, Top-Down Parsing, Bottom-Up Parsing.

Unit 3

Semantic Analysis

Context-Sensitive Analysis, Attribute Grammers, Symbol Tables, Type Checking.

Unit 4

Intermediate Representations

Properties, taxonomy, graphical IRs, Linear IRs, storage management, the procedure abstraction, linkage convention, run-time storage organization, code optimization, code generation

Reference:

1. Compilers, principles, techniques and tools, Aho, A.V., Sethi R and Ullman J.,D., Addison Wesley.
2. "Engineering a compiler", Keith Cooper, Linda Torczon, Morgan Kaufmann.
3. The Essence of Compilers, Hunter R., Prentice Hall.

SC Advanced Database Management System [2:1:1]

Objectives:

- To evaluate emerging architectures for database management systems.
- To develop an understanding the manner in which relational systems are implemented and the implications of the techniques of implementation for database performance.
- To assess the impact of emerging database standards on the facilities which future database management systems will provide.

Outcomes:

- Critically assess new developments in database technology.
- Interpret the impact of emerging database standards.
- Evaluate the contribution of database theory to practical implementations of database management systems.

Unit I: Database Design Methodology, Query Processing and Physical Design

Database Design and Implementation process, UML diagrams as an aid to Database Design Specification, Overview of Query Processing : Measures of Query cost, Algorithms for SELECT and JOIN Operations, Pipelining : Implementation of Pipelining, Evaluation algorithms for pipelining, Overview of Query Optimization, Physical Database Design in Relational Databases.

Unit II: Transaction Processing Concepts, Object and Object-Relational Databases

Introduction to Transaction Processing: Transaction and System Concepts, Desirable Properties of Transactions, Transaction Support in SQL.

Concepts for Object Databases: Overview of Object-Oriented Concepts, Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods, and Persistence, Type Hierarchies and Inheritance. Overview of the Object Model of ODMG, Overview of SQL and its Object-Relational Features, Evolution of Data Models and Current Trends.

Unit III: Security, Advanced Modelling and Distribution

Database Security : Security issues, Enhanced Data Models for Advanced Applications: Active Database Concepts and triggers, Distributed Databases: Distributed Database Concepts, Data Fragmentation, Transparency, Distributed Transactions, Types of Distributed Database Systems, Overview of Concurrency Control Distributed Databases.

Unit IV: Emerging Technologies

Overview of Data Mining Technology, Emerging Database Technologies and Applications: Mobile Databases, Multimedia Databases, Geographic Information Systems (GIS).

References:

1. Fundamentals of Database Systems – Fifth Edition – RamezElmasri, Shamkant B Navathe.
2. Database System Concepts – Abraham Siberschatz, Henry F. Korth, S. Sudarshan, Fifth Edition- McGraw – Hill.
3. Database Systems – Thomas Connolly, Carolyn Becg – Third Edition – Pearson Education.
4. An Introduction to Database Systems – Eight Edition- Date C J - Addison Wesley.
5. Strategic Database Technology – Simon A R, Morgan Kaufmann.

SC **Data Mining** **[3:1:0]**

Objectives:

- To get an understanding of methods and applications of Data mining.
- Understand the rules related to association, classification and clustering analysis.
- Compare and contrast between different classification and clustering algorithms

Outcomes:

- Develop an ability to identify data mining problems.
- Develop an ability to choose between classification and clustering solution.
- Develop an ability to model problems and solutions using data mining techniques.

Unit I:

Introduction: What is data mining? Challenges, Data Mining Tasks.

Data: Types of Data, Data Quality, Data Pre-processing, Measures of Similarity and Dissimilarity.

Unit II:

Association Analysis: Association Analysis: Problem Definition, Frequent Item set Generation, Rule generation. Alternative Methods for Generating Frequent Item sets, FP-Growth Algorithm, Evaluation of Association Patterns.

Unit III:

Classification: Decision Trees Induction, Method for Comparing Classifiers, Rule Based Classifiers, Nearest Neighbor Classifiers, Bayesian Classifiers.

Unit IV:

Clustering Analysis: Overview, K-Means, Agglomerative Hierarchical Clustering, DBSCAN, Cluster Evaluation, Density-Based Clustering, Graph Based Clustering, Scalable Clustering Algorithms.

References:

1. “Introduction to Data Mining”, Pang-Ning Tan, Michael Steinbach, Vipin Kumar Pearson.
2. “Data Mining -Concepts and Techniques”, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann Publisher, 3rd Edition.
3. “Mastering Data Mining” Michael.J.Berry,Gordon.S.Linoff, Wiley Edition, second edition.
4. “Principles of Data Mining”, David Hand, HeikkiMannila and Padhraic Smyth, The MIT Press.
5. “Data Mining Techniques”, Arun K Pujari, University Press.

OE **Office Automation** **[2:2:0]**

Objectives:

- To provide a basic introduction to computers and computing environment.
- To enable the students in crafting professional documents using word pre-processors.
- To enable students use spreadsheets for tabulating and calculating data and create graphical representations of data.
- To enable students to design professional presentations.

Outcomes:

- To understand the basics of computer hardware and software.
- To prepare documents of different types.
- Ability to develop and use spreadsheets for tabulating and analysing for productivity.
- To prepare presentations.

Unit I

Introduction to Computers, Basic Anatomy of Computers and Introduction to MS-Office.

Unit II

MS-Word – Word Basics, Formatting Features, Menu, Commands, Tool Bars and their Icons, Mail Merge and Macros Creating Tables.

Unit III

MS-Excel - Introduction, Menu, Commands, Tool Bars and their Icons, and Functions.

Unit IV

MS-Power Point – Menu, Toolbar, Navigating in PowerPoint, Working with PowerPoint and Introduction to MS-Access.

References:

1. MS Office for Everyone – Sanjay Sanena, Vikas Publishing House.
2. Step by Step Microsoft Office XP, PHI.

PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE [AUTONOMOUS]

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

Affiliated to University of Mysore

DEPARTMENT OF STUDIES IN ECONOMICS

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

Preamble

Department of Studies in Economics is approved (Proposed) by University Grants Commission (UGC) and affiliated to the University of Mysore started during the academic year 2014-15. M.A. course offered by the Department of Studies in Economics is a Full time course consisting of four semesters which are Choice Based Credit System (CBCS). The Department offers a Master of Arts (M.A.) programme in Economics, which reflects new developments in the discipline. The curriculum has a strong theoretical and quantitative focus with all students being trained in the use of computers and statistical software that they find useful in their professional careers in academia, research institutions, government, and industry.

Master in Economics is a four semester programme following Choice Based Credit System (CBCS). The CBCS is an advanced mode of learning in higher education wherein a student has freedom in selecting his/her own choices in the curriculum for completing Master's degree programme. CBCS facilitates the learning process to move from teacher centric to student centric education.

The Department of Studies in economics is bestowed with well experienced teaching staff and the classrooms are equipped with PPT facilities with good internet connection.

Some of the subjects studied by the students of Economics include advanced studies in Advanced Micro and Advanced Macro Economics, Development Economics, Mathematics and Statistics for Economists, Econometrics in all the four semesters, Public Economics, International Business, International Financial and Monetary System, and hosts of new special subjects like Infrastructure Economics, Energy Economics, Natural Resource Economics, and Urban Data Analytics.

Vision

"*Establishment of Creative and Innovative Multidisciplinary School of Economics with Research and Consultancy Services".*

Mission

Create, Develop, Nurture and Innovate quantitative and qualitative Economics Ideas, Concepts, Thoughts, Theories, Phenomena etc. in solving the Problems of the Economy/Industry/Market/Firms through Intra, Inter and Multidisciplinary Approach.

Program Title

Master of Arts in Economics

Duration of the Program

The Master Degree Programme is of Four Semester stretching over two years. A candidate can avail maximum of 8 semester – 4 years (in one stretch) to complete master Degree

(including blank semesters, if any).Whenever a candidate opts for blank semesters, he/she has to study the prevailing courses offered by the department when he/she continues his/her studies.

Period of the Programme:

Semester I and III July to December

Semester II and IV from January to June

Award of the Degree

The M.A. Economics is designed as a 80-credit, postgraduate degree programme, requiring full-time engagement for two academic years. A candidate has to earn a minimum of 80 credits, for successful completion of a Master degree. The 80 credits shall be earned by the candidate by studying Hardcore, Soft core and special Elective.

On successful completion of **Two** year programme, the students will be awarded the **Master of Arts in Economics degree by the University of Mysore**.

1. **Definition of Courses**:

Hard Core Course: A Course which should be compulsorily studied as a Core requirement. [Requirement: Minimum 42 & Maximum 52 Credits]

Soft Core: A Course with a single choice the main discipline/subject of study or from sister/related discipline/subject which supports the main subject.

[Requirement: Minimum 16 Credits]

Special Elective Course: Generally a course which may be very specific or specialized or advanced or supportive to the discipline/subject of study which provides an extended scope or nurtures the proficiency/skill. A Soft Core Course may also be considered as an elective.

Special Course: Project Work/Dissertation work involving application of knowledge in solving/ analyzing/exploring a real life situation/difficult problem. A project/dissertation work may be hard core or a soft core as decided by the concerned Board of Studies (BOS).

Open Elective: A Course chosen generally from an unrelated discipline/subject with an intention to seek exposure. It is given as an optional instead of a soft core in the second semester [Requirement: Minimum 4 Credits Maximum 09 Credits]

2. **Breakup of Number of Courses**:

i. **Hard Core Courses** [Compulsory] **:** **14** [3 or 4 Credits for each Course]

ii. **Soft Core** [With Single Choice] **:** **05** x 3 Credits per Course = **15Credits**]

Minimum is 16 Credits

iii. **Special Elective** [Compulsory] **:** **04**[04 Course Minimum x 3 Credits = **12 Credits**]

[Maximum of 3 Courses]

iv. Special Course : **01**[01 Course Minimum x 3 Credits = **03**

v. Open elective **: 01**[01 Course Minimum x 4 Credits = **04**

[Maximum of 3 Courses]

3. **Teaching Hours:** 3 to 4 Hours per week for each course. [About 60 Hours for each course per semester]

[This shall be inclusive of Theory/Application/Practical Work/Tutorials/Seminars depending on the content of the course and approach by the faculty for each course]

4. **Allocation of Marks** for M.A Economics Programme:

Total Marks for M.A Economics [without Add-on Proficiency Diploma] with 6 courses per semester with 80/96 Credits = **2400**/**2400 Marks** [600 Marks in I, II, & III Semester and IV Semester]

Number of Marks for Each Course: 100 Marks

Out of 100 Marks: **C3** = 70 Marks is for Theory Examination [Comprehensive end Semester Examination]

C1 + C2 = 15 + 15 = 30 Marks is for Continuous Assessment [for all the Courses in 4 Semesters]

30 Marks for C1 & C2 shall have the break-up as follows:

C1: 10 Marks for the First Test + 5 Marks for Assignment [For all the Course in 4 Semesters]

C2: 10 Marks for the Second Test + 5 Marks for Seminar [For all the Course in 4 Semesters]

Note: Out of total marks allocated to C1&C2, Minimum 30% marks have to be secured by students to write C3 Examination.

[i.e., a student is not permitted to write the end Semester Examination without securing 30% of marks in C1 + C2 put together]

5. Specialization Elective Courses:

1) Elective Courses (6^{th}Paper in all the four Semesters) have been designed with the focus on different fields/areas of Specialization.

2) Each Specialization Elective consist of Four Courses during Four Semesters [one each in every semester]

3) Introduction of any few of the Elective Courses from out of the 8 + 2 areas of specialization shall depend on the availability of faculty with respective area of specialization or interest to offer a particular course.

4) Specialization Elective Course shall either be opted by the student [from out of the Specialization Courses offered by the Department] or could be allotted by the department [depending on the circumstances] at the beginning of the first semester.

5) Specialization Elective Courses have a horizontal sequencing and once chosen/allotted in the first semester shall continue till the end of the fourth semester. Hence, there is no provision for any change.

6) Project Work to be submitted by the students in the fourth semester shall generally be from the area of Specialization Elective Course/Papers pursued by the student on the issues related to latest developments or current issues in Economics.

6. Project Work

1) **Project Work** is mandatory to students.

2) **Topic** for the Project Work as mentioned, can either be selected by the Student or suggested by the Faculty on the issues related to: Specialization Elective Course or Core Courses or latest developments, or current issues in Economics at the beginning of the Third Semester.

3) **Submission of Project Work** by the Students to the Department shall either be before the end of the Fourth Semester [i.e., on or before the last working day of the Semester].

4) **Marks for the Project Work:** 30 + 50 + 20 = 100 Marks.

5) **Break-up of Marks** for the Project Work is as follows:

Component-1 (C1) :Periodic Progress and Reports [15 Marks]

Component-2 (C2) : Results of the Work and Draft & Final Report [15 Marks]

Component-3: (C3) : Dissertation/Project Work Evaluation [50 Marks]

Viva Voce Examination :[20 Marks]

7. Viva-Voce Examination

1) Viva-Voce shall be conducted on the Project Work submitted by the students during the Fourth Semester.
2) Viva-Voce Examination shall be conducted in (i) Department of Studies in Economics, PBMMEC PGC within a week or two after the completion of IV Semester examination.
3) Viva-Voce Committee shall comprise of: (i) The Chairperson, (ii) Concerned Supervisor of the Projects, (iii) Faculty from the Department and (iv) Faculty from the other Colleges.
4) Marks for the Viva-Voce Exam shall be the average of marks given by all the examiners.
5) Consolidated Marks List [consisting of the marks given by each examiner] shall be sent to the Controller of Examination preferably on the same day or immediate next working day.

8. Eligibility for Admission

1) Candidates possessing a Bachelor's Degree of the University of Mysore or of any other University equivalent thereto and complying with the eligibility criteria indicated in the Admission Regulations of the University of Mysore are eligible for admission to Post-Graduate Degree Programme in M.A. Economics.

9. Attendance: 75% Attendance is mandatory for the student in each Course/Paper to appear for C3 Exam.

Note:

1) In case a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED the course and is not allowed to appear for C3 in the Course.
2) In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKE-UP option**.**

M.A. ECONOMICS: COURSE STRUCTRE AND SYLLABUS

BATCH: 2019-20

MINIMUM CREDITS REQUIRED FOR MA ECONOMICS COURSE

MA ECONOMICS: COURSE STRUCTRE AND SYLLABUS

BATCH: 2019-20

MINIMUM CREDITS REQUIRED FOR MA ECONOMICS COURSE

Semesters	HARD CORE		SOFT CORE		S ELECTIVE		Special Course		Open Elective (Optional)		TOTAL	
	Number of Papers	Credits	Number of Papers	Credits	Number of Papers	Credits	Number of Papers	Credits	Number of Papers	Credits	Number of Papers	Credits
I	04	15	01	0 3	01	03	-	-	-		06	21
II	04	14	01	03	01	03	-		-	-	06	20
III	03	10	02	05	01	03	-		01	-	06	19
IV	03	11	01	06	01	03	01	04	-	-	06	20
TOTAL	**14**	**50**	**6**	**18**	**04**	**12**	**1**	**03**			**24**	**80**

*Special Course (SC): Project Work

FIRST SEMESTER Foundations of Economics

Sl.No	Title	W/L per week In hrs	Hard Core/ Soft Core/ Special Elective	Number of Credits			
				L	T	P	Total
1	**HARD CORE** Advanced Microeconomics	05	HC-01	4	1	0	4
2	Advanced Macroeconomics	05	HC-02	4	1	0	4
3	Mathematics for Economics	05	HC-03	4	1	0	4
4	Econometrics-1	04	HC-04	3	1	0	3
5	**SOFT CORE 1**	04	SC-01	3	1	0	3

	Advanced Indian Economy						
6	**Special Elective1** Infrastructure Economics	04	SC-02	3	1	0	3
	Total	**28**					**21**

Note: One tutorials is equal to one hour of lecture

SECOND SEMESTER Core Economics I

Sl. No.	Title	W/L per week In Hrs	Hard Core/ Soft Core/ Open Elective	Number of Credits			
				L	T	P	Total
1	**HARD CORE** Economics for Development and Growth	05	HC-05	4	1	0	4
2	Statistics for Economics	04	HC-06	3	1	0	3
3	International Business	05	HC-07	4	1	0	4
4	Econometrics-II	04	HC-08	3	1	0	3
5	**SOFT CORE 2** Computer Applications for Economics	1Hours Theory + Work load of Two Practicals /Week (Each Batch has 10 students and the duration of each practicals is 2 hours)	SC-03	1	0	3	3
6	**Special Elective 2** Energy Economics	04	SE-02	3	1	0	3
	Total	**27**					**20**

Note: One tutorials is equal to one hour of lecture

THIRD SEMESTER Core Economics II

Sl. No.	Title	W/L per week In Hrs	Hard Core/ Soft Core/ Open Elective	Number of Credits			
				L	T	P	Total
1	**HARD CORE**	05	HC-09	4	1	0	4

	Public Economics						
2	Econometrics-III	04	HC-10	3	1	0	3
3	Research Methodology and Data Analysis	03	HC-11	3	0	0	3
4	**SOFT CORE 3** Managerial Economics	04	SC-04	3	1	0	3
5	**SOFT CORE 4** Natural Resource Economics	03	SC-05	2	1	0	2
6	**Special Elective 3** Spatial Economics - Urban Economics Or **Open elective**	05	SE-03	2	2	0	4
	Total	25					**19**

Note: One tutorials is equal to one hour of lecture

Table 6 : FOURTH SEMESTER Specialized Economics

Sl. No.	Title	W/L per week in Hrs	Hard Core/ Soft Core/ special Elective/special course	Number of Credits			
				L	T	P	Total
1	**HARD CORE** Welfare Economics	05	HC-11	4	1	0	4
2.	Econometrics-1V	04	HC-12	3	1	0	3
3.	International Finance & Monetary System	05	HC-13	4	1	0	4
4.	**SPECIAL COURSE** Minor Project Work*	As per regulations	SC-01	0	0	3	3
5.	**SOFT CORE 5** Indian Financial Institutions and Markets	04	SC-05	2	1	0	3
6.	**Special Elective 4** Urban Data Analytics	04	SE-04	2	1	1	3
	Total	21					**20**

Note: One tutorials is equal to one hour of lecture

***Work load for Project Work guidance is 2 hours per batch of 8 students per week**

Scheme of Examination for MA Economics

Semesters	Continuous Assessment 16 weeks (C1 and C2)		Semester End Exam (C3) Duration 3 hours		Pass	
	Max	Mini	Max	Min	Max	Mini
I Semester	30	09	70	21	100	50
II Semester	30	09	70	21	100	50
III Semester	30	09	70	21	100	50
IV Semester	30	09	70	21	100	50

10. Definition of Courses:

Hard Core Course: A Course which should be compulsorily studied as a Core requirement.

[Requirement: Minimum 42 & Maximum 52 Credits]

Soft Core: A Course with a single choice the main discipline/subject of study or from sister/related discipline/subject which supports the main subject.

[Requirement: Minimum 16 Credits]

Special Elective Course: Generally a course which may be very specific or specialized or advanced or supportive to the discipline/subject of study which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the proficiency/skill. A Soft Core Course may also be considered as an elective.

Special Course: Project Work/Dissertation work involving application of knowledge in solving/ analyzing/exploring a real life situation/difficult problem. A project/dissertation work may be hard core or a soft core as decided by the concerned Board of Studies (BOS).

11. Breakup of Number of Courses:

iv. **Hard Core Courses** [Compulsory] **:** **14** [3 or 4 Credits for each Course]

v. **Soft Core** [With Single Choice] **:** **05** x 3 Creditsper Course = **15Credits**]

Minimum is 16 Credits

vi. **Special Elective** [Compulsory] **:** **04**[04 Course Minimum x 3 Credits = **12 Credits**]

[Maximum of 3 Courses]

12. Teaching Hours: 3 to 4 Hours per week for each course. [About 60 Hours for each course per semester]

[This shall be inclusive of Theory/Application/Practical Work/Tutorials/Seminars depending on the content of the course and approach by the faculty for each course]

13. Allocation of Marks for M.A Economics Programme:

Total Marks for M.A Economics [without Add-on Proficiency Diploma] with 6 courses per semester with 80/96 Credits = **2400**/**2400 Marks** [600 Marks in I, II, & III Semester and IV Semester]

Number of Marks for Each Course: 100 Marks

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8) Each Specialization Elective consist of Four Courses during Four Semesters [one each in every semester]

9) Introduction of any few of the Elective Courses from out of the 8 + 2 areas of specialization shall depend on the availability of faculty with respective area of specialization or interest to offer a particular course.

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11) Specialization Elective Courses have a horizontal sequencing and once chosen/allotted in the first semester shall continue till the end of the fourth semester. Hence, there is no provision for any change.

12) Project Work to be submitted by the students in the fourth semester shall generally be from the area of Specialization Elective Course/Papers pursued by the student on the issues related to latest developments or current issues in Economics.

15. Project Work

6) **Project Work** is mandatory to students.

7) **Topic** for the Project Work as mentioned, can either be selected by the Student or suggested by the Faculty on the issues related to: Specialization Elective Course or Core Courses or latest developments, or current issues in Economics at the beginning of the Third Semester.

8) **Submission of Project Work** by the Students to the Department shall either be before the end of the Fourth Semester [i.e., on or before the last working day of the Semester].

9) **Marks for the Project Work:** 30 + 50 + 20 = 100 Marks.

10) **Break-up of Marks** for the Project Work is as follows:

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Component-2 (C2) : Results of the Work and Draft & Final Report [15 Marks]

Component-3: (C3) : Dissertation/Project Work Evaluation [50 Marks]

Viva Voce Examination :[20 Marks]

16. Viva-Voce Examination

6) Viva-Voce shall be conducted on the Project Work submitted by the students during the Fourth Semester.

7) Viva-Voce Examination shall be conducted in (i) Department of Studies in Economics, PBMMEC PGC within a week or two after the completion of IV Semester examination.

8) Viva-Voce Committee shall comprise of: (i) The Chairperson, (ii) Concerned Supervisor of the Projects, (iii) Faculty from the Department and (iv) Faculty from the other Colleges.

9) Marks for the Viva-Voce Exam shall be the average of marks given by all the examiners.

10) Consolidated Marks List [consisting of the marks given by each examiner] shall be sent to the Controller of Examination preferably on the same day or immediate next working day.

17. Eligibility for Admission

1) Candidates possessing a Bachelor's Degree of the University of Mysore or of any other University equivalent thereto and complying with the eligibility criteria indicated in the Admission Regulations of the University of Mysore are eligible for admission to Post-Graduate Degree Programme in M.A. Economics.

18. Attendance: 75% Attendance is mandatory for the student in each Course/Paper to appear for C3 Exam.

Note:

1) In case a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED the course and is not allowed to appear for C3 in the Course.

2) In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKE-UP option**.**

I Semester

Foundations of Economics

CBCSM A Economics I Year-2018-19

First Semester

Advanced Microeconomics

MAECOHC 19-01: Hard Core Paper-01 **Credit -4**

Course Objectives:

1. To develop analytical skills as applied in modern economics
2. To understand new principles and models in microeconomics and be able to critically appraise these models
3. To have the ability to critically evaluate empirical tests of theoretical models

MODULE 1: Theory of Demand and Consumer Behavior

Recent Developments in the Theory of Demand – Linear Expenditure System - Behaviour under the Conditions of Uncertainty and Risk -The Revealed Preference Hypothesis –The theory of marginal preference-Lancaster's Theory

MODULE - 2: Production and Cost Analysis.

Empirical Production Function – Statistical Estimation of Production Function – Technology and International Competition - Economies of Scale and Economies of Scope – Learning Curves – Nature of Costs- short run cost function, long run cost curves- Empirical Estimation of Cost Functions

MODULE - 3: Price and Output Determination under Different Markets

Perfect Competition- Monopoly- Monopolistic Competition: Product Differentiation – Resource Allocation and Utilization under Monopolistic Competition – Selling Cost. Oligopoly: Cournot Model – The Edgeworth Model – Chamberlin Model – The Kinked Demand Curve Model – The Centralized and Market Sharing Cartel Model – Price Leadership – Collusive Oligopoly – Oligopoly and Price Rigidity

MODULE -4: A Critique of the Neo - Classical Theory of Firm

The Marginalist Controversy – A Critique of Average-Cost Pricing – Baumol's Sales and Revenue Maximization Model – Williamsons' Model of Managerial Discretion – Morris's Model of Managerial Enterprise – Full Cost Pricing Rule – Bain's Limit Pricing Theory and its Recent Developments – Sylos – Labini's Model – Behavioural Model of The Firm – Game Theoretic Model.

Self-Study Component:

The Law of Demand- Elasticity of Demand –Demand Schedule -Supply Schedule- Equilibrium Supply and Demand.

Historical Development of the Consumer Theory - cardinal versus ordinal Utility theory.

Production Theory - Production Function with One Variable Input and Two Variable Inputs – Returns to Scale-nature and types of costs-theory of firm

Equilibrium of the firm and the industry- Characteristic features of Perfect competition, Monopoly, Monopolistic competition-Price and output determination under different market conditions

Reference Books:

1. Koutsoyiannis (1997), Modern Microeconomics, Macmillan, London.
2. Dominick Salvator, (2002) Theory and Problems of Microeconomic Theory, Schaum's Outline Series, McGraw-Hill Book Company, Singapore.
3. Pindyck Robert S., and Daniel L. Rubinfeld, (2006), Microeconomics, Pearson Prentice Hall, New Jersey.
4. Ahuja H.L. (2002) Advanced Economic Theory, S. Chand and Company, New

CBCSM A Economics I Year-2018-19

First Semester

Advanced Macroeconomics

MAECOHC 19-02: Hard Core Paper-01 **Credit -4**

Course Objectives:

1. To provide thorough grounding in a single semester to the models and tools macroeconomists use;
2. To teach developing positive models in order to understand the dynamics of key macroeconomic variables such as output, employment, unemployment, inflation, interest rates, etc.;
3. To understand the normative prescriptions for macroeconomic policymaking, in particular regarding the proper setting of fiscal and monetary policies

MODULE- 1: National Income Accounting

Key Macroeconomic variables & Functional relationship between them - Measurement of National Income and Macro Performance – National Income Accounts- Accounting Concepts

& Identities measuring the cost of Living – GNP and Quality of life- Importance of National Income Analysis- Green Accounting.

MODULE 2: Equilibrium Models

Classical approach – Full employment equilibrium – Policy implications and critical evaluation – Keynesian Approach – Effective Demand – Consumption Function: Debate and Evidences – Investment Function- Equilibrium Income and output – Relevance and critique of Keynesian Policies

MODULE- 3: Disequilibrium Models

Time horizon – Fluctuations – Nominal and Real Rigidities and Fluctuations – Business cycle Theories – Fluctuations in the open Economy- the sticky wage Model – Sticky price Model – Imperfect Information- Inflation (Theoretical expositions) – Unemployment – Philips curve – Policy implications – Dynamic Disequilibrium: Explaining Fluctuations with the IS – LM Model.

MODULE 4.: Open Economy Macroeconomics

Meaning – Concepts – Identities – Mundell Fleming Model – Balance of Payments and Exchange Rate Regimes – Simultaneous Equilibrium- Automatic Adjustment and Adjustment Policies – Policy implications and critique.– Interest –rate & exchange rate interdependence

Module 5 Neo-classical models

Emergence of New Classical Macroeconomics: Rational Expectations Analysis - Policy Conclusions and Implications - Supply-Side Economics - Theoretical Propositions and Implications - Keynesian Counter Critique.

Self-Study Components

1. Central Themes of Macroeconomics
2. Functional relationships & Identities
3. Methods of National Income Estimation
4. Trends in India's National Income
5. Problems in the estimation of India's National Income
6. Says Law of Markets. OTM, Pigouvian Theory, Real Theory of Interest.
7. Determinants of the PC and Investment
8. MEC & its determinants
9. Investment Multiplier, Accelerator
10. Alternative theories of consumption behavior.
11. Causes & Consequences of economic fluctuations
12. Theories of inflation.

References:

1. Froyen Richard T. *Macroeconomics-Theories and Policies,* Macmillan Pub., Company, NY.
2. Mankiw N. Gregory, *Macroeconomics*, Worth Publishers, New York.
3. Shapiro Edward (2004**) Macroeconomic Analysis**, Galgotia Publications Pvt Ltd, New Delhi.
4. RudigerDornbusch, Stanley Fisher and Richard Startz, **Macroeconomics**, Tata Mcgraw-Hill Publishing Co.Ltd, New Delhi 2004.

CBCS M A Economics I Year-2018-19

First Semester

Mathematics for Economics

MAECOHC 19-03 Hard Core Paper-03 Credit- 4

Objectives:

1. To impart knowledge about the concepts and tools of mathematics
2. To make students apply these in building models

Module 1 Applications of Mathematics in Economics

Relationship between mathematics and Economics – Limitations for its applicability. Number system – Natural Numbers – Fractions – Imaginary Numbers – Rational and Irrational Numbers – Real and Complex number – Number scale. Set Theory

Module 2 Functions

Linear and Non-Linear Functions- Graphical Representation of Linear and Non-linear functions-Applications of Linear and Non-linear functions in Economics-Market Equilibrium – Effects of Tax and Subsidy in Market Equilibrium – Product Transformation Curves – Pareto's law of income distribution -Compounding and Discounting Functions

Module 3 Elementary Matrix Algebra

Basic Concepts - Types of Matrix - Matrix Operations - Transpose - Inverse Matrix - Determinants: Meaning, Properties, Rank of Matrix, Minor, Co-factor.

Functions of Several Variables - Cramer's Rule and its Applications in Economics.

Module 4 Calculus

Concepts of limits and continuity – Differentiation of a function using first principle – Rules of differentiation of algebraic functions – Application of differentiation in economics –

Maxima and Minima : Elasticity of demand – Elasticity of supply – Cross elasticity – Revenue maximization and cost minimization

Homogeneous function - Integration – Definite and Indefinite Integration – Consumers' and Producers' Surplus.

Module5 Applications to Economic Analysis

Consumers Behavior: Elasticity of Demand, Relationship between Price Elasticity and TR, AR and MR, Consumers' Equilibrium and Utility Maximization

Firm's Behaviour: Production Function - Cost Function - Revenue Function - Equilibrium of Firm and its Profit Maximization - Homogenous Function - Cobb-Douglas Production Function - CES Production Function - Euler's Theorem

Monopoly and Joint Production -Duopoly, Monopolistic Competition and Oligopoly. Integral Calculus: Techniques of Integration - Definite and Indefinite Integration. Applications to Economic Analysis: Consumer's Surplus - Producer's Surplus. Introduction to Frontier Analysis: Technical Efficiency - Technological Change and Total Productivity - Multi-Market Equilibrium.

Self-study

Applicability of mathematical and statistical tools to other disciplines - Inductive and Deductive reasoning - Axiom system - Logic meaning of necessary and sufficient conditions - Sets and relations - number system - Algebra –Function and limits -linear and nonlinear functions, exponential function - logarithmic function.-Analytical Geometry - Simultaneous equation and solutions for two variables.

Differentiation and Integration – Derivative, rules of differentiation, functions of several variables, partial derivatives, total derivative.

Reference

1. Allen, R.G.D (2002) Mathematics for Economics, Prentice – Hall of India Private Limited, New Delhi.
2. Bose D. (2003) an Introduction of Mathematical Economics, Himalaya Publishing House, Mumbai.
3. Monga G.S. (2002) Mathematics and Statistics for Economics, Vikas Publishing House, New Delhi.
4. Veerachami R (2002) Quantitative Methods for Economists, New Age International Publication, New Delhi.
5. Yamane Taro (2002) Mathematics for Economists – An Elementary Survey, Prentice – Hall of India Private Limited, New Delhi.

CBCS M A Economics I Year-2018-19

First Semester

Econometrics-1

MAECOHC 19-04 Hard Core paper-04 Credits -3

Objectives:

1. To impart knowledge about the concepts and mathematical and statistical tools in building econometric models
2. To enable students to apply these in models for estimation and forecasting

MODULE 1: The Nature and Scope of Econometrics

Definition of Econometrics –Need for the study Econometrics - The Methodology of Econometrics – Creating a statement or Theory or Hypothesis – Collecting Data – Specifying the Mathematical Model Specifying the Statistical or Econometric Model – Checking for model adequacy and Model specification – Testing: Testing the hypothesis derived from the model – Using the Model for Prediction or Forecasting.

MODULE 2: A Review of Basic Statistical Concepts

The Summation Notation – Properties of the Summation Operator – Experiment: Sample space, sample point and Events – Random Variables – Probability – Probability of an Event: The Classical or A Priori Definition – Relative Frequency or Empirical definition of Probability of Random Variables – Random Variables and Probability Distribution Function – PDF of a Continuous Random Variable – Cumulative Distribution function – Multivariate probability Density Function – Conditional Probability Density Function – Statistical Independence – Characteristics of Probability Distributions – Expected value

MODULE 3 : Some Important Probability Distributions

The Normal Distribution-Properties of the Normal Distribution – The Standard Normal Distribution-Random Sampling from a Normal Population-Bootstrap Sampling – The Sampling or probability Distribution of the Sample Mean - The Central Limit Theorem – The Chi-Square (□2) Distribution – Properties of the Chi-Square Distribution – The 'F' Distribution – Properties of the F Distribution – The 'F' Distribution – Properties of the F Distribution – Relationship among the

t , F and χ^2 and the Normal Distributions.

MODULE 4: Linear Regression Model

The Meaning of Regression: Basic ideas of linear Regression: the two – variable Model – the Meaning of Regression – The Population Regression Function (PDF) – Stochastic Specification of the Population Regression Function (PDF) – the nature of the stochastic error term – the sample Regression. Function (SRF) –Meaning of the term Linear Regression –

Linearity in the Variables – Linearity in the Parameters – two variables Versus Multiple Linear Regression – Estimation of parameters : The Method of Ordinary Least Squares (OLS) – A Numerical Example and Interpretation of the Estimated Function for Widgets

Reference:

1. Kmenta Elements of Econometrics
2. Koutsuyannis "Econometrics".
3. DamodarGujarathi Fundamentals of Econometrics
4. DamodarGujarathi, Don C Porter and SangeethaGunashekar, Basic Econometrics, Tata McGraw Hill Education Pvt. Ltd, 2012
5. Christopher Doughetry , Introduction to Econometrics, Fourth Edition, Oxford University Press,2011.
6. Jeffrey M Wooldradge, Econometrics, Cengage Learning, 2009

CBCS M A Economics I Year-2018-19

First Semester

Advanced Indian Economy

MAECOSC 19-01Soft Core -01 **Credits -3**

Objectives:

1. To familiarize the students with the issues of Indian Economy

2. To enable them get perspective on issues related to Indian Economy

MODULE-1 : Factors Determining Growth, productivity and development.

Natural resources - Human resources - indices - Infrastructure – Institutional changes- Structural transformation - National Income Accounting- Saving-Investment- Capital-Output Ratios – Five Year Plans and Productivity Growth- Poverty and unemployment – Gender and development.

MODULE 2.: Development Experience, Policy, Strategies.

State v/s Market – Market failures -The ideology of planning- Development policy - Development strategies - Public and private sector – Disinvestment -The raise of corporate sector and Foreign capital - Redefining the role of state - Reforms – New Industrial policy – Advance Policy initiatives: NITI Ayog

MODULE 3: Money, Finance, Trade, and Capital market.

Monetary policy - supply and demand for money and inflation - Money and Capital Markets - Role of R.B.I. and SEBI - Fiscal policy- Financial sector Reforms - Trade and exchange Rate policy - Reforms - Trends in International trade - Financial Trade & Markets

MODULE 4: India in the World Economy - Neo-Classical counter Revolution-

Market Fundamentalism - Free markets - public choice - Market Friendly approach - Structural adjustment programme - Globalization and its impact on India-Privatization Wave in the world and its Impact - Flow of FDI and International Financial Capital and its volatility - W.T.O. and its Impact - ODA and India - The role of Multilateral Financial Institutions.

Lessons for self-study

1.Agricultural policy - Agricultural growth under five year plans- strategies to develop agriculture-Capital formation - Green revolution - Price policy - food security and Public distribution system - agricultural finance- marketing – market infrastructure.

2. Industrial development. Changing industrial policy regimes. Public v/s private sector – industrial finance and labour relations – Role of MNCs in industrial development – Regional disparities- Role and problems of micro, small and medium industrial enterprises – I T Industry.

3. Service sector growth – changing trends and composition of service sector- Parallel economy - Centre State Financial Relations

Reference Books:

1. RuddarDatt& K P M Sundaram (2010) – Indian Economy- S. Chand & co. Ltd New Delhi.
2. Mishra &Puri - Indian Economy- Himalaya Publication
3. Deepak Lal [1999] India in the world Economy, Oxford University press, New Delhi
4. Krueger [Ed] [2002] Economic Policy Reforms, Oxford University press New Delhi
5. Subramanianan S [ed] [2002]India's Development Experience, Oxford University press, New Delhi.
6. Uma Kapila(2003) Indian Economy since Independence, Academic Foundation, New Delhi.
7. I.C.Dhingra (2010) Indian Economy, Sulthan Chand & Son, Delhi.
8. A.N. Agarwal (2009), Indian Economy – Problems of Development and Planning, VishwaPrakashan, New Delhi.
9. WDR (1997) "The state in a changing world" Oxford University press- Washington.D.C.

10. Dharmghai (1993) Structural adjustment programme The social issues involved" Working paper United nations Institute for policy research Washington D.C.
11. Third international conference on globalization and development 2001 Havana

Reports:

1. Govt. of India, Ministry of Finance, Economic Surveys (of recent years)
2. The World Bank, World Development Report(of recent years)
3. The UNDP, Human Development Report (of recent years)
4. Govt. of India, Planning Commission, Drafts of 8^{th}, 9^{th}, 10^{th} and 11^{th} Five Year Plans
5. Govt. of India, Planning Commission, (2002) National Human Development Report
6. Indira -Gandhi Institute of Development Research(IGIDR), India Development Reports, Mumbai.
7. Todaro . M P .& S C Smith [2003] Economic Development - Pearson Education [Singapore] pvt. Ltd. Delhi- 92
8. C M I E reports on Indian Economy

CBCS M A Economics I Year-2018-19

First Semester

Infrastructure Economics

MAECSE 19-01 Special Elective -01 Credits -3

Objectives:

1. To provide the students with an essential idea on "Social Overhead Capital"
2. To enable them get perspective on issues related to Infrastructure Sector which is the fastest growing sectors of the modern economy

Module-1: Introduction

Infrastructure and Economic Development - Infrastructure as a Public Good - Social and Physical infrastructure - Special Characteristics of Infrastructural Facilities - Green Infrastructure -Economies of Scale of Joint Supply - Marginal Cost Pricing versus Other Methods of Pricing in Public Utilities - Cross-Subsidization - Free Prices, Equity and Efficiency.

Module-2: Transport Economics

The Structure of Transport Costs and Location of Economic Activities - Demand for Transports - Modals of Freight and Passenger Demand - Model Choice - Cost Functions in the Transport Sector, Principle of Pricing - Special Problems of individual Modals of

Transport - Inter-Modal Condition in the Indian Situation - Urban and Metropolitan Transportation Planning.

Module-3: Communications

Structure of Telecommunication Sector - Price Determination - Principles of Decreasing Costs in Telephone Industry - Characteristics of Postal Services - Criteria for Fixation of Postal Rates - Measurement of Standards of Services in Telephone and Postal Utilities - Private Sector Participation in Telephones and Postal Utilities - Regulatory Framework and Institutions -TRAI.

Module-4: Water Supply Economics

Irrigation - Financing Water Utilities - Urban and Rural Water Supply - Pricing of Drinking Water Supply and Sanitation - investments - Public Sector and Community Collaboration.

MODULE 5: Issues in Infrastructure Financing and Management

FDI and Infrastructure Finance, Private Financing of Infrastructure- trends and opportunities- Risk analysis and Risk management- PPP, Models- Legal and Regulation Issues- Resource use Efficiency- Reforms in Management- Imperatives- Systems and Functions- Evaluation.

References: [Please refer to the Latest Editions]

1. World Development Report 1994, "Infrastructure for Development, , Oxford University Press, New York..
2. Parikh K.S. (Ed) India Development Reports, Oxford University Press, New Delhi.
3. Indian Council of Social Science Research (ICSSR) 1976, Economics of Infrastructure, vol. IV, New Delhi.
4. Paul Stevens (Ed) (2000) The Economics of Energy Vol I & II.
5. Sankar U (1992) Pricing in Public Sector: Theory and Applications, Indian Economic Association Trust for Research and Development, New Delhi.
6. Nosten H.S (1971) Modern Transport Economics, C.E. Merrill, London.
7. KessidesChristiue, "The Contributions of Infrastructure to Economic Development : A Review of Experience and Policy Implications, World Bank Discussion Paper 213, 1993.
10. India Infrastructure Report

CBCS M A Economics I Year-2018-19

Second Semester

Economics of Growth and Development

MAECOHC19-05 Hard Core paper-05 Credits - 4

Objectives:

1. To study the critical issues pertaining to various sectors and discuss the development policy initiatives.
2. To understand that the crucial importance of institutional factors in economic development has been taken care of by incorporating social, state and market forces in the context of development.
3. To evaluate the development prospects in the context of the development goals of the 21 st century

MODULE 1: Introduction to Development Economics

Concept of Development - Evolution of Development Economics –Definitions & meaning of Economic development - Measuring Economic Development,– Goals of Economic Development - Capability Approach to Development – Emerging Challenges in Development – Development Debate – Development Vs Displacement – Development Ethics – Inclusive Development– Development as Freedom – Changing paradigms of Development Economics – Sustainable development – Institutions for Development, State & Market.

MODULE 2: Theoretical foundation of Development Economics & their policy Implications

Development theory concept – classical model, assumptions & features of classical approach to growth – Distinct features of prominent classical Economics & their policy implications – Neo-Classical model, assumptions & features – Distinct features of prominent neo-classical economics & its policy implications – Modern approach to development (human capital approach), Assumptions & features – Lucas, Romer, Becker - Distinct features of prominent Human Resource Development economists and their policy implications.

MODULE 3: Growth, Poverty & distributive Justice

Growth Controversy – Growth & Distributive Justice - Inequalities in Growth & Development – Measuring income distribution, Lorenz curve, Gini Co-efficient & functional distribution of income – Redefining Development Goals in terms of growth with improved income distribution- Poverty concept, measurement, salient features of poverty in LDCs – Poverty alleviation measures– Development distance between nations, measurement & trends – Measures to reduce development distance between Nations.

MODULE 4: Sectoral Development in LDCs

Leading issues & policy imperatives, Agricultural growth – Major issues & policy approach , Industrial Development – Essentials & policy approach, Trade & Economic Growth - Challenges & issues - Service Sector Growth– Trends & issues

References: [Please refer to the Latest Editions]

1. Thirlwall A.P, (2000) **Growth & Development**, 6thEdition ,Wesr press pvt. Ltd. New Delhi
2. Todaro M.P & Smith (2007), **Economic Development in the 3th World**, Orient & Longman, London.
3. Ray Debraj (1998), **Development Economics**. Princeton university press New Jersey
4. Meier M Gerald, (2004), **Leading Issues in Economic Deveoplment**, oxford New York.
5. Higgins Benjamin (1999) **Economic Development – Theory Principles &History** , W.W Norton, New York.
6. Srivastava O.S (1996) **Economics of Growth, Development &Planning** ,Vikas publication, new Delhi .
7. G.M Meier & josephs E. Stiglitz (2002), **Frontiers of Development Economics**, Oxford University press, New York.
8. Rajanikanth ( ), **Paradigm of Development Economics.**
9. Stuart R. Lynn(2003), **Economic Development – Theory & Practice for a divided World**, Printice hall, New jersy.
10. Robert J. Barro& Xavier Sale I Martin ( ) , **Economics Growth,** McGraw Hill, New York

CBCS M A Economics I Year-2018-19

Second Semester

Statistics for Economics

MAECOHC19-06 Hard Core paper-05 Credits - 3

Objectives:

1. To impart knowledge about the concepts and statistical tools for economic analysis.

2. To make students apply these for estimation and forecasting

Module-1: Introduction to Statistics

Types of Data - Nominal, Ordinal & Ratio-Scale Data, Qualitative and Quantitative Data, Individual, Discrete and Continuous Data - Cross Section, Time Series and Pooled Data - Sources of Data - Population and Samples - Descriptive Statistics and Inferential Statistics.

Module-2: Measures of Average and Dispersion

Measurement of Average - Arithmetic Mean, Weighted Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Quartile, Percentiles, and Mode. Measures of Variability - Range, Inter-quartile Range, Quartile Deviation, Percentiles Deviation - Mean Deviation, Standard Deviation, and Coefficient Variation.

Module-3: Probability and Distribution

Probability Theory - Concepts and Approaches to Estimate Probability - Probability Distribution Functions - Theoretical Distribution: Normal, t, Chi-Square & F Distribution.

Module-4: Theory of Estimation and Hypothesis Testing

Concept of Estimator - Sampling Distribution of Estimator - Point and Interval Estimation - Properties of Good Estimator for Small and Large Samples. Hypothesis Testing: Approaches to Hypothesis Testing - Confidence Interval Approach -Test of Significance Approach and P-Value Approach- Formulation of Hypothesis - Null and Alternative - Level of Significance - One Sided and Two Sided Hypothesis - Type-I and Type-II Error - Test Statistic- Critical Value - Parametric and Non-Parametric Tests.

Module-5: Correlation and Regression

Correlation: Meaning and Types of Correlation - Measurement of Correlation - Scatter Diagram - Karl Pearson's Coefficient of Correlation - Spearman's Rank Correlation - Testing of Correlation Coefficients. Regression: Simple Regression Model - Estimation - Least Squares Method - Goodness of Fit - Introduction to Multiple Regressions.

Nature and Decomposition of Time Series - Analysis of Trend - Polynomial Trend - Moving Average Method, Exponential Smoothening, Least-Square Method, Seasonal Component - Forecasts and their Accuracy - Root Mean Square Error.

Module-6: Index Numbers

Nature and Purpose of Index Numbers - Types of Index Numbers: Price Index - Retail Price Index - Quantity Index, Link and Chain Index - Simple and Aggregate Index Numbers: Laspeyre's Index, Paasche's Index, Marshall and Edgeworth's Index - Fisher's Index - Time Reversal and Factor Reversal Tests - Deflation and Splicing of Index Numbers - Problems of Construction of Index Numbers - Limitation of Index Numbers.

Practical Component:

Graphical Presentation of Data: Tabular and Graphical Methods - Relative Frequency and Percentage - Frequency Distribution - Bar Graphs, Line Graph, Pie Charts, Histogram, Cumulative Distribution and Ogives.

References: [Please refer to the Latest Editions]

1. Anderson, Sweeney & Williams, Statistics for Business & Economics, Thomson South-Western, Bangalore.
2. Gupta S P. Statistical Methods, S. Chand and Company, New Delhi.
3. Veerachami R. Quantitative Methods for Economists, New Age International Publication, New Delhi.
4. Yamane Toro, Statistics - An Introductory Analysis, Harper and Row Publishers, New York.

CBCS M A Economics I Year-2018-19

Second Semester

International Business

MAECOHC19-07 Hard Core paper-07 Credits – 4

Objectives

1. To demonstrates how international business variables affect the trade process.
2. To highlight the realities of international business; some of its advantages and its problems that come when business is conducted on the international stage
3. To study the impact of regulations on international business and how strategies are developed and how foreign legislation is considered.

Module-1: Global and National Business Environment

Global Business Environment: Globalization - Forces Driving Globalization - Untangling the Globalization Debate: Impact on Labour, Environmental Regulation, Income Inequality, National Sovereignty and influence on Cultures - Key Players in International Business:

Multinational Corporations, Entrepreneurs and Small Businesses - Global Business Environment.

National Business Environments: Cross-Culture Business - Components and Classifications.

Module-2: Politics and Law in Business

Political Systems - Political Risks - Legal Systems - Global Legal and Ethical Issues - Economic System and Development: Economic Systems: Centrally Planned Economy Mixed Economy, Market Economy - Development of Nations - Human Development - Economic Transition.

Module-3: International Trade

Overview of International Trade - Benefits, Volume, Composition, Direction and Trends - Theories of International Trade: Mercantilism, Absolute Advantage, Comparative Advantage, Factor Proportions Theory, International Product Life Cycle, New Trade Theory - National Competitive Advantage. Political, Economic and Cultural Motives behind Government Intervention - Methods of Promoting and Restricting Trade - Global Trading System: General Agreement on Tariffs and Trade (GATT) and World Trade Organization (WTO).

Module-4: Foreign Direct Investment

Explanations for Foreign Direct Investment - Patterns of Foreign Direct Investment - Management Issues in FDI Decisions - Government Intervention in FDI - Government Policy Instruments and FDI - Composition, Direction and Trends in FDI.

Module-5: Regional Economic Integration

Meaning of Regional Economic Integration - Effects of Regional Economic Integration - Integration in Europe: European Union - Integration in Americas: North American Free Trade Agreement (NAFTA) Latin American Integration Association (ALADI) Southern Common Market (MERCOSUR) Free Trade Area of the Americas (FTAA) and Transatlantic Economic Partnership (TEP) - Integration in Asia: Association of Southeast Asian Nations (ASEAN) Asia Pacific Economic Cooperation(APEC) - Integration in Middle East: Gulf Cooperation Council (GCC) - Integration in Africa: Economic Community of West African States (ECOWAS) South Asian regional Cooperation (SARC)

Module-6: International Business Management

International Strategy - International Organizational Structure - International Opportunities: Screening International Opportunities - Conducting International Research - Selecting and Managing Entry Modes: Contractual, Investment Entry and Strategic Factors - Developing and Marketing Products Managing International Operations –Managing Workforce in a cross cultural environment

R**eferences: [Please refer to the Latest Editions]**

1. Hill Charles W.L., (2013) International Business-Competing in the Global Marketplace, McGraw Hill Irwin, New York, USA.
2. Wild John J, Kenneth L Wild and Jerry C.Y. Han, (2007) International Business: The Challenges of Globalization, Pearson Prentice Hall. New Jersey.

CBCS M A Economics I Year-2018-19

Second Semester

Econometrics-II

MAECOHC 19-08 Hard Core paper-08 **Credits – 3**

Objectives:

1. To impart knowledge about the building two variable and multi variable regression Models
2. To make students trained in parameter estimation using OLSE

MODULE 1: The Classical Linear Regression Model

Variances and standard Errors of ordinary least squares (OLS) Estimators – Variances and standard Errors– why ordinary least squares? (OLS) –Assumptions of OLS estimators - Properties of OLS Estimators – Monte Carlo Experiment – the Sampling Or Probability Distributions of OLS Estimators – Hypothesis Testing – Testing H_0: $B_2 = 0$ Verses $H_1 : B_2 \neq 0$: The Confident Interval Approach – The test of Significance Approach to Hypothesis Testing — the χ^2 test of significance –: the Coefficient of Determination r^2 – Formulas to Compute r^2,– The Coefficient of Correlation (r) - Reporting the Results of Regression Analysis – Normality Tests – histograms of Residuals – Normal Probability Plot

MODULE 2 : Multiple Regressions

The three – Variable Linear Regression Model – The meaning of partial Regression Coefficient – Assumption of Multiple Linear Regression Model – Estimation of parameters of Multiple Regression – Ordinary Least squares (OLS) Estimators – Variances and Standard Errors of OLS Estimators – Properties of OLS Estimators of Multiple Regression - an illustrative example – Regression Results – Interpretation of Regression Results – Goodness of fit of Estimated Multiple Regression: Multiple Coefficient of Determination, R^2 – Hypothesis Testing in a Multiple Regression :– Testing of Hypotheses about Individual Partial Regression Coefficients – The test of Significance Approach – The Confidence Interval Approach to Hypothesis Testing – Testing the joint Hypothesis that $\beta_2 = \beta_3 = 0$ or $r^2 = 0$ – Important Relationship between F and R^2, two-Variable Regression in the Context of Multiple Regression: Introduction to specification bias – Comparing two R^2 values: the adjusted R^2 – When to add an additional explanatory Variable to the model – testing for

structural Regression Model : the Chow test – Illustrative examples – Discussion of Regression Results

Module-3: Practical Problems of Regression

Multicolinearity: Nature - Causes -Consequences - Detection - Remedial Measures - Heteroscedasticity: Nature - Causes -Consequences - Detection - Remedial Measures - Auto-Correlation: Nature - Causes -Consequences - Detection - Remedial Measures.

MODULE 4: Functional Forms of Regression Models

How to Measure Elasticity: the Log linear Regression Model – Hypothesis testing in log-linear Models. Comparing linear and log-linear Regression models – Multiple log linear Regression models – How to measure the growth rate: the semi log model – Instantaneous Versus Compound Rate of Growth – Linear Trend Model – The Lin-Log Model -Reciprocal Models – Polynomial Regression Models.

MODULE 5: Model Selection

Criteria: The Attributes of a Good model –types of specification errors – omitting a relevant variable – under fitting a model – inclusion of irrelevant variables: over fitting a model – incorrect functional form – detecting specification errors – tests of specification errors – detecting the presence of unnecessary variables – tests for omitted variables ,incorrect functional forms .

References: [Please refer to the Latest Editions]

1. GujarathiDamodar; Fundamentals of Econometrics
2. Kmenta Elements of Econometrics
3. Koutsuyannis "Econometrics".
4. DamodarGujarathi Fundamentals of Econometrics
5. DamodarGujarathi, Don C Porter and SangeethaGunashekar, Basic Econometrics, Tata McGraw Hill Education Pvt. Ltd, 2012
6. Christopher Doughetry , Introduction to Econometrics, Fourth Edition, Oxford University Press,2011.
7. Jeffrey M Wooldradge, Econometrics, Cengage Learning, 2009
8. Dilip .M. Nachane , , Econometrics, , Oxford University Press,2011

CBCS M A Economics I Year-2018-19

Second Semester

Computer Applications for Economics

MAECOSC19-02 Soft core paper-02 Credits – 3

Objectives

1. Understand the Big Data Platform and its Use cases
2. Identify Big Data and its Business Implications.
3. Understand the application of analytics on Structured, Unstructured Data.

Module 1 Computer Fundamentals

Input-Output Devices; Computer Codes; BCD, EBCDIC, ASCII and Collecting Sequence; Planningthe Computer Program; Algorithm, Flowcharts and Computer Program.Data Processing – An Overview of Word Processing – An Overview of Excel:Spreadsheet: Meaning, Overview, Overview and Application areas; Features of MS-Excel; Entering

Information. Saving workbooks and Formatting , Spreadsheet Function; Creating Graphs; PrintingWorksheets and Graphs.

Module 2 Fundamentals of Big Data Analysis

Introduction – What is Big Data? - Big data: definition and taxonomy -Big data value for the enterprise - First steps with the Hadoop "ecosystem"- Handling and Processing Big Data - Methodological Challenges and Problems - Few Applications

Module 3 Hadoop Ecosystem

Introduction to Hadoop - Hadoop components: Map Reduce/Pig/Hive/H Base - Loading data into Hadoop - Handling files in Hadoop - Getting data from Hadoop Exercises

Module 4 Big Data Analysis in Practice

Case Study Session 1 (Selection of case study topics and formation of small working groups. Students engage with the cases, read through background material provided in the session and work through an initial set of questions to deepen the understanding of the case. Sample applications and data is provided to help students familiarize themselves with the cases and available (big) data) C

Case Study Session 2 (Groups are given a specific task relevant to the case in question and are expected to develop a corresponding big data concept using the knowledge gained in the

course and the parameters set by the case study scenario. A set of questions that help guide through the scenarios will be provided)

Preparation of Case Study Report and Presentation(Each group prepares a short 2 – 5 page report on their results and a 10 min oral presentation of their big data concept. There are no further requirements on the exact format of the report or the how the results are presented to the course - slides, flipchart etc.,)

Case Study Presentation

Presentation of big data concept to the group and discussion of results.

Books for Reference

1. Matthew J. Salganik. (2017). Bit by Bit: Social Research in the Digital Age. Princeton University Press.
2. Rob Kitchin. (2014). The Data Revolution: Big Data, Open Data, Data Infrastructures and Their Consequences. SAGE Publications.
3. Manovich, Lev. (2012). Trending: The Promises and the Challenges of Big Social Data. Debates in the Digital Humanities, edited by Matthew K. Gold. The University of Minnesota Press.

CBCS M A Economics I Year-2018-19

Second Semester

Energy Economics

MAECOSE 19-02 Special Elective 02 Credits – 3

Objectives

1. To apply general principles of standard economic theory into the study of energy sector in a modern economy.
2. To understand and assess the significance of the sector, production, supply, demand and pricing determinants.

Module-1: An Overview of Energy Concepts and Energy sub-sectors

Concepts - Definitions - Sources and Categories of Energy - Energy Balance Tables - Energy Data Sources - Energy System - Energy - Economy Linkages - Green Energy -Forms of Energy - Electricity, Coal, Oil and Renewable Energy Sources - Availability and Features - Management of Energy Resources - Energy and Environmental Sustainability.

Module-2: Energy Supply and Demand Analysis

Energy Supply Analysis: Availability and Supply of Different Sources of Energy - Supply Constraints - Role of Renewable Sources of Energy - Institutional Framework for Energy

Supply in India - Supply Scenario and Investment Requirements - Alternative Energy Sources - Energy Imports - Trends and Issues - Policies of the Government.

Energy Demand Analysis: Determinants of Energy Demand - Estimating Energy Demand - Methods of Estimation - Price and Income Elasticity - Demand Estimation under Administered Price Regimes - Demand - Supply Gap - Energy Shortage and Crisis - Need for Energy Demand Management - Renewable Energy Options.

Module-3: Energy Pricing

Need - Methods and Principles of Energy Pricing - Economic Efficiency and Equity Considerations - Pricing Under Supply Constrained Framework - Energy Markets - Regulation - Issues and Challenges.

Module-4: Energy Efficiency and Conservation

Need - Principles and Methods - Energy Supply Side and Demand Side Management and Efficiency - Institutional Machinery and Community Engagement - Estimation of Benefits - Energy Audit - Policy Alternatives Energy Management:Carbon Credits

Module-5: Energy Planning and Policy

Approaches to Energy Planning - Principles and Components - Implementation Machinery - Decentralized Approach to Energy Planning - Planning for Energy Security - Integrated Energy Policy - Issues and Challenges. –Impact of Energy Sources on Environment

Alternative Energy Sources: Wind Energy - Solar Energy - Bio Mass Power - Waste-to-Power Small Hydro Power - Availability and Utilization - Government Policies.

References: [Please refer to the Latest Editions]

1. Kneese, A. V. and Sweeny, J L, Handbook of Natural Resource and Energy Economics. North Holland.
2. Munasinghe M & Meier P, Energy Policy Analysis and Modeling, Cambridge University Press, U K.
3. Paul Stevens (ed), The Economics of Energy Vol -I and Vol -II Edward Elgar.
4. Sankar U., Public Sector Pricing: Theory and Applications, Indian Economic Association Trust for Research and

CBCS M A Economics I Year-2018-19

Third Semester

Public Economics -Theory and Policy

MAECOHC 19-09 Hard Core paper-09 Credits – 4

Objectives

1. To impart a thorough understanding of the role and functions of the government in a modern economy.
2. To understand the functions of the government in today's world which are different from those of earlier societies.

Module-1: Overview of the Public Sector

Public Sector Vs Private Sector - Economics of Public Sector: The Field of Public Finance - Private and Public Interests: Individual Rights versus Social Responsibility - Adam Smith's Role of Government - Musgrave's Economic Role of Government. Principle of Maximum Social Advantage: Musgrave's Views on Principle of Maximum Social Advantage - Fundamental Theorems of Welfare Economics.

Module 2 Public Goods and Government Intervention

Public Goods and the Need for Government: Public and Private Goods - Rivalry and Exclusion. Allocation of Public and Private Goods - Efficiency in Public Goods Provision - A Game Theoretical Motivation for Government - Market Failure and Potential Roles for Government - Modes of State Intervention.

Module-3: Social Choice in a Democratic Society

Collective Decision Making: Individual Preferences and Collective Decision Making - Optimal and Sub-optimal Inter-Sectoral Allocation - The Societal Production Possibility Curve - Alternative Public Sector Allocation Instruments - Problem of Revealing Preferences and their Aggregation - Reconciliation of Conflicting Preferences - Representative Democracy - The Theory of Second Best.

Module-4: Public Expenditure

Theories of Public Expenditure - Structure and Growth of Public Expenditure - Budgeting in the Public Sector: Forecasting, Cost-Benefit Analysis and Debt Management - Public Education - Infrastructure, Capital Spending, and Public Sector Borrowing - Welfare, Social Security, and the Social Safety Net - Health Care - Control and Accountability - Expenditure Evaluation - Reforms in Expenditure Budgeting - Zero Base Budgeting.

Module-5: Sources of Public Revenue

Meaning and Significance - Sources of Public Revenue: Taxes, Commercial Revenues and Administrative Revenues.

Taxation: Theories of Taxation - Structure and Principles of Taxation: Efficiency and Equity Issues - Benefit and Ability to Pay Approaches - Theory of Optional Taxation: Ramsey Rule - Trade off between Equity and Efficiency -Tax Policy Analysis.

Classification: Taxes on Income, Corporate Income Tax - Sales and Excise Taxes - Property Taxes - Wealth Tax - Fees and Charges as a Revenue Source - Intergovernmental Grants in Theory and Practice.

Efficiency and Equity Effects of Taxes and Subsidies: Defining the Tax Base - Excess Burdens of Taxes and Subsidies - The Incidence of Taxes - Equity Concepts.- Optimal Taxation - Incentive Effect of Taxation: Taxation and Saving/Borrowing - Tax Evasion.

Module-6: Government Budgets, Borrowing, Deficit Financing and Fiscal Policy

Government Accounting, Budgets and Budget Processes - Determinants of the Size of Federal Deficit - Government Debt: Sources and Burden of Public Debt: Theories - Principles of Debt Management and Repayment - Deficit Financing of the Government.

Fiscal Policy: Objectives - Fiscal Policy and Price Stability - Full Employment, Economic Growth and Equity Interdependence between Fiscal and Monetary Policies - Fiscal Policy for Stabilization - Automatic versus Discretionary Stabilization.

Text Books: [Please refer to the Latest Editions]

1. Anderson John E, Public Finance Principles and Policy, Houghton Mifflin Company, Boston, USA.
2. Hyman David N, Public Finance - A Contemporary Application of Theory to Policy, Thomson SouthWestern, Ohio, USA.
3. Ulbrich Holley, Public Finance - In Theory and Practice, Thomson South-Western, Ohio, United States of America.

References: [Please refer to the Latest Editions]

1. Buchanan J.M, The Public Finance, Richard D. Irwin, Homewood.
2. Musgrave R.A and P.A. Musgrave Public Finance in Theory and Practice, McGraw-Hill Kogakusha, Tokyo.
3. Stiglitz J.E, Economics of Public Sector, Norton, New York.
4. Tyagi B.P, Public Finance, Jaiprakashnath and Company, Meerut, India.

CBCS M A Economics I Year-2018-19

Third Semester

Econometrics-III

MAECOHC 19-10 Hard Core paper-10 Credits – 3

Objectives

1. To expose the students to the advanced concepts of econometrics.
2. To develop a meaningful interface between theory and application - the emphasis being more on empirical analysis rather than theoretical rigor.

Module 1: Dummy Variable and Dynamic Regression Models

Dummy Variable Model: Meaning - Nature - Dummy Variable Trap - Dummy Variable Model with Single Qualitative Variable - Two Qualitative Variables - Dummy Variable Model with Mixture of Qualitative and Quantitative Variables.

Autoregressive and Dynamic Models: Role of Lag in Economics - Estimation Methods: Koyck's: Adaptive Adjustment and Partial Expectation Models - Almon Approach to Distributed Lag Models.

Module 2 Simultaneous Equation Models

Nature - Simultaneous Equation Bias - Identification: Under - Exact - Over Identification - Rules of Identification - Order and Rank Condition of Identification - Estimation of Simultaneous Equations Models: ILS, 2SLS, 3SLS, LIMLE, FIMLE.

Module 3 Qualitative Dependent Variable Models

Nature of Qualitative Variables - Linear Probability Model - Logit Model - Probit Model - Tobit Model for Grouped and Ungrouped Data - Their Application in Economics.

Module 4 Panel Data Models

Need for Panel Data - Estimation - Fixed Effects Method - All Coefficient Constant across Time and Individuals - Slope Coefficients Constant but Intercept Varies across Individuals - Slope Coefficients Constant but Intercept Varies Over Individuals as Well as Time - All Coefficients Vary across Individuals - Random Effects Method - Fixed Effects v/s Random Effects Model - Hausman Test - Their Application in Economics.

References: [Please refer to the Latest Editions]

1. Damodar Guajarati: Basic Econometrics McGraw Hill, International Student Edition, 1995.
2. Theory of Econometrics (Second Edition) by AKoutsoyiannis (2001) Palgrane Publication.

3. An Introduction to Applied Econometrics A Time Series Approach by Kerry Patterson Macmillan Press Ltd., London.
4. Introduction Econometrics with Application by RamuRamanathan, Thomson – South Western, Fifteenth Edition, Bangalore 2002.
5. Business Statistics by Sonia Taylor Palgave Publisher 2001.
6. GujarathiDamodar; Fundamentals of Econometrics

CBCS M A Economics I Year-2018-19

Third Semester

Research Methodology and Data Analysis

MAECOHC 19-11 Hard Core paper-11 Credits –3

Objectives:

1. To familiarize students with concepts and techniques of research methodology
2. To enable students to do a research / consultancy project

MODULE 1: Introduction

Research: Meaning and Characteristics- Objectives –Research in Social Sciences–Types of Research: –Experimental Research and Non-Experimental Research- Pure and Applied Research —Survey – Case Study – Field Study - Identification of Research problem– Hypothesis Testing.

- Review of Literature

MODULE 2: Research Plan-Sampling Design

Steps in Research- Research Plan- Scaling and Measurement- Attitude Measurement- Sampling Techniques –Sample Design and Choice of Sampling Techniques – Selection of Sample Size.

MODULE 3: Methods of Data Collection and Data Analysis

Primary and Secondary sources–Observation- Interview – Surveys: Online and Offline Surveys– Construction of Schedule and Questionnaire- Data processing- Editing, Classification, transcription, Coding and tabulation- Data Analysis- Univariate and multivariate data tools and analysis (cluster)- Estimation of mean and variance – test of single sample mean. two independent means test- testing for means of paired data – test of single sample variance – two sample variance test – non-parametric tests.

MODULE 4: Interpretation, Presentation and Report Writing

Types of Reports – Research Report- Format – Interpretations of Results - Research Findings and Suggested Recommendations - Limitations of the Study - Documentation- References – Footnotes and Bibliography – Writing the Report – Presentation.

Self- study

Types of Sample Design: Probability Sampling Techniques - Non-Probability Sampling Techniques - Errors in Sampling.

Testing for the Equality of 'K' Population Means - Assumptions for Analysis of Variance - Between Treatments Estimate of Population Variance - Within Treatments Estimate of Population Variance - Comparing the Variance of Estimates - The F Test - Multiple Comparison Procedures.

References: [Please refer to the Latest Editions]

1. Krishnamurthy O.R. (2002) Research Methodology in Social Science, Himalaya Publishing House, Bombay.
2. Kothari, 2004, Research Methodology, Himalaya Publishing House, Bombay.
3. Kurian C.T. (1984) Research Methodologies in Economics, Institute of Development Studies, Madras.
4. ICFAI Centre for Management Research,"Business Research Method", Hyderabad-500 034

CBCS M A Economics I Year-2018-19

Third Semester

Managerial Economics

MAECOSC 19-03 Soft Core paper-03 Credits – 3

Objectives

1. To teach the application aspects of Microeconomics and Macroeconomics to decision-making science
2. To help the students to develop analytical and application skills

Module-1: Nature and Scope of Managerial Economics

Introduction - Definition, Relationship of Managerial Economics to Economic Theory as well as

Decision Science. Organization of Business Firms - Concepts and Types of Business Organization,

Proprietorship, Partnership, Joint Stock Company, Corporation, Cooperatives

Case Study Method: Analyze a Case and Usefulness of Case Study.

Module-2: Organizations and Objectives of Firm

Reasons for the Existence of Firms and their Functions - Objective and Value of the Firm: Model of Profit Maximization, Average-Cost Pricing - Marginalist Controversy - Full Cost Pricing Rule.

Managerial Theories of Firm: Baumol's Sales Revenue Maximization Model and Theory with Advertisement - Dynamic Model - Williamson's Model of Managerial Discretion - Marris Model of Managerial Enterprises - Bain's Limit Pricing Theory and its Recent Developments.

Behavioural Theories: Behavioural Model of Firm - Game Theoretic Model - Simon's Satisfying Model - Sylos-Labini's Model - Cyert and March's Theory of Firm.

Measuring Efficiency of the Firm: Profitability Ratios, Financial Stability, Solvency and Gearing

Module-3: Demand Estimation and Forecasting

Identification Problem - Marketing Research Approaches - Regression Analysis - Problems in Regression Analysis - Demand Estimation Demand Forecasting: Time Series Analysis - Smoothing Techniques - Barometric Methods - Econometric Models (Input-Output Forecasting).

Module-4: Optimization Technique: Linear Programming

Problems of Optimization - Linear programming for Optimization -Meaning, Assumptions and Applications of Linear Programming - Basic Linear Programming Concepts - Procedure used in Formulating and Solving Linear Programming Problem - Linear Programming and Profit Maximization - Linear Programming and Cost Minimization - Graphical Solution and Simplex Method - Dual Problem and Shadow Prices - Linear Programming and Logistics in the Global Economy - Game Theory and Optimization Technique in Decision Making Process.

Module-5: Pricing Practices and Strategies and Profit Analysis

Pricing Practices: Specific Pricing Problems - Popular Pricing Practices: Cost-Oriented Pricing, Cost-Plus Pricing and Other Price Determinants, Peak - Load Pricing, Price over the Life Cycle of the Product, Penetration Price - Pricing of Multiple Products - Price Discrimination – International Price Discrimination and Dumping - Transfer Pricing.

Profit Analysis: Nature and Function of Profits: Business versus Economic Profit - Theories of Profit: Residual Claimant Theory, Wage Fund Theory, Dynamic Surplus Theory, Innovation Theory

- Profit Policy - Break- Even Analysis and Profit Measurement, Profit Forecasting.

Module-6: Capital Budgeting, Regulation and Risk Analysis

Capital Budgeting- An Overview - Meaning and Importance - Capital Budgeting Process – Capital Budgeting Decisions - Factors Influencing in Investment Decision - Determining the Size of Capital Budget - Methods used for Investment Decisions: Cost-Benefit Analysis, Steps for Capital Project Evaluation and Techniques for Investment Appraisal - Sources of Fund for Long-Term Financing - Measurement of Cost.

Regulation and Risk Analysis: Role of the Government in the Economy - Risk and Uncertainty in Managerial Decision Making - Long Run Investment Decisions.

Self Study: Theory of Demand - Price and Output Determination under various Market Conditions - Profit

Theories - Role of Government in Business

Text Books: [Please refer to the Latest Editions]

1. McGuigon R. James, R. Charles Moyer, Frederick H Deb, Harris (2017) *Managerial Economics:Applications, Strategy and Tactics,* South Western, USA
2. Salvatore Dominick, (2014) *Managerial Economics in a Global Economy,* McGraw Hill Inc., New York.

References: [Please refer to the Latest Editions]

1. Keat Paul G. and Philip K.Y. Young, (2003) *Managerial Economics- Economic Tools for Today'sDecision Makers,* Prentice Hall, New Jersey.
2. Mehta P.L., (2007) *Managerial Economics: Analysis, Problems and Cases,* Sultan Chand and Sons, NewDelhi.
3. Petersen H. Craig and W. Cris Lewis, (2006) *Managerial Economics,* Maxwell Macmillan International
4. Editions, New York.
5. Samuelson William F, and Stephen G. Marks, (2006) *Managerial Economics,* John Wiley and Sons, Inc.,New Jersey.
6. Shankaran S. (2013**)** *Managerial Economics,* Margham Publications, Madras.
7. Thomas Christopher R. and Charles Maurice S., (2005) *Managerial Economics,* McGraw-Hill Irwin,Boston.

CBCS M A Economics I Year-2018-19

Third Semester

Natural Resource Economics

MAECOSC19-04 Soft Core-04 **Credits – 2**

Objectives

1. To give a good understanding of both theoretical and practical aspects of natural resources availability and utilization which is necessary for sustainable policy formulation**.**
2. To discusses and analyse resources availability, its use and misuse in India.

Module-1: Introduction to Natural Resources Economics

Introduction - Concept - Importance of Resource Economics - Decision Making Over Time: Discounting - Types and Classification Natural Resources - Malthusian Approach - Stationary State of the Classical Economists - Club of Rome Approach - Scarcity of Natural Resources - Measuring Resource Scarcity: Unit Cost Measure, Real Prices, and Economic Rent.

Module-2: Economics of Exhaustible Resources

Resource Taxonomy - Efficient Inter temporal Allocations - The Two-Period Model Revisited - The *N*-Period Constant-Cost Case - Transition to a Renewable Substitute - Increasing Marginal Extraction Cost - Exploration and Technological Progress - *Historical Example of Technological Progress in the Iron Ore Industry* - Market Allocations of Depletable Resources - Appropriate Property Rights Structures - Environmental Costs - Harold Hotelling Theory of Exhaustible Resources - Petroleum Conservation in Theory and Practice

Module-3: Economics of Renewable Resources

Biological Mechanics - Bionomic Equilibrium - Harvesting under Open Sources - Socially Optimal Harvests under Private Property Rights - Regulation of Harvesting - Sole Ownership - Forests - The Economics of Forest Harvesting - Extending the Basic Model - Water as resource- The Potential for Water Scarcity - The Efficient Allocation of Scarce Water - Surface Water - Groundwater - Water Transfers and Water Markets - Examples - Water Market Assessment: Australia - Water Prices - Water Pricing in Canada

Module-4: Recyclable Resources: Minerals, Paper, Bottles, and E-Waste

Introduction- An Efficient Allocation of Recyclable Resources - Extraction and Disposal Cost - Recycling: A Closer Look - Recycling and Ore Depletion - Factors Mitigating Resource Scarcity -

Exploration and Discovery - *Lead Recycling* - Technological Progress - Substitution - Market Imperfections - Disposal Cost and Efficiency - The Disposal Decision - Disposal Costs and

the Scrap Market - Subsidies on Raw Materials - Corrective Public Policies - Markets for Recycled Materials - E-Waste - Pollution Damage

Module-5: Natural Resources Accounting

Natural Resources Accounting - Environmentalists' Criticism of National Accounts - Integrating National Accounting with Environmental Concerns - Valuation of Natural Resources - A Comparison between the System of National Accounts and the System of Integrated Environmental and Economic Accounting (SEEA).

Module-6: Resource Availability: Use and Misuse in India

Land Use and Land Degradation, Water Pollution - Energy Resources - Livestock Resources - Forest Resources and Deforestation - Fisheries and Aquatic Resources - Mineral Resources.

References: [Please refer to the Latest Editions]

1. Bernet H.J and Morse C, *Scarcity and Growth, the Economics of Natural Resource Activity,* John Hopkins, Baltimore.
2. Conard J.M and Clark C.W., *Natural Resource Economics: Notes and Problems,* Oxford University Press, Oxford.
3. Institute, *World Resources,* Annual Publications.
4. John M Kerr, *Natural Resource Economics,* Oxford and IBH, New Delhi.
5. Nalin K Shastree, *Environmental Resource Management,* Anmol Pub., Pvt, Ltd. New Delhi.
6. Perman, R., Ma, Y., McGillivray, J and Common, M., *Natural Resource and Environmental Economics*. 3rd edition, Pearson Education Limited, Edinburgh Gate.
7. Randall Alan, *Resource Economics,* Grid Publishing, Columbus, Ohio.
8. Tietenberg, T. and L. Lewis., *Environmental & Natural Resource Economics,* Pearson Education

CBCS M A Economics I Year-2018-19

Third Semester

Spatial Economics –Urban Economics

MAECOSE 19-03 Special Elective -03 Credits – 4

Objectives

1. To understand the functional role that the Cities which play an important role in the hierarchy of human settlement of different size and classes
2. To analyze the various economic issues pertaining to urbanization and other aspects associated with it.

Module-1: Introduction

Definition and Scope of Urban Economics - An Overview of the Emergence and Growth of Cities - Globalization and Urbanization -Urban Centres as the Engine of Economic Growth.

Module-2: Economics of Urbanization

The Process of Urbanization: Nature and Dimensions - Factors Initiating and Perpetuating - The Urbanization Process-Characteristics of an Economy Passing through Different Stages of Urbanization - Clusters and Agglomeration - Sub-urbanization.

Module-3: Theories of Urban Growth

Christaller's Central Place Theory - Urban Economic Base and Urban Growth - The Human Ecological Approach to Urban Growth - City Size and Urban Growth - Urban Size: Ratchet-Rank Size Rule - The Cost and Benefits of City Size - Optimum City Size.

Module-4: Theories of Urban Spatial Structure

Urban Spatial Structure: Features - Concepts of City Structure - The Minimization of Costs of Friction Hypothesis -Location Equilibrium of an Urban Firm - Retail Establishments - Market Areas - Consumers and Residents - The Concentric Zone Hypothesis - Urban Residential Land Use Models: Von Thunen, Alonso, Muth, Siegel, Park Burgess Etc.,

Module-5: Urban Public Economy

Urban Local Administration - Role and Functions - The Developmental Role of Urban Local Bodies - Local Public Finance and Fiscal Problems - Methods of Financing - Urban Government Expenditure.

Module-6: Urban Problems and Urban Planning

Urban Housing Problem and Slum Upgradation - Urban Transport - Urban Environment - Urban Poverty and Unemployment - Urban Infrastructure Management - Water Supply and

Sanitation - Need for Urban Planning: Objectives and Techniques - Existing Methods and Practices - Emerging Planning Process - Strategies and Issues.

References: [Please refer to the Latest Editions]

1. Harry W Richardson, *Urban Economics,* The Dryden Press, Italians.

2. Hirsch W.E., *Urban Economic Analysis,* McGraw-Hill Book Company, New York.

3. James Heilbruch, *Urban Economics and Public Policy*, St Martic's Press, New York.

4. O' Sullivan, *Urban Economics,* McGraw Hill Higher Education, Boston.

5. Robert L Bish and Hugh O Nourse, *Urban Economics and Policy Analysis,* McGraw Hill Kogakusha Ltd. Tokyo.

Or

Open Elective

IV Semester

Specialized Economics

CBCS M A Economics I Year-2018-19

Fourth Semester

Welfare Economics

Applied Welfare Economics and Public Policy

MAECOHC 19-12 Hard Core paper-12 Credits – 4

Objectives

1. To equip students with a "language" with which they may critically evaluate the public policy
2. To study various market failures as a justification for public action, and analyze how government policies can improve market outcomes.
3. To evaluate Cost-benefit analysis of public projects and policy evaluation analysis as instruments of evidence-based policy making.

Module 1 Pre-Paretian Welfare Economics

Benthamite Approach to Aggregate Welfare; Optimum Resource Allocation andWelfare Maximization, Assumption of Uniform Income – Utility function ofIndividuals; Question of Income Distribution; Issue of Interpersonal Comparisons ofUtility; Marshallian Welfare Economics: Consumer's Surplus; Measurement ofConsumer's Surplus – Difficulties involved, Criticism; Principles of compensatingVariation; Hick's Four Consumer's surpluses; Concept of Consumer's Surplus;consumer's Surplus and Tax-Bounty Analysis.

Module 2 Paretian Welfare Economics

Pareto optimality – Optimum exchange conditions, The production optimum, The consumption optimum; Concept of contract curve; Top level optimum; Infinitenumber of non-comparable optima vs. unique social optimum; Compensation criteria– Contributions of Barone, Kaldor and Hicks; The Scitovsky double criterion;Concept of community indifference map, Samuelson's utility possibility curve; Valuejudgments and welfare economics; Bergson's social welfare function, Arrow'spossibility theorem.

Module-3 Economics of Externalities

Economics of Externalities: Categories and Examples - Externalities and the Absence of Markets - Public Goods as a Special Case of Externalities.

Negative Externalities: Analysis of Marginal Damages - Extent of the Damages - Pollution Abatement. Positive Externalities: Analysis of Marginal External Benefits.

Remedies for Externalities: A Private Solution: The Coase Theorem - Emissions Permit Trading - A Public Solution: Regulations and Controls - Pigouvian Taxes and Subsidies.

Module 4 Choice Theory

Theory of Public Choice and Policy implications of Public Choice Theory.

Divergence between private and social costs; Problems of non-market interdependence; Externalities of production and consumption; External economies and diseconomies; Problem of public goods; Pigovian welfare economics; Second best optima; Marginal cost pricing; Cost-benefit analysis; Interdependent utilities; Attempts to develop dynamic welfare analysis.

– Sen‟s Contributions to Welfare Economics – Collective Choice and Social Welfare-Social Choice and Political decision Making.

References: [Please refer to the Latest Editions]

1. Arrow, K. J. (1951), Social choice and Individual Values, Yale University Press,New Haven.
2. Baumol, W. J. (1965), Welfare Economics and the Theory of the State (SecondEdition) Longmans, London.
3. Baumol, W. J. (Ed.) (2001), Welfare Economics, Edward Elgar Publishing Ltd. U.K.
4. Broadway, R. W. and N. Bruce (1984), Welfare Economics, Basil Blackwell,Oxford.
5. Duesenberry, J. S. 91949), Income, Saving and the Theory of consumer Behaviour, Harvard University Press, Cambridge, Mass
6. Feldman, A. M. (1980), Welfare Economics and Social Choice theory MartinusNijhoff, Boston.
7. Graaff J. de V. (1957), Theoretical Welfare Economics, Cambridge UniversityPress, Cambridge.
8. Little, I. M. D. 9139), A. Critique of Welfare Economics (2nd Edition), OxfordUniversitypress, Oxford.
9. Marshall, A. (1946), Principles of Economics, Macmillan, London
10. Myint, H. (1948), Welfare Economics, Macmillan, London.
11. Nicholas, B. (Ed.) (2001), Economic Theory and the Welfare state, Edward ElgarPublishingLtd., U. K.
12. Pigou, A. C. (1962), The Economics of Welfare (4th Edition) Macmillan.
13. Quirk, J. and R. Saposnik (1968), Introduction to General Equilibrium theory andWelfare Economics, McGraw Hill, New York.
14. Samuelson, P. A. (1947), Foundations of Economic Analysis, Harvard UniversityPress, Cambridge, Mass.

CBCS M A Economics I Year-2018-19

Fourth Semester

Econometrics-1V

Applied Econometrics

MAECOHC19-13 Hard Core paper-13 Credits – 3

Objectives

1. To teach advanced econometric methods, estimation methods and related econometric theories
2. To help students to apply these methods to data or econometric modeling techniques
3. To enable the students to interpret econometric estimates, analyze the results and critically evaluate published econometric research.

Module I Nonlinear Regression Models

Introduction -Nonlinear Regression Models - Assumptions of the Nonlinear Regression Model

The Orthogonality Condition and the Sum of Squares - The Linearized Regression - Large Sample Properties of the Nonlinear Least Squares Estimator - Computing the Nonlinear Least Squares Estimator – Applications - A Nonlinear Consumption Function

Module II Time Series Econometrics Basic Concepts

Introduction - Stationary and Non-Stationary Series - Random Walk Model - Testing of Unit Root - Co-integration - Test for Co-integration - Engel-Granger Test - Johansen Test - Error Correction Model - Their Application in Economics.

Module III Time series |Econometrics forecasting

Approaches to economic forecasting AR, MA, And ARIMA Modelling of time series data, the Box Jenkins Methodolgy Identification, Estimation of ARIMA model, Diagnostic checking, Forecasting, further aspects of BJ Methodology, Vector Autoregression Model(VAR), Measuring Volatality in financial Time Series: ARCH and GARCH models.

Module IV Empirical Demand, Production and Investment Analysis

Static Single Equations - Demand Analysis - Theoretical Foundations of Demand Analysis - Utility Theory - Tobin's Study- Static Multiple Equations - Production Function - Neoclassical Production Function - Cobb-Douglas Production Function - CES Production Function - Dynamic Single Equation Model - Investment Behaviour Models - Meyer and Kuh Model - Kuh Model

Econometric Applications in India

Econometric Applications in Indian Demand Analysis - Indian Agriculture - Indian Industry - International Trade.

Module V Maximum Likelihood Estimation (MLE)

Introduction - The Likelihood Function and Identification of Parameters - Efficient Estimation: The Principle of Maximum Likelihood - Properties of Maximum Likelihood Estimators - Regularity Conditions - Properties of Regular Densities - The Likelihood Equation - The Information Matrix Equality - Asymptotic Properties of the Maximum Likelihood Estimator – Consistency - Asymptotic Normality - Asymptotic Efficiency – Invariance -e Conclusion

References: [Please refer to the Latest Editions]

1. Chris Brooks - Introductory Econometries for Finance Chris Brooks, Cambridege University Press – 2002.
2. Kerry Patterson -An Introduction to Applied Econometries A Time Series Approach Macmillan Press Ltd. London.
3. KL Krishna:P Indian Econometrics Models
4. Koutsoyiannis: Theory of Econometrics ch.17,18
5. Meghand Desai - Applied EconometriesMehra Hill Publication Company Ltd., 1997
6. RamuRamanathan, Thomson - Introduction Econometrics With Application South-Western Fifteenth Edition, Bangaloer-2002
7. Studenumund. A.H: Using Econometrics.ch 15.
8. GujarathiDamodar- Fundamentals of Econometric
9. William H. Greene – Econometric Analysis

CBCS M A Economics I Year-2018-19

Fourth Semester

International Finance & Monetary System

MAECOHC19-14 Hard Core paper-14 Credits – 4

Objectives

1. To provide a solid understanding of international finance within a complex capital markets context with an emphasizes the managerial perspective of finance for a multinational corporation (MNC).
2. To understand how based on macroeconomic and institutional foundations, advanced techniques and instruments for managing the foreign exchange exposure and riskof MNCs are developed.
3. To prepare and provide the students with the skills required for, international investment management, cross-border acquisitions, international capital budgeting, and multinational cash management and trade financing.

Module-1 International Finance and Resource Movements

International Money and Finance - Circular Flow of Income and Product – International Transactions and how they affect Balance of Payments (an example).

International Resource Movements and Multinational Corporations: International Capital Flows -Motives and Effects of International Capital Flows - Multinational Corporations - Labour Migration - Motives and Effects of International Labour Migration.

Module-2 Foreign Exchange Markets

Functions of Foreign Exchange Markets - Exchange Rates and the Markets for Foreign Exchange -Foreign Exchange Risks - Interest Arbitrage and the Efficient and Effective Exchange Rates -Composite Currencies: Special Drawing Rights and European Currency Unit - Foreign ExchangeArbitrage - Demand and Supply of Currencies - Introduction to Foreign Exchange Rate Theories -International Money Markets.

Exchange Rate Arrangements and Systems: Gold Standard - Bretton Woods System - Flexible

Exchange Rate System - Other Forms of Exchange Rate Arrangements Today - Fixed or Floating Exchange Rates?

Module-3 International Financial Instruments, Markets and Institutions

Forward Currency Market and International Financial Arbitrage: Foreign Exchange Risk - Forward Exchange Market - International Financial Arbitrage - Uncovered Interest Parity - Eurocurrency Market. Interest Yield, Interest Rate Risk, and Derivative Securities: Hedging, Speculation and Derivative Securities and their Risk.

International Financial Market Integration: International Capital Markets - International Money Markets - Vehicle Currencies - Capital Market Integration - International Banking and Payment System.

Module-4 Central Banks, Exchange Rates, and Balance of Payments Determination

Role of the Central Banks: Managed Exchange Rates - Foreign Exchange Interventions - Do

Interventions Accomplish Anything?

Traditional Approaches to Exchange-Rate and Balance of Payments Determination: Exports,

Imports and the Demand for and Supply of Foreign Exchange - Elasticity Approach – Absorption Approach - Monetary and Portfolio Approaches to Exchange Rate and Balance of Payment Determination.

Module-5 Open Economy Macroeconomics and Policy Analysis

An Open Economy Framework - Economic Policy with Fixed Exchange Rates - Economic Policy with Floating Exchange Rates - Policy Co-ordination, Monetary Union and Target Zones - Monetary and Fiscal Policy under Fixed Exchange and Floating Exchange Rates.

Module-6: International Financial Market Integration

International Monetary System: Gold Standard and Inter-War Experience - Bretton Woods System and its Operation, Evolution and its Collapse - Present International Monetary System – Economic Policy and Status of the World Economy - Current International Economic Problems and challenges

Text Books: [Please refer to the Latest Editions]

1. Daniels Joseph and David Van Hoose, (2012) *International Monetary and Financial Economics,* South-Western College Publishing, Cincinnati.
2. Melvin Michael, (2012) *International Money and Finance,* Addison Wesley Longman, Massachusetts.
3. Salvatore Dominick, (2009) *International Economics,* Macmillan Publishing Co., New York.

Additional References: [Please refer to the Latest Editions]

1. Francisco L River-Batiz and Luis River-Batiz, (2000)International Finance and Open Macro Economy,
2. Macmillan Publishing Company.
3. International Monetary Fund and World Bank, Annual Reports, Washington. D.C., USA.

CBCS M A Economics I Year-2018-19

Fourth Semester

Indian Financial Institutions and Markets

MAECOSC19-05 Soft Core -5 Credits – 3

Objectives

1. To study the financial markets and their regulation and to appreciate their key role in an economy,
2. To acquaint the students fully with the changing role of financial institutions in the process of growth and development

Module-1 Introduction to Money and Banking System

Introduction - Definition - Evolution of Money - Nature and Significance of Money - Kinds of Money - Demand and Supply of Money - Monetary Standards.

Banking System: Evolution of Modern Banking System - Types of Banking - Structure of Banking System. *Central Banking System*: Objectives - Functions.

Money Market: Importance - London Money Market - New York Money Market - Indian Money Market. Introduction - Functions - Money Market Instruments - Primary Market - Resource Mobilization - Mutual Funds. **Secondary Market**: Introduction - Stock Exchanges

Module-2 Financial and Banking System in India

Financial Systems in India: Introduction - Historical Background - Banking Prior to 1950 - Development of Banking in different periods: 1950-1969, 1069-1992 and 1992 till date - An Overview of Money and Capital Markets - State Control over Banks - Nationalization of Banks - Banking Commission.

Reserve Bank of India: Introduction - Origin and Development - Structure and Management - Functions and Working - Instruments of Monetary Control - Role of Reserve Bank of India in the Economy - Objectives of Monetary Policy - RBI and Financial Sectors Reforms.

Module-3 Commercial Banks, Cooperative Banks, & Development Banking in India

Commercial Banks: Evolution - Nature of Commercial Banks - Role and Functions - Credit Creation - Bank Borrowings - Problem of Non-Performing Assets.

Cooperative Banks Introduction - Organization Structure and Development of Cooperatives - Role of RBI in Cooperative Banks - Reforms in Cooperative Credit.

Development Bans - National Bank for Agriculture and Rural Development (NABARD) IDBI – etc.,

Module-4 NBFIs, Insurance, Mutual Funds & Foreign Exchange Market in India

NBFIs: Significance - Structure and Growth of NBFIs in India - Financial Sector Reforms - Liberalization Measures (1996) - Size & Assets of NBFIs - Regulation of NBFIs and the RBI.

Insurance: Growth and Structure of Insurance Companies - Life Insurance Corporation and its Progress - General Insurance Companies and their Functions.

Mutual Funds: Introduction - Types - SEBIs Directives - Private Mutual Funds - Asset Management Company - Unit Trust of India - RBI Guidelines.

Foreign Exchange Market: Trading in Foreign Exchange Markets - Speculation - Foreign Exchange Rates - Liberalized Exchange Rate Management System:1992 - Capital Account Convertibility - Currency Arbitrage - Hedging with Options.

Module-5 Derivatives Market, Debt Market and Financial Services

Derivatives Market: Introduction - Forwards and Futures - Futures Trading Strategies - Options - Trading Strategies - Derivatives Market in India - Derivatives Trading in India.

Debt Market: Introduction - Private Corporate Debt Market - Public Sector Undertaking - Bond Market - Government Securities Market.

Financial Services: Investment Banking - Introduction, Functions, Types - Investment Banking Services - Merchant Banking Services - SEBI - Pre-Issue & Post-Issue Obligations - Changing Scenario of Investment Banking - Depositories and Custodians - Credit Rating.

Credit Rating Agencies in India: Factoring and Forfeiting - Housing Finance - Leasing and Hire Purchase.

References: [Please refer to the Latest Editions]

1. Desai Vasant, *Development Banking and Financial Intermediaries*, Himalaya Pub., House.
2. Khan, M. Y, *Indian Financial System*, Tata McGraw-Hill Education, New Delhi.
3. Machiraju H.R. *Indian Financial System*, Vikas Publishing House PVT Ltd., New Delhi.
4. Madaiah M, *Financial Intermediaries, Monetary Policy and Economic Development***,** Prasaranga, Mysore.
5. Mithani and Gordon, Banking *Theory and Practice***,** Himalaya Pub., House, Mumbai.
6. Nirmala Prasad and Chandradass J, *Banking and Financial System*, Himalaya Pub., House, Mumbai. Pathak, Bharati V. *The Indian Financial System: Markets, Institutions and Services*, Pearson Education India.

7. Reddy P. V. and H R Appannaiah, *Banking Theory and Practice*, Himalaya Pub., House, Mumbai.
8. Reserve Bank of India, *Trends and Progress of Banking in India* (latest edition), Mumbai.
9. Shekhar&Shekhar, *Banking Theory and Practice*, Vikas Publishing House, New Delhi.
10. Vasant Desai, *Indian Financial System*, Himalaya Publishing House,

CBCS M A Economics I Year-2018-19

Fourth Semester

Urban Data Analytics

MAECOSE 1904 Special Elective Credits – 3

Objectives

1. To give a basic intro to census and economic data collection, processing, andanalysis;
2. To teach surveys mapping techniques in planning;
3. To demonstrates the uses of real-time urban data and analytics; and
4. To provide a socio-economic-political context for the smart cities movement, focusing on data ethics and governance.

Module 1 Introduction to Data Science for Planners

Introduction to Smart Cities - Data Fundamentals for Planners - Metadata: Understanding the Indian Census - Using Census Data - Introduction to Economic Data and the Longitudinal Household - Employment Data -Static Data Visualization -Neighborhood Data and Indicators

Practical:

Excel Basics - Formulas and Generating Charts- Accessing Census Data via Fact Finder - Accessing Census and Economic Data via Social Explorer - Accessing Local Employment - Household Dynamics Data

Module 2 Mapping the City

Spatial Data & GIS Fundamentals - Volunteered Geographic Information (VGI) - Introduction to Story Mapping - Participatory Mapping – Power ,Place and Mapping

Practical:

Story Mapping with Social Explorer

Module 3 Big Data and Smart Cities

Introduction to Big Data - Big Data and Ethics for Planners - Complex Urban Modeling Part I: Machine Learning

Module 4 Presenting Data

Defining Smart Cities in Theory and Practice - Smart Institutions & e-Governance -Civic Hacking and Equity - Inclusive Smart City

Practical

Accessing and Using Open Data Portals and Big Data

References

1. Townsend, Anthony M. 2013. Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia. W. W. Norton & Company.
2. Wheelan, Charles. 2013. Naked Statistics: Stripping the Dread from the Data . W. W. Norton & Company
3. Ratti, Carlo, and Matthew Claudel. 2016 The City of Tomorrow: Sensors, Networks, Hackers, and the Future of Urban Life . Yale University Press.
4. Dolores Hayden. Part I -Chapter 2 and Chapter 10, The Power of Place: Urban Landscapes as Public History, MIT Press, 1995.

New Modified Regulations for MA-Economics-2018-19

Title of the Paper (Existing):

Computer Applications to Economics-19 (First Semester) and Computer Applications to Economics-11(Second Semester)

Title Changed: Computer Applications to Economics offered during second semester

Under new regulation there will be one paper offered with two practicals during second semester with a title Computer Applications to Economics.

The following modification is made for continuous evaluation and term end examination of Computer Applications to Economics to be introduced for second semester students of MA – Economics.

Existing:

Continuous assessment for papers with practicals: (Modified)

a) One test (theory)… 15 Marks

b) One practical test... 15 Marks

Distribution of Marks for components of Continuous Assessment(Modified)

Component	Modules Covered	Test	Practical Test	Total	Period of Assessment
I	1, 2	15	-	15	First half of the semester
II	3,4	-	15	15	Second half of the semester
Total		**15**	**15**	**30**	

Modified Regulation for Continuous Evaluation-2018-19

a) Two tests (theory)… 15 Marks each totaling 30 marks reduced to 50% of continuation evaluation.

b) Two practical test: 15 Marks Each totaling 30 marks reduced to 50% for continuous evaluation.

Distribution of Marks for components of Continuous Assessment (Modified)

Component	Modules Covered	Theory Test	Practical Test	Total	Period of Assessment
I	1	15	15	30	First half of the semester
II	2	15	15	30	Second half of the semester
Total		**30**	**30**	**60***	*50% of 60 Marks would be considered for Continuous Evaluation

ModifiedRegulation(Exiting)

Semester-end Examination for papers with practical excluding project work:Components of Semester-end Examination (Modified)

Component/	Modules covered in a paper	Weight age	Marks	Period of assessment
C-3	1 & 2	20 Marks for practicals of 2 hours duration Subject a minimum of (30%)= 6marks. 50 Marks for theory examination of 2 hours duration. Subject to a minimum of (30%) =15 marks	Max-70 Min-21	To be completed during 19th to 20th week.

New Modified: Modified Regulation-2018-19

Semester-end Examination for papers with practical excluding project work

The semester-end examination shall be as follows:

Components of Semester-end Examination (New Modified)

Component/	**Modules covered in a paper**	**Weight age**	**Marks**	**Period of assessment**
C-3	1 & 2	40 Marks for practical of 3 hours duration reduced to 20 marks subject a minimum of 30% of 20 marks= 6marks. 50 Marks for theory examination of 2 hours duration. Subject to a minimum of 30% =15 marks	Max-70 Min-21	To be completed during 19th to 20th week of the semester.

PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE [AUTONOMOUS]

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

Affiliated to University of Mysore

DEPARTMENT OF STUDIES IN MICROBIOLOGY

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

UPDATED REGULATIONS FOR CHOICE BASED CREDIT SYSTEM (CBCS) AND CONTINUOUS ASSESSMENT GRADING PATTERN (CAGP) FOR M.Sc. MICROBIOLOGY PROGRAM WITH EFFECT FROM 2019-2020

PREAMBLE

The University Grants Commission (UGC) has stressed on speedy and substantive academic and administrative reforms in higher education for promotion of quality and excellence. The Action Plan proposed by UGC outlines the need to consider and adopt Semester System, Choice Based Credit System (CBCS), and Flexibility in Curriculum Development and Examination Reforms in terms of adopting Continuous Evaluation Pattern by reducing the weightage on the semester- end examination so that students enjoy a de-stressed learning environment. Further, UGC expects that institutions of higher learning draw a roadmap in time bound manner to accomplish the above.

ABOUT THE COURSE

The M.Sc. Microbiology course of the University of Mysore is approved by the University Grants Commission. The syllabus is designed to provide a holistic insight into the subject by experts of the University and was adopted for teaching in the Centre. The Department is well furnished and provided with state-of-the-art laboratory facilities. The Department has highly qualified and experienced faculty for the students to learn and experiment, hands on, with techniques of great relevance to current day bio industries. Besides, the Centre also invites eminent Scholars, Scientists and Professors from UOM, CFTRI, DFRL and other institutions for special lectures to enlighten students on most recent developments in the subject. The students are also encouraged to take part in scientific seminars, group discussions and quiz competitions apart from the other extra curricular activities. Our students have won prizes in intercollegiate essay, debate and music competitions.

OBJECTIVE

The Department makes it their mission to provide socially and industrially relevant post-graduate education and training. The Department also undertakes basic and applied research in the area of Microbiology as related to the sustainability of the Earth Ecosystem.

The Department endeavors to build and enhance the capabilities of the future generation by providing quality education that provides a deep insight into the subject that can be exploited to build sustainable bio-enterprises. The Department also strives to produce technically highly qualified and skilled scientists to help the bio-industries.

5. TITLE AND COMMENCEMENT

These Regulations shall be as per the University of Mysore regulations for Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) for M.Sc.

Microbiology program. These Regulations shall come into force from the academic year 2019.

6. PROGRAM OFFERED

(2) **M.Sc.**: Microbiology

7. DEFINITIONS

Course Every course offered will have three components associated with the teaching-learning process of the course, namely

8. Lecture – L (ii) Tutorial- T (iii) Practicals - P, where

L stands Lecture session. **T** stands Tutorial session consisting participatory discussion / self study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands Practice session and it consists of Hands on experience / Laboratory Experiments / Field Studies / Case studies that equip students to acquire the much required skill component.

In terms of credits, every one hour session of L amounts to 1 credit per semester and a minimum of two hour session of T or P amounts to 1 credit per semester, over a period of one semester of 16 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components. That means a course may have only lecture component, or only practical component or combination of any two or all the three components.

The total credits earned by a student at the end of the semester upon successfully completing the course are L + T + P. The credit pattern of the course is indicated as L: T: P.

If a course is of 4 credits then the different credit distribution patterns in L : T : P format could be

4 : 0 : 0,	1 : 2 : 1,	1 : 1 : 2,	1 : 0 : 3,	1 : 3 : 0,
2 : 1 : 1,	2 : 2 : 0,	2 : 0 : 2,	3 : 1 : 0,	3 : 0 : 1,
0 : 2 : 2,	0 : 4 : 0,	0 : 0 : 4,	0 : 1 : 3,	0 : 3 : 1,

The concerned BoS will choose the convenient credit pattern for every course based on the requirement. However, generally, a course shall be of 3 or 4 credits.

Different courses of study are labeled and defined as follows:

CORE COURSE

A course which should compulsorily be studied by a candidate as a core- requirement is termed as a Core course.

A Core course may be a **Soft Core** if there is a choice or an option for the candidate to choose a course from a pool of courses from the main discipline /subject of study or from a sister/related discipline / subject which supports the main discipline / subject. In contrast to the phrase Soft Core, a compulsory core course is called a **Hard Core** Course**.**

ELECTIVE COURSE

Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline / subject of study or which provides an extended scope or which enables an exposure to some other discipline / subject/domain or nurtures the candidate's proficiency/ skill is called an Elective Course. Elective courses may be offered by the main discipline/ subject of study or by sister / related discipline / subject of study. A Soft Core course may also be considered as an elective.

An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called an **open elective**.

An elective course designed to acquire a special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher is called a **Self Study Elective**.

A core course offered in a discipline / subject may be treated as an elective by other discipline / subject and vice versa.

Project work/Dissertation work is a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A project work up to 4 credits is called Minor Project work. A project work of 6 to 8 credits is called Major Project Work. Dissertation work can be of 10-12 credits. A Project/Dissertation work may be a hard core or a soft core as decided by the BoS concerned.

9. ELIGIBILITY FOR ADMISSION

4.1. B.Sc. with Microbiology as one of the Major/ Optional subjects from University of Mysore or any other University equivalent thereto; 45% for general category and 5% relaxation for SC/ST students.

4.2. **STRENGTH OF THE STUDENTS**:

Intake = 20 candidates

10. SCHEME OF INSTRUCTIONS

5.1. A Masters Degree program is of 4 semesters-two years duration. A candidate can avail a maximum of 8 semesters – 4 years (in one stretch) to complete Masters Degree (including blank semesters, if any). Whenever a candidate opts for blank semester(s)/DROP in a course or in courses or is compelled to DROP a course or courses as per the provision of the regulation, he/she has to study the prevailing courses offered by the department as per the prevailing scheme, when he/she continues his/her study.

5.2. A candidate has to earn a minimum of 76 credits, for successful completion of a Master's degree with a distribution of credits for different courses as given in the following table.

Course Type	Credits
Hard Core	A minimum of 42, but not exceeding 52
Soft Core	A minimum of 16
Open Elective	A minimum of 04

Every course including project work, practical work, field work, seminar, self study elective should be entitled as hard core or soft core or open elective by the BoS concerned.

5.3. A candidate can enroll for a maximum of 24 credits per semester.

5.4. Only such candidates who register for a minimum of 18 credits per semester in the first two semesters and complete successfully 76 credits in 4 successive semesters shall be considered for declaration of ranks, medals and are eligible to apply for student fellowship, scholarship, free ships and hostel facilities.

5.5. In excess to the minimum of 76 credits for masters degree in the concerned discipline / subject of study, a candidate can opt to complete a minimum of 18 extra credits to acquire **add on proficiency diploma** in that particular discipline / subject along with the masters' degree. In such of the cases wherein, a candidate opts to earn at least 4 extra credits in different discipline / subjects in addition to a minimum of 76 credits at masters level as said above then an **add on proficiency certification** will be issued to the candidate by listing the courses studied and grades earned.

5.6. A candidate admitted to Masters program can exercise an option to exit with Bachelor Honors degree / PG diploma after earning 40 credits successfully.

6.0. Continuous Assessment, Earning of Credits and Award of Grades

The evaluation of the candidate shall be based on continuous assessment. The Structure for evaluation is as follows:

6.1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified as C1, C2, and C3.

6.2 The performance of a candidate in a course (30:70 pattern) will be assessed for a maximum of 100 marks as explained below:

6.2.1 The first component (C1), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions, etc., During the first half of the semester, the first 50% of the syllabus will be completed. This shall be consolidated during the 8^{th} week of the semester. Beyond 8^{th} week, making changes in C1 is not permitted.

6.2.2 The second component (C2), of assessment is for 15 marks. This will be based on test/ assignment/seminar/quiz/group discussions etc. The continuous assessment and scores of second half of the semester will be consolidated during the 16^{th} week of the semester. During the second half of the semester the remaining units in the course will be completed.

6.2.2.1. The outline for continuous assessment activities for Component-I (C1) and Component-II (C2) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective Departmental Council. The students should be informed about the modalities well in advance. The evaluated courses/assignments during component I (C1) and component II (C2) of assessment are immediately returned to the candidates after obtaining acknowledgement in the register maintained by the concern teacher for this purpose.

6.2.3 During the 18^{th} - 20^{th} week of the semester, a semester-end examination of 3 hours duration shall be conducted for each course. This forms the third/final component of assessment (C3) and the maximum marks for the final component will be 70.

Setting question papers and evaluation of answer scripts:

XXV. Question papers in two sets shall be set by the internal examiner and one set by external examiner for a course. Whenever there are no sufficient internal examiners, The Chairman, BoE shall get the question papers set by external examiners.

Whenever there are no external examiners, The Chairman, BoE shall get the question papers set by internal examiner.

XXVI. The Board of Examiners shall scrutinize and approve the question papers and scheme of evaluation.

XXVII. (i) There shall be single evaluation for all theory papers by internal examiner and 25% of the total scripts will be reviewed by an external examiner.

(ii) The average of first valuation and the review evaluation will be considered as the final marks of the candidate.

(iii) If there is difference of marks in maiden and reviewed evaluation is greater than 15 marks then the script will go for third evaluation by the external examiner and marks awarded in the third evaluation will be final.

(iv)The examination for Practical work/ Field work/ Project work will be conducted jointly by one internal and one external examiner.

XXVIII. Challenge Evaluation

A student who desires to apply for challenge evaluation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Controller of Examinations within 15 days after the announcement of the results. This challenge evaluation is only for C3 component.

The answer scripts, for which challenge evaluation is sought for, shall be sent to external examiner. The marks awarded in the challenge evaluation will be final.

6.2.4. In case of a course with only practical component a practical examination will be conducted with two examiners (one Internal and one external)

A candidate will be assessed on the basis of

a) Knowledge of relevant processes

b) Skills and operations involved

c) Results / products including calculation and reporting.

If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the Departmental council.

6.2.5 If **X** is the marks scored by the candidate out of 70 in C3 in theory examination, if **Y** is the marks scored by the candidate out of 70/50/40 in C3 in Practical examination, and if **Z** is the marks scored by the candidate out of 70/50/40 in C3 for a course of

(L=0):T:(P=0) type that is entirely tutorial based course, then the final marks (M) in C3 is decided as per the following table.

L.T.P distribution	Formula to compute Mark (M) in C3
L:T:P	$\frac{[(L+T)*X]+[(T+P)*Y]}{L+2T+P}$
L:(T=0):P	$\frac{(L*X)+(P*Y)}{L+P}$
L:T:(P=0)	X
L:(T=0):(P=0)	X
(L=0):T :P	Y
(L=0): (T=0):P	Y
(L=0): T:(P=0)	Z

6.2.6 The details of continuous assessment (30:70 patterns) are summarized in the following table:

Component	Syllabus in a Course	Weightage	Period of Continuous Assessment
C1	First 50%	15%	First half of the semester To be consolidated by 8th week
C2	Remaining 50%	15%	Second half of the semester. To be consolidated by 16th week
C3	Semester-end examination (All units of the course)	70%	To be completed during 18th-20th Week.

6.2.7 A candidate's performance from all 3 components will be in terms of scores, and the sum of all three scores will be for a maximum of 100 marks (15 +15 + 70).

6.2.8 Finally, awarding the grades should be completed latest by 24th week of the semester.

6.3 **Minor/ Major Project Evaluation:**

Right from the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his/her progress in the form of seminars in addition to the regular discussion with the guide. Components of evaluation are as follows:

Component – I (C1): Periodic Progress and Progress Reports (15%)

Component – II (C2): Results of Work and Draft Report (15%)

Component– III (C3): Final Viva-voce and evaluation (70%).

The report evaluation is for 40% and Viva-voce examination is for 30%.

6.4 In case a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

In case a candidate's class attendance in a course is less than 75%, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

Teachers offering the courses will place the above details in the Department Council meeting during the last week of the semester, before the commencement of C3, and subsequently a notification pertaining to the above will be brought out by the Chairman of the Department before the commencement of C3 examination. A copy of this notification shall also be sent to the office of the Director & the Controller of Examinations.

6.5 In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUP option.

In case a candidate secures more than or equal to 30% in C3, but his/her grade (G) = 4, as per section 6.9 below, then he/she may be declared to have been conditionally successful in this course, provided such a benefit of conditional clearance based on G=4 shall not be availed for more than 8 credits for the entire program of Master's Degree of two years.

In case a candidate secures more than 30% in C3, he/she may choose DROP/MAKE-UP option.

The candidate has to exercise his/her option immediately within 10 days from the date of notification of results.

A MAKE UP examination for C3 shall be conducted in all the semesters. Candidates can register for the MAKE UP examination within 10 days from the date of notification of results. The MAKE UP examination will be conducted within one month of the notification of the results.

If a candidate is still unsuccessful, A MAKE UP Examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with next regular even semester examinations; however,

not exceeding double the duration norm in one stretch from the date of joining the course.

6.6 A candidate has to re-register for the DROPPED course when the course is offered again by the department if it is a hard core course. The candidate may choose the same or an alternate core/elective in case the dropped course is soft core / elective course. A candidate who is said to have DROPPED project work has to re-register for the same subsequently within the stipulated period. **The details of any dropped course will not appear in the grade card.**

6.7 The tentative / provisional grade card will be issued by the Controller of Examinations at the end of every semester indicating the courses completed successfully. This statement will not contain the list of DROPPED courses.

6.8 Upon successful completion of Bachelors Honors/Master's Degree, a final grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Controller of Examinations.

6.9 The grade and the grade point earned by the candidate in the course will be as given below.

Marks(M)	**Grade**	**Grade Point (GP = V x G)**
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

Here, **P** is the Percentage of marks (P = [(C1+C2) + M] secured by a candidate in a course which is rounded to nearest integer. **V** is the credit value of course. **G** is the Grade and **GP** is the Grade Point.

6.10 A candidate can withdraw any course within ten days from the date of notification of final results. Whenever a candidate withdraws a paper, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is soft core/open elective.

A DROPPED course is automatically considered as a course withdrawn.

6.11 Overall Cumulative Grade Point Average (CGPA) of a candidate after successfully completing the required number of credits (76) is given by:

CGPA = ΣGP / Total Number of Credits

7. Classification of results

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	FGP	
	Numerical Index	Qualitative Index
4 <= CGPA <	5	SECOND CLASS
5 <= CGPA <	6	
6 <= CGPA <	7	FIRST CLASS
7 <= CGPA <	8	
8 <= CGPA <	9	DISTINCTION
9 <= CGPA < =10	10	

Overall percentage=10*CGPA or is said to be 50% in case CGPA<5

8. MEDIUM OF INSTRUCTION

The medium of instruction shall be English. However, a candidate will be permitted to write the examinations either in English or in Kannada. This rule is not applicable to languages.

9 PROVISION FOR APPEAL

If a candidate, is not satisfied with the evaluation of C1 and C2 components, he / she can approach the grievance cell with the written submission together with all facts, the assignments, test papers etc, which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty as prescribed by the university on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she is found guilty. The decision taken by the grievance cell is final.

For every program there will be one grievance cell. The composition of the grievance cell is as follows.

4. The Controller of Examination / Convener

5. One senior faculty member (other than those concerned with the evaluation of the

course concerned) drawn from the department/discipline and/or from the sister departments/sister disciplines.

6. One senior faculty members / subject experts drawn from outside the University department.

MINIMUM CREDITS TO BE REGISTERED BY A STUDENT IN A NORMAL PHASE TO

SUCCESSFULLY COMPLETE M.SC. MICROBIOLOGY DEGREE IN FOUR SEMESTERS

Semesters	Hardcore		Softcore		Open elective		Total	
	Numbers	**Credits**	**Numbers**	**Credits**	**Numbers**	**Credits**	**Numbers**	**Credits**
I semester	3	12	3	08			06	20
II semester	2	08	3	08	1	04	06	20
III semester	3	12	3	08			06	20
IV semester	2	12	2	04			04	16
Total	**10**	**44**	**11**	**28**	**1**	**04**	**22**	**76**

Honors in Microbiology

Credit Based Choice Based Continuous Evaluation Pattern System

Proposed Semester-wise distribution of the course structure for the year 2019-2020

Semester-I Credits: 20

NO	PAPER CODE	TITLEOF THE COURSE PAPER	CREDIT PATTERN IN L:T:P	CREDITS
1	**MB 1.1 Hardcore**	Virology	3:1:0	4
2	**MB 1.2 Hardcore**	Bacteriology	3:1:0	4
3	**MB 1.3 Hardcore**	Mycology	3:1:0	4
		Select 3 among 4 papers		
4	**MB 1.4 Softcore**	Microbial Genetics	3:1:0	4
5	**MB 1.5 Softcore**	Microbial Ecology & Diversity	3:1:0	4
6	**MB 1.6 Softcore**	Practical I(Virology & Bacteriology)	0:0:2	2
7	**MB 1.7 Softcore**	Practical II (Mycology & Microbial Genetics)	0:0:2	2

HC= 03; SC=03;
O.E=0.

Semester-II Credits: 20

NO	PAPER CODE	TITLEOF THE COURSE PAPER	CREDIT PATTERN IN L:T:P	CREDITS
1	**MB 2.1 Hardcore**	Microbial Physiology	3:1:0	4
2	**MB 2.2 Hardcore**	Immunology	3:1:0	4
		Select 3 among 4 papers		
3	**MB 2.3 Softcore**	Food Microbiology	3:1:0	
4	**MB 2.4 Softcore**	Soil Microbiology	3:1:0	4
5	**MB 2.5 Softcore**	Practical III (Microbial Physiology & Immunology)	0:0:2	2
6	**MB 2.6 Softcore**	Practical IV (Food Microbiology)	0:0:2	2
7	**MB 2.7 OE**	**Microbial Diversity**	**2:2:0**	4

HC= 02; SC=03; O.E=1.

M. Sc. Microbiology

Credit Based Choice Based Continuous Evaluation Pattern System

Proposed Semester-wise distribution of the course structure

Semester-III Credits: 20

NO	PAPER CODE	TITLEOF THE COURSE PAPER	CREDIT PATTERN IN L:T:P	CREDITS
1	**MB 3.1 Hardcore**	Molecular Biology	3:1:0	4
2	**MB 3.2 Hardcore**	Genetic Engineering	3:1:0	4
3	**MB 3.3 Hardcore**	Industrial Microbiology	3:1:0	4
		Select 3 among 4 papers		
4	**MB 3.4 Softcore**	Medical Microbiology	3:1:0	4
5	**MB 3.5 Softcore**	Clinical & Diagnostic	3:1:0	4
6	**MB 3.6 Softcore**	Practical V (Molecular Biology & Genetic Engineering)	0:0:2	2
7	**MB 3.7 Softcore**	Practical VI (Industrial Microbiology & Medical Microbiology)	0:0:2	2
8	**MB 3.8 OE**	Techniques in Microbiology	1:1:0	2

HC= 03; SC=03;
O.E=01.

Semester-IV Credits: 16

NO	PAPER CODE	TITLEOF THE COURSE PAPER	CREDIT PATTERN IN L:T:P	CREDITS
1	**MB 4.1 Hardcore**	Agricultural Microbiology	3:1:0	4
		Select 2 among 3 papers		
2	**MB 4.2 Softcore**	Environmental Microbiology	2:0:0	2
3	**MB 4.3 Softcore**	Genomics & Proteomics	2:0:0	2
4	**MB 4.4 Softcore**	Practical VII (Agricultural Microbiology & Environmental Microbiology)	0:0:2	2
5	**MB 4.5 Hardcore**	Project Work	0:2:6	8

HC= 01; SC=02; PW=01

Grand Total Credits: 76

SEMESTER I

MB 1.1 Hardcore: VIROLOGY

THEORY **32hours**

UNIT I **8 hours**

A) The science of virology: Concept and scope of virology. Definitive properties of viruses: Morphology, Ultra structure, Chemical composition - proteins, nucleic acids, and other contents. Classification and nomenclature of viruses. Evolutionary importance of viruses.

B) Working with viruses: Visualization and enumeration of virus particles, Biological activity of viruses, Physical and chemical manipulation of the structural components of viruses, Characterization of viral product expressed in the infected cells. Isolation and purification of viruses, Detection of viruses: physical, biological, immunological and molecular methods.

UNIT II **8hours**

A) Virus replication Strategies: Principal events involved in replication: Adsorption, penetration, uncoating nucleic acid and protein synthesis, intracellular trafficking, assembly, maturation and release, viral-host interaction, Host response to viral infection.

B) Replication patterns of specific viruses: Identification of virus prototypes associated with different virus replication schemes; Details on important viruses namely Herpes virus, Poliovirus, Influenza virus, SV40 and Adeno Virus, Poxviruses, Hepatitis Viruses, Retroviruses.

UNIT III **8hours**

A) Propagation, purification, characterization and identification and genomics of plant viruses: General methods of propagation of plant viruses; purification of plant viruses using centrifugation, chromatography and electrophoresis techniques, methods employed in identification of plant viruses.

B) Sub-viral particles: Discovery, Structure, Classification, replication and diseases caused by Satellite, Satellites virus, Virusoids, Viroids and Prions.

C) Anti-viral strategies-prevention and control of viral diseases: Host specific and nonspecific defense mechanisms involved in resistance to and recovery from virus infections. Role of interferon in viral infections. Viral Chemotherapy: Nucleoside analogs, reverse transcriptase inhibitors, protease inhibitors, History of vaccines especially smallpox and polio. New methods: subunit vaccines, antiidiotype and DNA vaccines.

UNIT IV **8hours**

A) Microbial viruses: Diversity, classification, characteristics and applications of bacteriophages, and general account on algal, fungal and protozoan viruses.

B) Viruses and the future: Promises and problems. Emerging diseases, sources and causes of emergent virus diseases

References:

1. Marc H.V. van Regenmortel , Brian W.J. Mahy (2009) Desk Encyclopedia of General Virology , 1 edition , Academic Press.
2. Alan J. Cann (2011) Principles of Molecular Virology, 5th edition , Elsevier
3. Clokie, Martha R. J., Kropinski, Andrew (2009) Bacteriophages, Methods and Protocols, Volume 1: Isolation, Characterization, and Interactions, Humana Press
4. Edward K. Wagner, Martinez J. Hewlett , David C. Bloom , David Camerini (2007), Basic Virology, 3rd Edition, John Wiley & Sons.
5. Hunter-Fujita, Frances R., Philip F. Entwistle, Hugh F. Evans, and Norman E. Crook. Insect viruses and pest management. John Wiley & Sons Ltd, 1998.
6. Jane S. Flint , Lynn W Enquist, Anna Marie Shalka (2004) Principles of Virology: Molecular Biology, Pathogenesis, and Control of Animal Viruses, American Society for Microbiology
7. *John Carter, Venetia A. Saunders,(2007),Virology: Principles and Applications*, John Wiley & Sons, west Susscex , England.
8. Lobocka, Malgorzata, and Waclaw T. Szybalski, eds.(2012) Bacteriophages. Part 2 , Academic Press
9. Matthews, Richard Ellis Ford, and Roger Hull.(2002) Matthews' plant virology. 4th edition, Gulf Professional Publishing.
10. Nigel Dimmock, Andrew Easton, Keith Leppard, 2009, Introduction to Modern Virology, 6th Edition, Wiley-Blackwell

MB 1.2HardCore: BACTERIOLOGY

THEORY **32 Hours**

UNIT I **8 hours**

Introduction: Important events in development of bacteriology, Scope and relevance of bacteriology.

Economic importance of bacteria.

Cell Structure: An overview of bacterial size, shape and arrangement, structure, chemical composition of cell wall of Archaebacteria, gram-negative bacteria, gram-positive bacteria and acid fast bacteria, cell wall deficient organisms including L-form structure, composition and function of cell membrane, capsule, flagella, pili, Inclusion bodies, ribosomes, mesosomes, reserve food materials , magnetosomes and phycobilisomes, endospores, bacterial nucleic acids – chromosome, plasmid, transposons, integrons and antibiotic resistance cassettes.

Microscopy: Working Principles of bright field microscope, fluorescent microscope, dark field microscope, phase contrast microscope, stereo microscope, confocal microscopy and electron microscope. Preparation of sample for electron microscopic studies. Application and importance of above microscopes. Measurement of microscopic objects.

UNIT II **8 hours**

Bactericidal and bactedriostatic agents - Factors affecting static and cidal activity, phenols and phenolic compounds, alcohols, halogens, heavy metals, dyes, detergents, aldehydes Non-medical uses of antibiotics. Assay methods of antimicrobial agents – Phenol coefficient, qualitative assay of drugs (drug sensitivity testing), quantitative assays – liquid tube assay (MIC), agar tube assay. Agar plate assay

UNIT III **8 hours**

Growth, Cultivation and control of Bacteria: Nutrient requirements, nutritional types of bacteria, culture media, classification of media. Growth: Nutritional uptake, Growth kinetics, generation time, growth curve, factors affecting growth. Methods for measurement of microbial growth – direct microscopy, viable count estimates, turbidometry, and biomass. Aerobic, anaerobic, batch, continuous and synchronous cultures. Methods of pure culture isolation, Enrichment culturing techniques, single cell isolation, and pure culture development. Preservation and Maintenance of Microbial cultures: Repeated subculturing, preservation at low temperature, sterile soil preservation, mineral oil preservation, deep freezing and liquid nitrogen preservation, lyophilization. Advantages and disadvantages of each method. Control of microorganisms: Antimicrobial agents, physical and chemical methods. Principles, functioning and types of Biosafety cabinets.

UNIT IV **8 hours**

Characteristics and Salient features of major groups of Bacteria: Archaebacteria: general **c**haracteristics and classification; extremophiles, halophiles, thermophiles and barophiles; General

characteristics, classification, diversity and distribution, economic importance of .**Actinomycetes, Cyanobacteria**. **Bioluminescent bacteria;** characteristics and examples, mechanism of bioluminescence. General characteristics, life cycle, growth, multiplication and significance of Mycoplasma, Rickettsiae and Chlamydia

References:

1. Sherwood, and Woolverton Willey (2007), Prescott, Harley, and Klein's Microbiology (7^{th} International Edition), McGraw-Hill
2. Mara, Duncan, and Nigel J. Horan, (2003) . Handbook of water and wastewater Microbiology, Academic Press.
3. Michael T. Madigan, David P. Clark, David Stahl, John M. Martinko, 2012, Brock Biology of Microorganisms 13th Edition, Benjamin Cummings
4. Jacquelyn G. Black (2012) Microbiology: Principles and Explorations ,8th edition, Wiley
5. Michael J. Leboffe, Burton E. Pierce , David Ferguson (2012) Microbiology Laboratory Theory & Application, Brief, 2nd Edition, Morton Publishing Company
6. Jeffrey C. Pommerville (2010) Alcamo's Fundamentals of Microbiology, 9th Revised edition, Jones and Bartlett Publishers, Inc
7. Jeffrey C. Pommerville (2010) Alcamo's Laboratory Fundamentals of Microbiology, Jones and Bartlett Publishers, Inc
8. Alfred Brown (2011) Benson's Microbiological Applications Short Version (Brown, Microbioligical Applications), 12th edition, McGraw-Hill Science/Engineering/Math
9. Jerome J. Perry , James Staley , Stephen Lory (2002), Microbial Life, Sinauer Associates.
10. Stuart Hogg (2013) Essential Microbiology, 2nd Edition, Wiley-Blackwell

MB 1.3 Hardcore: MYCOLOGY

THEORY 32 Hours

UNIT I **8 hours**

A) Introduction: History and Development of Mycology, scope of mycology. Recent developments in Mycology.

B) Fungal taxonomy: Taxonomic problems associated with variation in fungi, Classification of fungi (Alexopoulos and Mims).

UNITII **8 hours**

A) General characteristics of fungi and reproduction: Morphology and somatic structures: The thallus, organization, fungal cell, nuclear components, specialized somatic structures; Aggregation of hyphae, tissues, mycangia, General aspects of fungal nutrition and reproduction (Asexual, Sexual reproduction, Heterothalism and Parasexuality)

B) Mechanism of growth in Fungi

UNIT III **8 hours**

A) Salient features of fungal major groups: Chytridiomycota, Zygomycota , Basidiomycota, Ascomycota, Deuteromycota, Oomycota, Hypochytriomycota, Labyrinthulomycota, Plasmodiophoromycota and Myxomycota. Symbiotic fungi- Lichens.

UNIT IV **8 hours**

A) Economic importance of fungi: Fungi as biocontrol agent, Economic importance of Fungi in Agriculture, Industry and medicine. Fungi as SCP, Fungi as parasites of human and plants. Role of fungi in bio deterioration of wood and paper. Mycorrhiza – ectomycorrhiza, endomycorrhiza, vesicular arbuscular mycorrhiza. Fungi as insect symbiont.

Reference:

1. Alexopoulas C J and Mims C W, 1979 Introductory Mycology 3rd edn, Wiley Eastern.,New Delhi.
2. Deacon, J W, 1997- Modern Mycology 3rd Edition, Blackwell Science publishers, London.

3. Mehrotra, RS & Aneja, K R, 1998. An Introduction to Mycology. New Age International Pvt. Ltd. New Delhi.
4. Odum, E.P. 1971. Fundamentals of Ecology; Third Edition. Toppan Co. Ltd. Tokyo, Japan.
5. Mercedes S. Foster& Gerald F. Bills (2011) Biodiversity of Fungi: Inventory and Monitoring Methods. Academic Press
6. Michael John Carlile, Sarah C. Watkinson, G. W. Gooday (2007) The fungi. Academic Press. London, U. K
7. Kevin Kavanagh (2011) Fungi: Biology and Applications. John Wiley & Sons, Sussex, U.K.
8. David Moore, Geoffrey D. Robson, Anthony P. J. Trinci (2011) 21st Century Guidebook to Fungi. Cambridge University Press.

MB 1.4 Softcore: MICROBIAL GENETICS

THEORY

32 Hours

UNIT I **8 hours**

A) Concepts in Microbial Genetics: History and developments of Microbial genetics. Essentials of microbial genetics: Microbes as Genetic Tools for Basic and Applied Genetic studies. Advantages and disadvantages of Microbes, Generalized reproductive cycles of microbes- *Neurospora*, *Saccharomyces*, *Chlamydomonas* and *Acetabularia.*

UNIT II **8 hours**

A) Viral Genetics: Lytic and Lysogenic cycles, Phage Phenotypes, Phenotypic Mixing, Recombination in viruses: Mutations, Recombination and Mapping.

B) Bacterial Genetics: Bacterial Transformation: Types of transformation mechanisms found in prokaryotes, Bacterial Conjugation: properties of the F plasmid, F+ x F - mating, F' x F- conjugation, Hfr conjugation. Transduction: Generalized and specialized transduction, Transposable elements.

UNIT III **8 hours**

A) Fungal Genetics: *Neurospora*- Tetrad analysis and linkage detection - 2 point and 3 point crosses, chromatid and chiasma interference and Mitotic recombination

B) Algal Genetics: *Chlamydomonas* - unordered tetrad analysis - Recombination and Mapping, Nucleocytoplasmic interactions and gene expression in *Acetabularia*. Extra nuclear (Cytoplasmic) inheritance.

UNIT IV **8 hours**

A) Mutation and mutagenesis: Nature, type and effects of mutations. Mutagenesis – physical and chemical mutagens, base and nucleoside analog, alkylating agents, interrelating agents, ionizing radiation. Induction and detection of mutation in microorganisms. Site directed mutagenesis and its applications.

References:

1. Larry Snyder, Joseph E. Peters, Tina M. Henkin, Wendy Champness (2013) Molecular Genetics of Bacteria, 4th Edition; ASM Press

2. D. Peter Snustad, Michael J. Simmons (2011) Principles of Genetics, 6th Edition; Wiley

3. Stanley R.Maloy, Jhon E. Cronan, Jr. David Freifelder (1994) Microbial Genetics (Jones and Bartlett Series in Biology),2nd edition; Jones and Bartlett Publishers
4. Uldis N. Streips, Ronald E. Yasbin (2002) Modern Microbial Genetics, 2nd edition; Wiley-Liss
5. Nancy Jo Trun, J. E. Trempy (2003) Fundamental Bacterial Genetics; Wiley-Blackwell
6. John R. S. Fincham (1996) Microbial and Molecular Genetics; Hodder Arnold
7. Venetia A. Saunders (1987) Microbial genetics applied to biotechnology :principles and techniques of gene transfer and manipulation; Springer
8. Sriram Sridhar (2005) Genetics and Microbial Biotechnology; Dominant Publishers & Distributors
9. Dr. Evelyn J. Biluk (2012)Microbiology Study Guide: Microbial Genetics, Controlling Microbial Growth, and Antimicrobial Agents; CreateSpace Independent Publishing Platform
10. Royston C. Clowes, William Hayes (1968) Experiments in Microbial Genetics; Blackwell Science Ltd
11. Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick (2012) Lewin's GENES XI, 11 edition; Jones & Bartlett Learning
12. James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine,Richard Losick (2013) Molecular Biology of the Gene, 7 edition; BenjaminCummings

MB 1.5 Softcore: MICROBIAL ECOLOGY AND DIVERSITY

THEORY **32 Hours**

UNIT I **8 hours**

A) Introduction to microbial ecology. Structure of microbial communities. Interaction among microbial populations. Interaction between microorganisms and plants. Biotransformation, biodegradation, bioremediation and phytoremediation. Ecological and Evolutionary diversity (Genetic diversity) of microbial world

B) Development of Microbial communities : Dynamics of community, ecological succession, structure, dispersion, microbial communities in nature and ecosystem models

UNIT II **8 hours**

A) Physiological Ecology of microorganisms: Adaptation to environmental conditions - abiotic limitations to microbial growth .

B)Viral Diversity: Group I – T2 Bacteriophage, Group II – Banana bunchy top virus, Group III – Reovirus, Group IV- TMV, Group V – Rhabdovirus, Group VI – HIV, Group VII – Hepatitis virus.

Sub-viral particles: Discovery, Structure, Classification, replication and diseases caused by Satellite, Satellites virus, Virusoids, Viroids and Prions.

UNIT III **8 hours**

A) Bacterial Diversity: Archaebacteria, Photosynthetic Eubacteria, Chemoautotrophic and Methophilic Eubacteria, Gliding Eubacteria, Spirochetes, Rickettsiae and Chlamydiae, Actinomycetes, Mollicutes, Protists

B) Fungal Diversity: salient features of the following group: Zygomycota (*Rhizopus*), Ascomycota *Neurospora*), Basidiomycota (*Agaricus*), Deuteromycota (*Penicillium*), Chytridiomycota (*Allomyces*) Myxomycota and Yeast.

UNIT IV **8 hours**

A) Importance and Conservation of Microbial Diversity: Importance of microbial diversity in environment, pharmaceuticals & human health. Metagenomics. Importance of conservation. *In situ* conservation and *Ex situ* conservation. Role of culture collection centers in conservation.

References

1. OladeleOgunseitan (2008) Microbial Diversity: Form and Function in Prokaryotes; Wiley- Blackwell
2. Ronald M. Atlas, Richard Bartha (1997) Microbial Ecology: Fundamentals and Applications (4th Edition); Benjamin Cummings

3. David L. Kirchman (2012) Processes in Microbial Ecology; Oxford University Press
4. David L. Kirchman (2008) Microbial Ecology of the Oceans; Wiley-Liss
5. McArthur, J. Vaun (2006) Microbial Ecology An Evolutionary Approach; Academic Press
6. Atlas, Ronald M., Bartha, Richard (1997) Microbial Ecology Fundamentals and Applications; Addison-Wesley
7. Nelson, Karen E. (1997) Advances in Microbial Ecology; Springer
8. Pierre Davet (2004)Microbial Ecology of the Soil and Plant Growth; Science Pub Inc
9. Osborn, A. M., Smith, Cindy (2005) Molecular Microbial Ecology; Taylor & Francis Group
10. OladeleOgunseitan (2004) Microbial Diversity: Form and Function in Prokaryotes; Wiley- Blackwell
11. Satyanarayana, T., Johri, B. N. (2005) Microbial Diversity: Current Perspectives and Potential Applications; I.K. International Publishing House Pvt., Limited
12. James W.Brown (2014) Principles of Microbial Diversity; ASM Press
13. Colwell, R. R., Simidu, Usio, Ohwada, Kouicki (1996) Microbial Diversity in Time and Space; Springer

MB 1.6 Softcore: Practicals I (Virology and Bacteriology)

1. Laboratory safety rules
2. Microscopic measurement of microorganisms by micrometry
3. Culturing and maintenance of bacterial cultures
4. Isolation and enumeration of bacteria from soil
5. Isolation and enumeration of bacteria from water
6. Cultural characteristics of bacteria
7. Staining techniques – simple (positive and negative), differential (Grams and acid fast), structural (endospore and capsule)
8. Motility test (hanging drop method and soft agar method)
9. Biochemical tests for the identification of bacteria – catalase, oxidase, IMViC, Urease, TSIA, Nitrate reduction, gelatine, starch, casein, chitin and esculin hydrolysis.
10. Determination of growth curve in E.coli.
11. Diauxic growth curve in E.coli
12. Isolation of coliphages from sewage
13. Study of morphological changes due to viral infection in plants

MB 1.7 Softcore: Practicals II (Mycology and Microbial Genetics)

1. Isolation of slime molds.
2. Isolation of aquatic fungi.
3. Isolation of soil fungi.
4. Isolation of fungi from air.
5. Isolation of fungi from cereals and cereal based products.
6. Study of the following representative genera: *Aspergillus, Penicillium, Fusarium, Neurospora, Saccharomyces, Erysiphae, Polyporus, Agaricus, Puccinia, Ustilago, Alternaria, Drechslera, Saprolegnia, Rhizopus, Trichoderma* and symbiotic fungi-Lichens.
7. Measurement of concentration of fungal conidia by Haemocytometer.
8. Measurement of fungal cells by Micrometer.
9. Replica plating technique for transfer of bacterial colonies.
10. Ultra-violet killing curve and determination of mutant types in *Saccharomyces cerevisiae.*
11. Induction of mutation
12. Isolation of streptomycin resistant strain of *E .coli* by gradient plate method.
13. Ames test
14. Isolation of genomic DNA from bacteria by heat lysis method.
15. Isolation of genomic DNA from yeast by DNA spooning method.

SEMESTER II

MB 2.1 Hardcore: MICROBIAL PHYSIOLOGY

THEORY **32 Hours**

UNIT I **8 hours**

A) **Microbial Physiology**: Microbial Physiology: Role of ATP in metabolism. Microbial enzymes: Structure and Classification, Mechanism of Enzyme actions: Lock and Key model, induced fit Theory, Factors affecting rates of enzyme mediated reactions (pH, temperature and substrate and enzyme concentration), Enzyme Inhibition and Enzyme regulation- types of enzymes

UNIT II 8 hours

A) **Metabolism of Carbohydrate**: Metabolism of Carbohydrate: Glycolysis, Citric acid Cycle and different types of Phosphorylation, Homo and Hetero Lactic Fermentation, Utilization of sugars other than glucose: Lactose, Galactose, Maltose, Mannitol. Degradation of cellulose, Starch and Glycogen (bioenergetics).

UNIT III **8 hours**

A) Metabolism of other Substrates: **Lipid metabolism**: β-oxidation, Biosynthesis of fatty acids, degradation of fatty acids. **Nitrogen metabolism**: Nitrogen metabolism, Biological nitrogen fixation process, symbiotic and non symbiotic nitrogen fixation. urea cycle, degradation and biosynthesis of essential and non-essential amino acids. **Nucleic acid metabolism**: Biosynthesis and degradation of purines and pyrimidines.

UNIT IV **8 hours**

A) Microbial Photosynthesis: Photosynthetic Pigments and apparatus in bacteria. Oxygenic and Anoxygenic. Photosynthesis. Autotropic CO2 fixation and mechanism of Photosythesis. Utilization of light energy by Halobacteria.

B) Autotrophic Mechanisms in bacteria: Hydrogen bacteria, Nitrifying bacteria, Purple sulphur bacteria, Non-sulfur bacteria, Green sulfur bacteria, Iron bacteria, Methylotrophs.

C) Microbial Stress Responses: Oxidative stress, Thermal stress, Starvation stress, Aerobic to anaerobic transitions. Biofilm and quorum sensing

References:

1. Albert G. Moat,Michael P. Spector John W. Foster (2009) Microbial Physiology,; BWSTM
2. Albert G. Moat,Michael P. Spector John W. Foster (2009) Microbial Physiology; BWSTM

3. Byung Hong Kim,Geoffrey Michael Gadd (2008) Bacterial Physiology and Metabolism; Cambridge University Press
4. Daniel R.Caldwell (1999) Microbial Physiology and metabolism ; Star Pub Co
5. Daniel R.Caldwell (1999) Microbial Physiology and metabolism,; Star Pub Co
6. David White, James Drummond , Clay Fuqua (2011)The Physiology and Biochemistry of Prokaryotes, Oxford University Press
7. Frederick C. Neidhardt, John L. Ingraham ,MoselioSchaechter (1990)Physiology of the Bacterial Cell: A Molecular Approach; Sinauer Associates Inc
8. Robert K. Poole (2014) Advances in Microbial Systems Biology, Volume 64 (Advances in Microbial Physiology); Academic Press
9. Rose, Anthony H. ()Advances in Microbial Physiology, Vol. 9; Elsevier Science & Technology Book
10. Rose, Anthony H. (1976) Chemical Microbiology An Introduction to Microbial Physiology; Basic Books

MB 2.2 Hardcore: Immunology

THEORY **32 Hours**

UNIT I **8hours**

A)Introduction to Immunology: An overview of immune system, Phagocytes, Natural killer cells, mast

cells, basophils, Dendritic cells and other cells of the inmate immune system. Immunity**:** Types- Innate immunity: (nonspecific) physical, biochemical and genetic factors involved in governing innate immunity, molecules of inmate immunity – complement, acute phase proteins and interferons; Chemokines and Cytokines . Acquired immunity: (specific) natural, artificial, passive immunity, humoral or antibody mediated immunity, cell mediated immunity.

B) Antigens and Antibodies: Antigen processing and presentation, properties of antigen, Super antigen, Hapten; Haptens and the study of antigenicity Microbes as antigen Antigen recognition and MHC molecules. Antibodies (Immunooglobulins) – structure and function, clonal selection, monoclonal antibodies and its clinical applications, Antibody engineering (Construction of monoclonal antibodies Lymphoma and other diseases by genetically engineered antibodies).

UNIT II **8 hours**

A) Hypersensititivity: Hypersensitivity reactions, Types and their roles in Immunopathological processes.

B) Autoimmune processes: Immunologic tolerance, genetic predisposition to the development of autoimmune processes. Autoimmune disorders- Immunopathogenesis of celiac disease, myasthenia gravis, sclerosis multiplex, psoriasis vulgaris**,** Rheumatoid arthritis) Immunodeficiency diseases, Hormones and environmental factors in induction of autoimmune processes.

UNIT III **8 hours**

A) Transplantation of tissues and organs: Nomenclature of transplantations. Recognition of self and non-self- Transplantation reactions HvG and GvH. Exception from rejections. Kidney and bone marrow transplantations.

B) Tumours and immune system: Etiology of malignant transformations of cells (physical, chemical and biological factors involved in). Immunological surveillance. Escape mechanisms of tumor cells from immunological surveillance. Metastatic processes. Immunodiagnosis and Immunotherapy.

UNIT IV **8 hours**

A) Vaccines and Vaccination: Vaccines – definition, types, Antigens used as Vaccines, effectiveness of vaccines, Vaccine safety, current vaccines, adjuvants, active immunization and passive immunization

B) Manipulation of immune mechanisms: Immunoprevention, Immunoprophylaxis, Immunostimulatory and Immunosuppressive drugs.

C)Immunotechniques and Immunodiagnosis: Antigens and Antibody reactions *in vitro;* Agglutination, complement fixation, ELISA, Immunodiffusion, Immunoelectrophoresis, Immunoflourescence, Immunoprecipitation, Radioimmunoassay and serotyping.

References:

1. Abul K. Abbas (2014)Cellular and Molecular Immunology, ; Saunders
2. Judy Owen , Jenni Punt, Sharon Stranford (2013) Kuby Immunology; W. H. Freeman
3. Abul K. Abbas , Andrew H. H. Lichtman , Shiv Pillai (2012)Basic Immunology: Functions and Disorders of the Immune System, ; Saunders
4. Peter Parham (2009)The Immune System, 3rd Edition; Garland Science
5. Abul K. Abbas , Andrew H. H. Lichtman , Shiv Pillai (2011)Cellular and Molecular Immunology; Saunders
6. George Pinchuk (2001) Schaum's Outline of Immunology; McGraw-Hill
7. William E. Paul (2012) Fundamental Immunology; LWW
8. Helen Chapel , ManselHaeney, SirajMisbah, Neil Snowden (2014) Essentials of Clinical Immunology; Wiley-Blackwell
9. Louise Hawley, Benjamin Clarke, Richard J. Ziegler (2013) Microbiology and Immunology; LWW
10. Delves, Peter J., Martin, Seamus J., Burton, Dennis R.(2011)Roitt's Essential Immunology;Wiley & Sons, Incorporated, John

MB 2.3: Softcore: FOOD MICROBIOLOGY

THEORY **32 Hours**

UNIT I **8 hours**

A) Introduction to food microbiology: Definition, concepts and scope. Food as substrate for microbes. Factors influencing microbial growth in food-Extrinsic and intrinsic factors. Principles of food preservation-Chemical preservatives and Food additives Asepsis-Removal of microorganisms, (anaerobic conditions, high temperatures, low temperatures, drying). Canning, processing for Heat treatment.

UNIT II **8 hours**

A) Contamination and food spoilage: Cereals, sugar products, vegetables, fruits, meat and meat products, Fish and sea foods- poultry- spoilage of canned foods.

B) Dairy Microbiology: Microbiology of raw milk, Milk as a vehicle of pathogens, Prevention of contamination of raw milk, Microbiology of processed milk, Spoilage and defects fermented milk and milk products, Microbiological standards for milk and milk products. Cream and butter bacteriology.

UNIT III **8 hours**

A)Food poisoning and intoxication: Significance of food borne diseases, Staphylo Food poisoning and intoxication: Significance of food borne diseases, Staphylococcal, Gasteroenteritis and enterotoxins: Types and incidence, Prevention of Staphylococcal and other food poisoning syndromes, *Clostridium perfringens* food poisoning and Botulism, *Bacillus cereus* food poisoning, Food borne Listeriosis by *Listeria monocytogenes*, Food borne Gastroenteritis by *Salmonella* and *Shigella*, *Vibrio, Campylobacter* and *Yersinia*, fungal spoilage and Mycotoxins.

B) **Food produced by Microbes:** Microbial cells as food (single cell proteins) – mushroom cultivation. Bioconversions- production of alcohol-fermented beverages- beer and wine. Genetically modified foods.

C) Application of fungal pigments in food industry

UNIT IV **8 hours**

A) Detection of food-borne microorganisms: Culture, Microscopic and Sampling methods.. Chemical: Thermostable nuclease *Limulus* Lysate for Endotoxins, Nucleic Acid

(DNA) probes, DNA Amplification (PCR), Adenosine- Triphosphate Measurement, Radiometry, Fluoro-and Chromogenic substrates. Immunologic Methods: Fluorescent Antibody, Enrichment Serology, Salmonella 1-2. Test, Radioimmunoassay, ELISA.

B) Microbial indicators of food safety and quality control: Principles of quality control and microbiological criteria, Indicators of product quality and microbiological safety of foods, Hazard analysis, critical control points (HACCP), Good manufacturing process (GMP) Microbiological standards Codex Alimentarius and Food legislation.

References:

1. Adams M. R. and Moss M. O. 2007. Food Microbiology 3rd Edition. Royal Society of Chemistry. UK.
2. Ahmed E.Y. and Carlstrom C. 2003 Food Microbiology: A Laboratory Manual, John Wiley and Sons, Inc. New Jeresy.
3. Bibek Ray, ArunBhunia. 2013. Fundamental Food Microbiology, Fifth Edition. CRC Press
4. C Blackburn.2006. Food Spoilage Microorganisms. Woodhead Publishing.
5. Dongyou Liu. 2009. Molecular Detection of Foodborne Pathogens. CRC Press.
6. Elmer H. Marth, James Steele. 2001. Applied Dairy Microbiology, Second Edition. CRC Press.
7. Frazier W.C. and Westhoff C.D. 2008 Food Microbiology. Tata Mc Graw Hill Publishing Company Limited, New Delhi. Indian Edition.
8. Jay, James M., Loessner, Martin J., Golden, David A. 2004.Modern Food Microbiology. 7th ed. Springer
9. Marshall, Richard J. (Ed.). 2007. Food Safety. Springer.
10. Pina M. Fratamico, Arun K. Bhunia, and James L. Smith. 2008. Foodborne Pathogens: Microbiology and Molecular Biology. Caister Academic Press.
11. Pitt, John I., Hocking, Ailsa D. 2009. Fungi and Food Spoilage 3rd Edition. Springer.
12. Sperber, William H., Doyle, Michael P. (Eds.). 2010. Compendium of the Microbiological Spoilage of Foods and Beverages. Springer.
13. Stephen J. Forsythe. 2010. The Microbiology of Safe Food, 2nd Edition. Wiley-Blackwell.

MB 2.4: Softcore: SOIL MICROBIOLOGY

THEORY **32 Hours**

Unit I **4 Hours**

A) Soil Microbiology: Historical accounts and the "Golden Age" of soil microbiology and significant contributions of pioneer soil microbiologists.

Unit II **4 Hours**

A) Soil Microbial diversity: Diversity and abundance of dominant soil microorganisms, Methods of isolation of soil microflora, soil organic matter decomposition,

Unit III **4 Hours**

A) Biogeochemical cycles: carbon, sulphur and iron cycles in soil.

A) Soil microbe interaction - Antagonism, commensalism, mutualism, symbiosis, predators and parasite relationship and competition. Interaction of soil microflora with vascular plants - Rhizosphere, rhizoplane microorganisms, *Rhizobium*, *Azatobacter*, *Azospirillum*, *Cyanobacteria* and *Azolla*.

Unit- V **2 Hours**

A) Applied soil microbiology: soil microbial inoculants, Manipulations of soil microorganisms for agriculture, Soil environmental contaminants and Bioremediation, Microbial products- Plant growth promoting Hormones, Antibiotics, Toxins and Enzymes

Unit- VI **8 Hours**

A) Soil-Borne Diseases and Human Health: *Clostridium tetani* (tetanus), Toxoplasmosis, Aspergillosis, Actinomyces. **Soil microorganisms in agro ecosystems**: Types of microbial communities; soil microbial diversity: significance and conservation; effect of agricultural practices on soil organisms. Biological nitrogen-fixation: The range of nitrogen fixing organisms; mechanism of nitrogen fixation (biochemistry of nitrogenase); genetics of nitrogen-fixation; *Rhizobium*-Legume Association; Symplasmids, N2 fixation by non-leguminous plants

References:

1. Agrios, G. N. 2000. Plant pathology. Harcourt Asia Pvt. Ltd.
2. Bergersen, F.J. and Postgate, J.R. 1987. A Century of Nitrogen Fixation Research Present Status and Future Prospects. The Royal Soc., London.
3. Buchanan, B.B., Gruissem, W. and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants. I.K. International Pvt. Ltd.
4. Burges, H.D. 1981. Microbial control of insect pests, Mites and plant diseases. Academic, London.

5. Dixon, R.O.D. and Wheeler, C.T. 1986. Nitrogen Fixation in plants. Blackie USA, Chapman and Hall, New York.
6. Kannaiyan, S. 1999. Bioresources Technology for sustainable agriculture. Assoc. Pub. Co. New Delhi.
7. Mehrotra, R.S. 2000. Plant pathology. Tata McGraw-Hill Publishing Company Limited.
9. Metcalf, R.L. and Luckmann, W.H. 1994. Introduction to insect pest management 3ed edn. John Willey and Sons, Inc.
10. Motsara, I.M.R., Bhattacharyya, P. and Srivastava, B. 1995. Biofertilizer Technology, Marketing and usage-A source Book-cum- glossary- FDCO, New Delhi.
11. Somasegaran, P and H.J. Hoben, 1994. Hand book for Rhizobia; methods in legume *Rhizobium* Technology. Springer-Verlan, New York.

MB 2.5 Softcore: PRACTICAL III (Microbial Physiology and Immunology)

1. Population growth of yeast – *S. cerevisiae*.
2. Population growth of bacteria – *E coli*.
3. Sugar fermentation tests.
4. Catalase activity.
5. Hydrolytic rancidity.
6. Casein hydrolysis.
7. Carbohydrate catabolism by microbes
8. Study of acid and pH stress tolerance by microbes.
9. Effect of molecular oxygen on microbial growth.
10. Effect of osmotic pressure on microbial growth.
11. Effect of relative humidity on microbial growth.
12. Effect of different wavelengths of light on microbial growth.
13. Immunological Methods used for organism detection – production of antibodies for use in laboratory testing.
14. Serological Diagnosis of Infectious diseases – Serologic test Methods.
15. Precipitin test, ELISA, Ouchterlony Immunodifusion test, Immunoelectrophoresis, Complement fixation test.
16. Isolation of Antigens and raising antibodies from animals (from different Models),
17. Development of polyclonal antibodies, purification of antibodies.
18. WIDAL Test.
19. VDRL Test (RPR).
20. HBs Ag Test.
21. HCG test (Agglutination inhibition test).
22. Detection of RA factor.
23. CRP test.
24. ASO Test (Anti streptolysin 'O' Test).

MB 2.6 Softcore: PRACTICAL IV (FOOD AND DAIRY MICROBIOLOGY)

1. Bacterial examination of drinking water by membrane filter technique.
2. Study of important microbes in the degradation of wastes.
3. Determination of TDT.
4. Determination of TDP.
5. Detection and quantification of Aflatoxin B1.
6. Detection of food-borne bacteria by immunoassays.
7. Detection and enumeration of Microorganisms present in Utensils.
8. Isolation and identification of pathogenic microorganisms from canned food.
9. Enumeration of bacteria in raw and pasteurized milk by SPC method.
10. Determination of quality of a milk sample by MBRT.
11. Detection of number of bacteria in milk by breed-count method
12. Litmus milk test.
13. Microbial quality of milk products.
14. Microbiological examination of Ice-cream and Dairy products
15. Soil microbes interaction *In vitro* by dual culture method
16. Isolation, identification and enumeration of Rhizosphere and Rhizoplane microorganism
17. Isolation of *Rhizobium* from roots of leguminous plant

MB 2.7: Open elective: MICROBIAL DIVERSITY

THEORY **32 Hours**

UNIT I **8 hours**

A)Viral Diversity: Morphology, ultra structure, chemical composition of virus, classification of viruses, Group I – T2 Bacteriophage, Group II – Banana bunchy top virus, Group III – Reovirus, Group IV- TMV, Group V – Rhabdovirus, Group VI – HIV, Group VII – Hepatitis virus. **Sub-viral particles**: Discovery, Structure, Classification, replication and diseases caused by Satellite, Satellites virus, Virusoids, Viroids and Prions.

UNIT II **8 hours**

A)Bacterial Diversity: Archaebacteria, Photosynthetic Eubacteria, Chemoautotrophic and Methophilic Eubacteria, Gliding Eubacteria, Spirochetes, Rickettsiae and Chlamydiae, Actinomycetes, Mollicutes, Protists. Classification based on Bergey's manual (Determinative & Systematic).

UNIT III **8 hours**

A)Fungal Diversity: Classification, Distribution, Importance, Structure, reproduction and general characteristics of the fungal divisions: Zygomycota (*Rhizopus*), Ascomycota (*Neurospora*), Basidiomycota (*Agaricus*), Deuteromycota (*Penicillium*), Chytridiomycota (*Allomyces*) , Myxomycota and Yeast.

UNIT IV **8 hours**

A) Importance and Conservation of Microbial Diversity: Importance of microbial diversity in agriculture, forestry, environment, industrial & food biotechnology, animal & human health. Metagenomics. Importance of conservation. *In situ* conservation and *Ex situ* conservation. Role of culture collection centers in conservation.

References

1. Alexopoulos, C. J. and Mims, C. W. 1979. Introductory Mycology. III edition, Wiley Eastern, New Delhi.
2. Dimmock, N. J., Easton, A. J. and Leppard, K. N. 2001. Introduction to Modern Vorology. 5th edn. Blackwell publishing, USA.
3. Ghosh, A. 2003. Natural Resource Conservation and Environment Management. Aph Publishing Corp. Calcutta.
4. Landecker, E. M. 1972. Fundamentals of Fungi. Prentice-Hall, Angelwood Cliff, New Jersey.

5. Madigan M.T., Martinko M. J. and Parker, J. 2003. Brock Biology of microorganisms. Pearson education., New Jercy.
6. Pelczar, (Jr.) M. J., Chan, E. C. S. and Kreig, N. R.1993. Microbiology. McGraw Hill, New York
7. Perry, J.J. and Staley, J.T. 1997. Microbiology. Dynamics and Diversity. 4th edn. Wesley Longman pub. New York.
8. Presscott, L. M., Harley, J. P. and Klein, D. A. 1999. Microbiology. 4th edn. WCB Mc Graw- Hill, New Delhi.
9. Satyanarayana, T. and Johri, B. N. 2005. Microbial Diversity – Current Perspectives and Potential Applications. I K Int. Pvt. Ltd. New Delhi.
10. Stainer, R. Y., Ingraha, J, L, Wheelis, M. L. and Painter, P. K. 1986. General Microbiology. Mc Millan Edun. Ltd. London.
11. Stanley J.T. and Reysenbach A.L.1977. Biodiversity of microbial life. John Wiley 7 Sons Inc.Publication. New York.
12. Wagner, E.K. and Hewlett, M.J. 1999. Basic Virology. Blackwell Science. Inc.

SEMESTER III

MB 3.1 Hardcore: MOLECULAR BIOLOGY

THEORY **32 Hours**

UNIT I **8 hours**

A) Concepts in Molecular Biology: Microbes in molecular biology. **Organization of Genomes:** Prokaryotic genome- Genetic and Physical organization of bacterial genome, Eukaryotic genome – Genetic and Physical organization of nuclear genome

B) DNA structure and Replication: DNA as Genetic material, Chemistry of DNA, Modes of DNA Replication, Enzymes of DNA replication, Molecular mechanism of DNA replication, Differences in prokaryotic and eukaryotic DNA replication.

UNIT II **8 hours**

A) DNA damage and recombination: Types of DNA damage - deamination, oxidative damage, alkylation and pyrimidine dimers; DNA repair – mismatch, short patch repair, nucleotide/base, excision repair, recombination repair and SOS repair. Molecular basis of mutation, Recombination; Site specific recombination, Homologous recombination, transposition

UNIT III **8 hours**

A) Gene Expression: Structure of RNA- Classes of RNA, Chemistry of RNA. **Transcription:** Transcription in prokaryotes and eukaryotes, Eukaryotic transcription factors. RNA processing, Ribozymes, Antisense RNA, Inhibitors of transcription and their mechanism of action.

B)Translation: Role of ribosome and different types on RNA in protein synthesis, basic feature of genetic code, mechanism of initiation, elongation and termination, Translational control and posttranslational events.

UNIT IV **8 hours**

A) Regulation of Gene expression: Regulation of gene expression in prokaryotes and Eukaryotes. Regulation of gene expression in bacteriophages, gene silencing – gene regulation after transcription.

References:

1. Benjamin, L. 1990. Gene 4th edn. Oxford Univ. Press, Oxford.
2. Brown, T. A. 1991. Essential Molecular Biology. A Practical Approach Vol-I & Vol.-II, Oxford Univ. Press. Oxford.
3. Flint, S.J., Enquist, L.W., Drug, R.M., Racaniello, V.R. and Skalka, A.M. 2000. Principles of Virology- Molecular Biology, Pathogenesis and Control. ASM Press, Washington, D.C.
4. Garrett and Grisham. 1999. Biochemistry. 2nd edn. Saunders college pub. USA.
5. Hartl, D.L. 1994. Genetics. Jones and Bartler Publishers, London.
6. Lewin, B. 2000. Genes VII. Oxford Univ. Press.
7. Lodish, H., Berk, A., Zipursky, S. A., Matsudaira, P., Baltimore, D. and Darnell, J. 1999.
8. Molecular Cell Biology, W.H. Freeman and Company, New York.

MB 3.2. Hardcore: GENETIC ENGINEERING

THEORY **32 Hours**

UNIT I **8 hours**

A) Introduction to Genetic Engineering: Historical perspectives and milestones in Recombinant DNA Technology. Importance of gene cloning and future perspectives.

B) Tools in Genetic Engineering: Enzymes in genetic engineering. Cloning vectors: Ti Plasmid, pBR322, pUC –series. Phage vectors-M13 phage vectors, Cosmids-Types, Phasmids or Phagemids, Shuttle vectors. YAC and BAC vectors, Adenovirus vector, Synthetic construction of vectors, Ti cloning vector

UNIT II **8 hours**

A) rDNA Technology: The basic principles of gene cloning strategies: Preparation, Manipulation and Insertion of desired DNA into vector. Introduction of DNA into host cells – Transformation, Transduction, Transfection, Microinjection, Biolistics, Electroporation, Liposome fusion. Shotgun cloning. Genomic and c-DNA Libraries. Cloning and expression in bacteria, yeasts, Identification and Selection of recombinants.

UNIT III **8 hours**

A) Analysis of gene and gene products: Isolation and purification of nucleic acids, staining, Molecular markers in genome analysis: RFLP, RAPD, AFLP and ISSR analysis, DNA sequencing. Blotting techniques- Southern, Northern and Western blotting techniques. PCR – principles, types, and applications. **Introduction to Bioinformatics and Molecular Databases**, Primary Databanks – NCBI, EMBL, DDBJ; Secondary Databases – UNIPROT; Structural Database –PDB; Database similarity search (FASTA, BLAST); Alignment: Pairwise and Multiple sequence alignment; Genome Annotation and Gene Prediction; Primer Designing**;** Phylogenetics analysis and Tree construction; Protein Sequence Analysis; DNA microarrays. DNA sequencing methodology – Sangers dideoxy method.

UNIT IV **8 hours**

Applications of gene cloning and Ethics in Genetic Engineering: Applications of gene cloning in Biotechnology, Medicine, Agriculture, Forensic Science, Antisense technology. RNAi and Gene silencing, Gene therapy.

A) Safety of recombinant DNA technology: Restriction and regulation for the release of GMOs into Environment. Ethical, Legal, Social and Environmental Issues related to rDNA technology.

References:

1. Brown, T.A. (2010)Gene Cloning and DNA Analysis-An Introduction 6thedn. Blackwell Science.
2. Brown, T.A. (2011) Introduction to Genetics: A Molecular Approach 1st Ed.
3. Setlow, Jane K. (2004) Genetic Engineering: Principles and Methods. Springer.
4. Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger(2007) Molecular Cell Biology 6th Ed. W.H. Freeman and Company, New York.
5. Alexander N. Glazer, Hiroshi Nikaido(2007) Microbial Biotechnology Fundamentals of Applied Microbiology 2nd Ed. Cambridge University Press
6. H.-J. Rehm, G. Reed. (2008) Biotechnology: Genetic Fundamentals and Genetic Engineering,
8. Desmond, S. T. and Nicholl. (2002) An Introduction to Genetic Engineering. Cambridge Univ. Press. Cambridge
9. Maheshwari, D.K., Dubey, R.C. and Kang, S.C.(2006) Biotechnological Applications of Microorganisms. I.K. International Publishing House. New Delhi.
10. P. K. Gupta. (2008) Molecular Biology and Genetic Engineering. Deep and Deep Publications. India.
11. VK Gupta, MSchmoll, M Maki, MTuohy, MAMazutti. (2013) Applications of Microbial Engineering. CRC Press.

MB 3.3 Hard Core: INDUSTRIAL MICROBIOLOGY

THEORY **32 Hours**

UNIT I **8 hours**

A) Introduction: Fermenter design and types of fermenters, achievement and maintenance of aseptic conditions, Types of fermentation processes (Surface, submerged, Batch, Continuous, solid-substrate, Dual, Fed batch fermentation and its applications),

B) Industrial Microorganisms: Screening, Isolation. Identification and characterization o**f** industrially important microbes. Strain improvement- mutation, recombination- gene regulation and genetic manipulation. Preservation of industrially important microbes. Culture collection centres**.**

UNIT II **8 hours**

A) Media for Industrial Fermentations: Media formulation, growth factors, carbon, nitrogen, Energy and Mineral sources, buffers, inhibitors, precursors, inducers, Oxygen requirements Antifoam agents and others, Sterilization: Sterilization of bioreactor, media, air and exhaust air and filter sterilization

B) Downstream processing and fermentation economics: Steps in recovery and purification Methods of cell separation – filtration and centrifugation, cell disruption, liquid liquid extraction, chromatography, membrane processes. Fermentation economics- expenses for industrial organisms, strain improvement, media sterilization, heating, cooling, aeration and agitation. Cost of Plant and equipments, batch process cycle time, continuous culture, recovery and effluent treatment, cast recovery due to waste usages and recycling.

UNIT III **8 hours**

A) Industrial production of energy fuels: Industrial alcohol production: Biosynthesis, methods of production, recovery and applications of ethanol, acetone – butanol and glycerol through microbial process.

B) Industrial production of Organic acids and Enzymes: biosynthesis, media, production process, product recovery and application of citric acid and lactic acid, Enzymes: Fungal and Bacterial Amylase; Bacterial proteases.

UNIT IV **8 hours**

A) Industrial production of food additives: amino acid production, methods of production, product recovery of L-Glutamic acid and L-lysine (scaling downstream technique). Commercial uses of Amino acids Vitamins: Commercial production of Vitamin B12, and Riboflavin. Alcoholic beverages (Beer, Wine)

B) Industrial production of health care product: Penicillin and Streptomycin: Biosynthesis, production and recovery.

C) I P R: Patent Laws: Patent regulations of processes, products and microorganisms.

References:

1. Barsanti, L and Gualtieri, P. 2005. Algae: Anatomy, Biochemistry, and Biotechnology. Taylor and Francis New York.
2. Casida, L.E. 1997. Industrial Microbiology. New Age International Publishers.
3. Crueger, W. and Crueger, A. 2003. Biotechnology- A text book of Industrial Microbiology. Panima Publishing corporation.
4. Demain, A. L. 2001. Industrial Microbiology and Biotechnology IInd Edition. ASM Press, Washington.
5. Demain, A.L. and Davies, J.E. 1999. Manual of Industrial Microbiology and Biotechnology IInd Edition. ASM Press, Washington.
6. El-Mansi, E.M.T. and Bryce, C.F.A. 2004. Fermentation Microbiology and Biotechnology. Taylor and Francis Group.
7. Horton, H.R., Moran, L. A., Scrimgeour, K.G. Perry, M.D and Rawn, J.D. 2006. Principles of Biochemistry, IVth Edition. Pearson Education Internationl. London.
8. Julian E Davies and Arnold L Demain 2009 Manual of Industrial Microbiology and Biotechnology ASM Publisher
9. Maheshwari, D.K., Dubey, R.C. and Saravanamtu, R. 2010. Industrial Exploitation of Microorganisms. I.K. International Publishing House. New Delhi.
10. Mansi El-Mansi, C. F. A. Bryce. 2007. Fermentation microbiology and biotechnology. CRC Press.
11. Michael J Waites , Neil L Morgan , John S Rockey , Gary Higton 2009. Industrial Microbiology
12. Nduka Okafor 2010. Modern Industrial Microbiology and Biotechnology ASM Publisher
13. Nupur Mathur Anuradha 2007 Industrial Microbiology A Laboratory Manual**.**
14. Patel A H: 2008 Industrial Microbiology: PB Books**.**
15. Patel, A. H. 1999. Industrial Microbiology, Mc Millan India Limited, India.
16. Peppler, H.J. and Perlman, D. 1979. Microbial Technology. Academic Press, New York.
17. Peppler, H.J. and Perlman, D. 2005. Microbial Technology: Fermentation Technology Second Edition Volume 1. Elsevier India Private Limited.
18. Peppler, H.J. and Perlman, D. 2005. Microbial Technology: Fermentation Technology Second Edition Volume 2. Elsevier India Private Limited.
19. Puri, R.S. and Viswanathan, A. 2009. Practical Approach to Intellectual Property Rights. I.K. International Publishing House. New Delhi.
20. Raymond Bonnett 2010 Wine Microbiology and Biotechnology CRC press
21. Reed. G. 1999. Prescott and Dunn's Industrial Microbiology. CBS Publishers and Distributors.

MB 3.4 Softcore: MEDICAL MICROBIOLOGY

THEORY: **32 Hours**

UNIT I **8 hours**

A) Introduction to Medical Microbiology: History, Development and scope of Medical Microbiology. Concept of Disease, disorder, syndrome, Communicable diseases- Microbial infections and diseases. Factors responsible for microbial pathogenicity.

B) Microbial infections**:** Types of infections, modes of transmission, portal of entry: Urinary tract infection, sexually transmissible infection, Infection of the central nervous system, Infections of circulatory system, Oral cavity and respiratory infection, gastrointestinal infection.

UNIT II **8 hours**

A) **Nosocomial infection:** Incidence of nosocomial infections, types of nosocomical infections, emergence of antibiotic resistant microorganisms, hospital infection control programmes, preventing nosomical infections and surveillance, General concepts for specimen collection and handing of specimen, specimen processing and biosafety.

B) Chemotherapeutic agents-antibiotics (Classification based on chemical structure, mode of action and range of effectiveness). Recent trends-Drug resistance and its consequences, antibiotic policy, NCCLS (CLSI) guidelines and standards, WHO guidelines.

C) G protein signaling-Establishment, spreading, tissue damage and anti-phagocytic factors; Evasion of host defense, non-specific host defense, toxigenesis-bacterial toxins and its types, Significance of quorum sensing in Gram positive and Gram negative.

UNIT III **8 hours**

A) Epidemiology, Pathogenesis, Spectrum of disease, Laboratory diagnosis and Prevention**:** Diseases caused by Viruses: Chicken pox, Rabies virus, hepatitis, encephalitis, AIDS, Herpes simplex infections, Influenza, Dengue

B) Diseases caused by Bacteria: Tuberculosis, Leprosy, cholera, Typhoid, Botulism, Shigellosis, Helicobacter pylori infection, Salmonellosis, Tetanus. Diseases caused by Fungi: Candidiasis, Histoplasmosis, Blastomycosis, Coccidiomycosis, Dermatomycosis, Aspergillosis and Cryptococcosis, Anthrax

UNIT IV

a. Diseases caused by Mycoplasma: *Mycoplasma pneumoniae, M. urealyticum, M.homonis*. 8 hours

b. Diseases caused by Protozoa: Giardiasis, Trichomoniasis, Celebral Malaria, Toxoplasmosis, Cryptosporidium.

c. Disease caused by Chlamydiae: Psittacosis, Lymphogranuloma Venereum, Trachoma and Inclusion conjunctivitis.

d. Emergent Diseases: Hemorrhagic fever, Swine flu, SARS, Chikun gunya, Ebola, Hanta, Leptospoirosis, Marburg

References:

1. Robert W. Bauman Ph.D. (2011) Microbiology with Diseases by Body System (3rd Edition);Benjamin Cummings
2. Patrick R. Murray PhD, Ken S. Rosenthal PhD, Michael A. Pfaller MD (2012) Medical Microbiology; Saunders
3. Brooks, Geo F., Carroll, Karen C., Butel, Janet S. (2012) JawetzMelnick&Adelbergs Medical Microbiology ; McGraw-Hill Medical Publishing Division
4. Kenneth Ryan, C. George Ray , Nafees Ahmad , W. Lawrence Drew, Michael Lagunoff ,Paul Pottinger, L. Barth Reller, Charles R. Sterling (2014) Sherris Medical Microbiology, Sixth Edition; McGraw-Hill Medical
5. Robert W. Bauman Ph.D. (2011) Microbiology with Diseases by Body System (3rd Edition); Benjamin Cummings
6. Timothy JJ Inglis (2013) Clinical Microbiology and Infectious Diseases; Point of Care Publications
7. Patricia Tille (2013) Bailey & Scott's Diagnostic Microbiology; Mosby Marjorie Kelly Cowan (2012) Microbiology Fundamentals: A Clinical Approach; McGraw-Hill Science/Engineering/Math
8. Connie R. Mahon , Donald C. Lehman , George Manuselis Jr. (2010) Textbook of Diagnostic Microbiology ; Saunders
9. Ananthanarayan ,Paniker(2009)Textbook of Microbiology , 8th Edition; University Press
10. Jawetz (2010)Medical Microbiology ,25th Edition; Tata McGraw - Hill Education

MB 3.5 Softcore: CLINICAL & DIAGNOSTIC MICROBIOLOGY

THEORY **32 Hours**

UNIT I **8 hours**

A) Introduction to clinical Microbiology**:** Role of Microbiologist in Diagnostic laboratory, General concepts for specimen collection, handling, transportation, processing, specimen workup, Laboratory safety and infection control.

B) Scientific and Laboratory basis for Clinical/Diagnostic Microbiology**:** Microscopic examination of infectious diseases, Growth and biochemical characteristics, Rapid methods of identification.

UNIT II **8 hours**

A)Immunotechniques and Immunodiagnosis**:** Antigens and Antibody reactions *in vitro;* Agglutination, complement fixation, ELISA, Western Blotting Immunodiffusion, Immunoelectrophoresis, Immunoflurescence, Immunoprecipitation, Radioimmunoassay and serotyping.

B) Vaccines and Vaccination**:** Vaccines – definition, types, Antigens used as Vaccines, effectiveness of vaccines, Vaccine safety, current vaccines, adjuvants, active immunization and passive immunization.

UNIT III **8 hours**

A)Recent Diagnostic tools and techniques: Principle, working and application of a) Autoanalyser b) Biosensor glucometer c) Diagnositic kits- ELISA, Western Blot d) Enzymes in Disease diagnosis and therapy: Lactate dehydrogenase, Aspartate aminotransferase, Alkaline phosphatase, Creatine kinase, Acid phosphotase, Cholinesterase.

UNIT IV **8 hours**

A) Antimicrobial Chemotherapy**:** Development of chemotherapy; General characteristics of drugs and their testing; Mechanism of action. Antibacterial drugs; antifungal drugs, antiviral and antiprotozoan drugs; antibiotic sensitivity testing, MIC, Drug resistance; mechanism of drug resistance; multi drug resistance.

Reference

1. Goura Kudesia (2009) Clinical and Diagnostic Virology. Cambridge University Press. UK.
2. J. Andre Knottnerus and Frank Buntinx (2008) The Evidence Base of Clinical Diagnosis: Theory and Methods of Diagnostic Research, 2nd Edition. Wiley Publication.
3. Huggett and Justin O'Grady *LGC (2014)* Molecular Diagnostics: Current Research and Applications. Caister Academic Press.
4. Vinay Kumar et al., (2010) Robbins and Cotran pathologic basis of disease. Philadelphia, PA: Saunders/Elsevier.
5. Richard A. McPherson and Matthew R. Pincus (2011). Henry's clinical diagnosis and management by laboratory methods. (22nd Edi) Philadelphia, PA : Elsevier/Saunders,
7. Alberto M. Marchevsky and Mark Wick. (2011). Evidence Based Pathology and Laboratory Medicine. Springer publication.
8. David E. Bruns; Edward R. Ashwood; Carl A. Burtis; Barbara G. Sawyer (2007). Fundamentals of Molecular Diagnostics St. Louis, Mo. : Saunders Elsevier
9. Stephen B. Hulley; Steven R. Cummings; Warren S. Browner; Deborah G. Grady; Thomas B. Newman (2007) Designing clinical research (3rd edition). Philadelphia, PA: Lippincott Williams & Wilkins.
10. Huw Llewelyn , Hock Aun Ang, Keir E Lewis and Anees Al-Abdullah (2009). Oxford Handbook of Clinical Diagnosis. Oxford publications.
11. Peter Hu Madhuri Hegde and Patrick Alan Lennon (2012). Modern Clinical Molecular Techniques. Springer publications.
12. Henrik Winther and Jan T. Jorgensen (2010). Molecular Diagnostics. Springer publications.
13. Prakash S. Bisen, Mousumi Debnath and GBKS Prasad (2010) Molecular Diagnostics: Promises and Possibilities. Springer publications

MB 3.6 Softcore: PRACTICAL V (Molecular Biology and Genetic engineering)

1. Isolation of Genomic DNA from *E. coli*.
2. Determination of purity and concentration of isolated DNA using spectrophotometer
3. Separation of proteins by SDS PAGE.
4. Salt fractionation of Yeast protein and quantification.
5. Isolation of plasmids from bacteria by agarose gel electrophoresis.
6. Estimation of DNA
7. Estimation of RNA
8. Estimation of protein by Lowry's method
9. Digestion of the gene of interest with suitable restriction enzymes.
10. Ligation of the digested gene in a vector.
11. Preparation of competent *E. coli* cells for Bacterial transformation.
12. Transformation of the vector into the host cell and selection of the desired clones.
13. Induction of gene expression and purification of the induced protein from the host.
14. Amplification, Purification and separation of PCR product.
15. Determination of DNase activity on isolated DNA.
16. Determination of RNase activity on isolated RNA.
17. Determination of Proteinase activity on proteins.

MB 3.7 Softcore: PRACTICAL VI (Industrial and Medical Microbiology)

1. Study design of Fermentor and Parameters
2. Isolation of antibiotic/ amino acid/organic acid producing microbes and their preservation.
3. Batch fermentation of Citric acid production, recovery and estimation of citric acid.
4. Production of any vitamin and its quantification by bioassay.
5. Antibiotic fermentation and estimation of penicillin.
6. Preparation of wine and estimation of alcohol by specific gravity method.
7. Alcoholic fermentation and determination of total acidity and non-reducing sugars
8. Preparation of banana juice using Pectinase
9. Pathogenic fungi of the skin (Dermatophytes).
10. Microbial flora of mouth – teeth crevices.
11. Microbial flora of saliva.
12. Microorganisms of respiratory tract-examination of sputum/ AFB acid – fast bacteria.
13. Estimation of bacteria in urine by calibrated loop direct streak method.
14. Antimicrobial assay – sensitivity test (MIC) for pathogenic bacteria.
15. Laboratory diagnosis of important human diseases: Diphtheria, Tuberculosis, Typhoid, Wound infections, Malaria, Leprosy, AIDS and Hepatitis.

MB 3.7 OPEN.ELECTIVE: MICROBIAL TECHNOLOGY

THEORY **32 Hours**

UNIT I **8 hours**

A) Microscopy: Light microscopy- Simple microscopy (dissection microscope), Compound microscopy (Bright field, Dark field, phase contrast, and Fluorescence microscopy) and stereomicroscopy. Electron microscopy: Principles, construction and mode of operation of scanning and Transmission electron microscopy, limitations. Preparation of specimens for electron microscopic studies (Ultra thin sectioning, negative staining, shadow casting and freeze etching).

UNIT II **8 hours**

A) Microbiological stains and staining techniques: Types of stains and principles of staining. Stains for bacteria, fungi, algae and protozoa, spirochetes, stains for azotobacter cysts, stains for mycoplasma. Preparation of bacterial smears for light microscopy: Fixation, simple staining, Differential staining, Structural staining (Capsule, Flagella, Cell wall and Endospore of bacteria), and nuclear staining.

UNIT III **8 hours**

A) Culture media for Microbes Types of media- general purpose media, special purpose mediaselective, elective, diagnostic, resustication media, Media for fungi, algae, bacteria, mycoplasma and viruses.

B) Sterilization techniques: Principles, types of Sterilization, and their mode of action. Physical methods: Heat-dry heat (Hot-Air oven), Incineration, Moist heat (Autoclave and Pressure cooker), Tyndalization (Fractional Sterilization), Filtration-Types of filters, Laminar airflow. Radiation methods (UV radiation, x-rays and cathode rays).

UNIT IV **8 hours**

A) Control of Microorganisms: Chemical methods: Definition of terms- Disinfectants, Antiseptics, Sanitizers, Microbicides (bactericide, fungicide and Sporicide), Microbistatic (bacteristatic and fungi static agents). Use and mode of action of Alcohols, Aldehydes, Halogens, Phenols, Heavy metals, and Detergents.

B) Pure culture techniques: Different types of inoculation techniques - Spread plate, Pour plate and Streak plate methods.

References:

1. Alcomo, I.E. 2001. Fundamentals of Microbiology. VI Edition, Jones and Bartlett Publishers, Sudbury, Massachusetts.
2. Aneja, K.R. 1993. Experiments in Microbiology, Plant Pathology. Rastogi and Company, Meerut.

3. Cappuccino, J. G. and Sherman, N. 1999. MICROBIOLOGY A Laboratory Manual 4th Edn. Addison – Wesley.
4. Becker, W. M., Kleinsmith, L.J. and Hardin, J. 2000. The world of the Cell. IVth Edition. Benjamin/Cummings.
5. Kango. N. 2010. Textbook of Microbiology. I.K. International Publishing House. New Delhi.
6. Madigan M.T., Martinko M. J. and Parker,J. 2003. Brock Biology of microorganisms. Pearson education., New Jercy.
7. Pelczar, (Jr.) M. J., Chan, E. C. S. and Kreig, N. R.1993. Microbiology. McGraw Hill, NewYork
6. Perry, J.J. and Staley, J.T. 1997. Microbiology. Dynamics and Diversity. 4th edn. Wesley Longman pub. New York.
7. Perry, J.J., Staley, J.T. and Lory, S. 2002. Microbial Life. Sinauer Associates, Publishers, Sunderland, Massachusetts.
8. Presscott, L. M. Harley, J. P. and Klein, D. A. 1999. Microbiology, International edn. 4th edn. WCB Mc Graw-Hill.
9. Schaechter, M. Ingraham, J.L. and Neidhardt, F.C. 2006. Microbe. ASM Press, Washington.D.C.
10. Stainer, R. Y., Ingraha, J L, Wheelis, M. L. and Painter, P. K. 1986. General Microbiology. Mc Millan Edun. Ltd. London
11. Stanley J.T. and Reysenbach A.L.1977. Biodiversity of microbial life. John Wiley 7 Sons Inc. Publication. New York.
12. Sullia, S.B. and Shantharam,S. 2000. General Microbiology (Revised) Oxford & IBH Publishing Co. Pvt. Ltd.
13. Talaro, K and Talaro, A.1996. Foundations in Microbiology, II edition, WCB publishers.
14. Tortora, G.J., Funke, B.R. and Case, C.L. 2004. Microbiology-An Introduction. Benjamin Cummings. San Francisco.

SEMESTER IV

MB 4.1 Hardcore: AGRICULTURAL MICROBIOLOGY

THEORY **32 Hours**

UNIT I **8 hours**

A) Introduction to Agricultural Microbiology:, Introduction to agricultural microbiology, concepts and scope of agricultural microbiology, Agronomy and production of important crop plants, Green revolution. Plant Pathology: Concept of disease, History of Plant Pathology, Significance of plant diseases, Symptoms and types of plant diseases, Koch rules

B) **Transgenic Resistance:** Gene-to-gene resistance (horizontal and vertical), functions of plant resistance genes, Resistance to viruses, fungi, bacteria and insects.

UNIT II **8 hours**

A)Parasitism and Disease Development Parasitism and pathogenecity, Host range of pathogens, Disease triangle, Diseases cycle / Infection cycle, Relationship between disease cycles and epidemics; Pathogens Attack Plants – Mechanical forces, Microbial enzymes and toxins, Growth regulators. Effect on physiology of Host – Photosynthesis, Translocation and transpiration, Respiration, Permeability, Transcription and translation. Environment and Plant Disease– Effect of Temperature, Moisture, Wind, Light, Soil, pH and structure, Nutrition and Herbicides.

B) Defense Mechanisms of Plant: Disease Pre-existing structural and chemical defenses, Induced structural and biochemical defenses. Microbe mediated strategies for abiotic stress management.

UNIT III **8 hours**

A)Plant Disease & their management: Tobacco Mosaic Disease, Sandal Spike Disease, Bacterial blight of Paddy, Citrus canker, Angular leaf spot of cotton, Late Blight of Potato, Downy Mildew of Bajra, Blast of paddy, Tikka disease of ground nut, Rust of coffee, Grain and Head smut of Sorghum. Powdery mildew of Cucurbits, Wilt of Tomato, and Root Knot of Mulberry. Bunchy top of Banana.

UNIT IV **8 hours**

A) Microbes and Plant interaction-Mycorrhizae-Biology and their applications, Biofertilizers - microbial inoculants. Production and application of *Rhizobium, Azospirillum, Azotobacter,* phosphor bacteria and

Cyanobacteria. PGPR's plant growth promoting *Rhizobacteria* and their uses.

B)Biological nitrogen fixation(BNF): Nitrification, denitrification; symbiotic nitrogen fixation (Rhizobium, Frankia), non-symbiotic nitrogen fixation (Azotobacter, Azospirillum); Nitrogenase enzyme, nif genes and molecular mechanism of nitrogen fixation. Role of nodulin genes in nodule development and symbiosis. Genetic engineering of BNF

References:

1. George. N. Agrios (2005),Plant pathology, Elsevier academic press, 5th edition, U.K.
2. Mehrotra. R.S. and Ashok Aggarwal (2002), Plant pathology, Tata MC Graw-Hill publishers, 2nd edition, Delhi.
3. Kannaiyan. S. (2002), Biotechnology of Biofertilizers, Alpha science international, 1st edition.
4. Bagyaraj D.G. and Rangaswami. G. (2005). Agricultural Microbiology, Prentice-Hall of India, 2nd edition, New Delhi.
5. Neelima Rajvaidya and Dilip Kumar Markandey. (2006). Agricultural Applications of Microbiology, Nangia S.B. and A.P.H. publishing corporation, New Delhi.
6. Oerke, E.C. Dehne, H.C. Schönbeck, F.Weber, A. (1999). Crop Production and Crop Protection, Elsevier academic press, 5th edition, U.K.
8. Roger Hull (2013).Plant virology, Elsevier academic press, 1th edition, U.K.
9. Hermann H. Prell, Peter R. Day. (2001). Plant-Fungal Pathogen Interaction: A Classical and Molecular View, 1st edition, Springer-Verlag Berlin Heidelberg, Germany.
10. Geoffrey Clough Ainsworth (1981). Introduction to the History of Plant Pathology 1st edition, Cambridge university press, U.K.
11. Vidhyasekaran, P. (2007). Fungal Pathogenesis in Plants and Crops: Molecular Biology and Host Defense Mechanisms, 2nd edition, APS press, U.S.A.

MB 4.2 Softcore: ENVIRONMENTAL MICROBIOLOGY

THEORY **32 Hours**

UNIT I **8 hours**

Air Microbiology: Airspora of indoor and outdoor environment, factors affecting airspora, Techniques of trapping air borne microorganisms. **Aquatic Microbiology:** Distribution of microorganisms in the aquatic environment, Water pollution sources, Biological indicators of water pollution, Determination of sanitary quality of water, Waste water microbiology-Primary, secondary, tertiary treatment and reclamation of waste water

UNIT II **8 hours**

Soil Microbiology: Characteristics and classification of soil. Interactions between microorganisms: Mutualism, commensalism, ammensalism synergism, parasitism, predation, competition. Rhizosphere, rhizosphere microflora and its beneficial activity. Role of microorganism in nitrogen, phosphorous and sulphur cycles. Detrimental effects of diverted biogeochemical cycles. Biological nitrogen fixation in detail: Symbiotic, asymbiotic and associated nitrogen fixation. Structure, function and gentic regulation of nitrogenases. Viable but nonculturable bacteria.

UNIT III **8 hours**

A) Microbes in extreme environment: Microbes of extreme environments, Thermophiles, acidophiles, alkaliphiles, halophiles. barophiles and their survival mechanisms.

B) Space microbiology: Historical development of space microbiology, Life detection methods a) Evidence of metabolism (Gulliver) b) Evidence of photosynthesis (autotrophic and heterotrophic).

UNIT IV **8 hours**

Microbes in the degradation of wastes: Treatment of solid and liquid industrial wastes, Microbial degradation of pesticides, Xenobiotics, degradation of lignin, cellulose and pectin. Bioremediation. Geomicrobiology: Microbes in metal extraction, mineral leaching and mining, copper extraction by leaching and microbes in petroleum product formation. Global Environmental Problems: Global Warming, Acid rain, Ozone depletion. Biodeterioration of wood and metals.

MB 4.3 Softcore*:* GENOMICS AND PROTEOMICS

THEORY **32 Hours**

UNIT I **8 hours**

A) Genome - Overview Of Genome; Sequence Of Genome Acqusition And Analysis - Homologies - Snps - Genetic Analysis, Linkage Mapping, High

B) **Resolution Chromosome Mapping And Analysis** - Physical Mapping, Yac, Hybrid Mapping, Strategies, Sequence Specific Tags (Sst), Sequence Tagged Sites(Sts), Ish, Fish, Rflp, Rapd.

UNIT II **8 hours**

A) **DNA Sequencing** - Methods, Maxam And Gilbert Method, Ladder, Fluorescent, Shot Gun, Mass Spectrometry, Automation Sequencing – Find Gene Mutations, Implications of DNA – Sequencing And Sequencing Genomes.

UNIT III **8 hours**

A)Genome Data Bank, Metabolic Pathway Data - Construction And Screening Of cDNA, Libraries And Microarrays - Application Of DNA Arrays - PCR - Variations In PCR - Gene Disruptions – Sage And Sade, Pharmacogenomics.

UNIT IV **8 hours**

A)**Protein Sequence Analysis** - Introduction - Sequence Data Banks - Wbrf – Pir - Swissport - Databases, Data Mining - Algorithms Of Proteomics And Its Applications - Protein Expression

B)**Profiling -** Protein - Protein Interaction - Protein Modifications. Automation - Nucleic Acid Data Bank – EMBL Nucleotide Sequence Data Bank - Aids Virus Sequence Data Bank - RNA Data Bank.

UNIT V **8 hours**

A)**Tools For Data Bank** - Pairwise Alignment - Needleman And Wusch Algorighm – Smith Waterman - Multiple Alignment - Clustral - Pras - Blast - Fast, Algorithms To Analyse Sequence Data - Pdb, Cambridge Structure Data Base (Lsd), 2d Electrophoresis, Ief, Hplc, Protein Digestion Technique, Mass Spectrometry, Maldi, Tof, Peptides, Mass Finger, Printing, Protein.

References

1. Lynn Jorde , Peter Little , Mike Dunn and Shankar Subramaniam (2014). Encyclopedia of Genetics, Genomics, Proteomics and Bioinformatics. Wiley Publication. UK
2. Suhai, Sándor (2002). Genomics and Proteomics. Springer publications.
3. Nawin Mishra (2010). Applications of Proteomics I: Proteomics, Human Disease, and Medicine. Wiley publication. UK
4. Ganapathy Subramanian and Nawin Mishra (2012). Science of Proteomics: Historical Perspectives and Possible Role in Human Healthcare. Wiley Publications. UK
5. Ferenc Darvas, András Guttman, György Dormán (2013). Chemical Genomics and Proteomics (2nd
7. Ruchi Singh (2014). BIOINFORMATICS: GENOMICS AND PROTEOMICS. Vikas Publications. Newdelhi.
8. Metin Akay (2007). Genomics and Proteomics Engineering in Medicine and Biology. Wiley Publications. UK.
9. Devarajan Thangadurai and Jeybalan Sangeetha (2015). Genomics and Proteomics Principles, Technologies, and Applications. Apple Academic Press.
10. Malcolm Campbell, Laurie J. Heyer (2003). Discovering genomics, proteomics and bioinformatics. Benjamin Cummings publications.
11. Nachimuthu Saraswathy and Ponnusamy Ramalingam (2011). Concepts and Techniques in Genomics and Proteomics . Woodhead Publishing groups.
12. R. S. Dassanayake, Y. I. N. Silva Gunawardene (2011). Genomic and Proteomic Techniques: In Post Genomics Era. Narosa Book Distributors.

MB 4.4 Softcore: PRACTICAL VII (Agricultural Microbiology &Environmental Microbiology)

1. Isolation, culturing and seed inoculation of *Rhizobium* and testing of nodulation ability and beneficial effects.
2. Isolation and testing the efficiency of various biofertilizers like *Rhizobium, Azotobacter, Azospirillum*.
3. Mass multiplication techniques of *Azolla.*
4. Estimation of total phenols in diseased and healthy plant tissues.
5. Seed health testing by SBM.
6. Collection and Identification of following disease: Tobacco mosaic disease, Bunchy top of Banana, Bean Mosaic, Sandal spike, Bacterial blight of paddy. Citrus canker, Downy mildew of Bajra, Powdery mildew of mulberry, Head smut of sorghum, Leaf rust of coffee, Blast disease of paddy, Tikka disease of groundnut, Leaf spot of paddy and Grassy shoot of sugarcane.
7. Isolation and identification of micro flora of soil, sewage and air
8. Microbes as indicators of water pollution – Determination of indices of water quality.
9. Determination of BOD of pollution water.
10. Determination of COD of polluted water.
11. Degradation of cellulose by *Chaetomium globosum.*
12. Bacterial examination of drinking water by membrane filters technique.
13. Study of associated soil microorganisms with plants, Actinorhiza, Mycorrhiza.
14. Study of important microbes in the degradation of wastes.
15. Isolation of cellulose degraders, chitinase and pesticide degraders
16. Determination of TS and MLSS

Date: 18.02.2019

ANNEXURE –II

AMENDMENT OF SYLLABUS FOR M.SC MICROBIOLOGY

Ist SEMESTER

MB 1.2HardCore: BACTERIOLOGY THEORY 32 Hours	
EXISTING	**AMENDED**
UNIT II 8 hours **Bacterial classification and taxonomy:** Criteria for the classification of bacteria. Phenetic, Phylogenetic, Genotypic, Numerical taxonomy. Techniques for determining microbial taxonomy and Phylogeny. ICNB rules. Classification systems of major categories and groups of bacteria according to Bergey are manual of Systematic Bacteriology and Determinative Bacteriology. Nonculturable methods for the identification of pathogenic microorganisms.	**Bactericidal and bactedriostatic agents - Factors affecting static and cidal activity, phenols and phenolic compounds, alcohols, halogens, heavy metals, dyes, detergents, aldehydes Non-medical uses of antibiotics. Assay methods of antimicrobial agents – Phenol coefficient, qualitative assay of drugs (drug sensitivity testing), quantitative assays – liquid tube assay (MIC), agar tube assay. Agar plate assay**
MB 1.3 Hardcore: MYCOLOGY THEORY 32 Hours	
UNITII 8 hours **A) General characteristics of fungi and reproduction:** Morphology and somatic structures: The thallus, organization, fungal cell, nuclear components, specialized somatic structures; Aggregation of hyphae, tissues, mycangia, General aspects of fungal nutrition and reproduction (Asexual, Sexual reproduction, Heterothalism and Parasexuality)	**Unit II: Mechanism of growth in Fungi**
I SEMESTER : MB 1.4 Softcore: MICROBIAL GENETICS	
UNIT III 8 hours **A) Fungal Genetics**: *Neurospora*- Tetrad analysis and linkage detection - 2 point and 3 point crosses, chromatid and chiasma interference, Mitotic recombination in *Neurospora* and *Aspergillus*. **B) Algal Genetics:** *Chlamydomonas* - unordered tetrad analysis - Recombination and Mapping, Nucleocytoplasmic interactions and gene expression in *Acetabularia*. Extra nuclear (Cytoplasmic) inheritance.	**Fungal Genetics: *Neurospora*- Tetrad analysis and linkage detection - 2 point and 3 point crosses, chromatid and chiasma interference and Mitotic recombination**.

AMENDMENT OF SYLLABUS FOR M.SC MICROBIOLOGY

IInd SEMESTER

<table>
<tr><th colspan="2">MB 2.1 Hardcore: MICROBIAL PHYSIOLOGY</th></tr>
<tr><th>EXISTING</th><th>AMENDED</th></tr>
<tr><td>UNIT I 8 hours
A) Microbial Physiology: Microbial Energetics, The role of ATP in metabolism. Microbial enzymes: Structure and Classification, Mechanism of Enzyme actions: Lock and Key model, induced fit Theory, Factors affecting rates of enzyme mediated reactions (pH, temperature and substrate and enzyme concentration), Enzyme Inhibition and Enzyme regulation.</td><td>UNIT I 8 hours
A) Microbial Physiology: Role of ATP in metabolism. Microbial enzymes: Structure and Classification, Mechanism of Enzyme actions: Lock and Key model, induced fit Theory, Factors affecting rates of enzyme mediated reactions (pH, temperature and substrate and enzyme concentration), Enzyme Inhibition and Enzyme regulation-types of enzymes</td></tr>
<tr><td>UNIT II 8 hours
A) Metabolism of Carbohydrate: Glycolysis, Citric acid Cycle and different types of Phosphorylation, Fates of pyruvate, Fermentation. Utilization of sugars other than glucose: Lactose, Galactose, Maltose, Mannitol. Degradation of cellulose, Starch and Glycogen</td><td>UNIT II 8 hours
A) Metabolism of Carbohydrate: Glycolysis, Citric acid Cycle and different types of Phosphorylation, Homo and Hetero Lactic Fermentation, Utilization of sugars other than glucose: Lactose, Galactose, Maltose, Mannitol. Degradation of cellulose, Starch and Glycogen (bioenergetics)</td></tr>
<tr><th colspan="2">MB 2.3: Softcore: FOOD MICROBIOLOGY</th></tr>
<tr><td>UNIT III 8 hours
A)Food poisoning and intoxication: Significance of food borne diseases, Staphylo Food poisoning and intoxication: Significance of food borne diseases, Staphylococcal, Gasteroenteritis and enterotoxins: Types and incidence, Prevention of Staphylococcal and other food poisoning syndromes, Clostridium perfringens food poisoning and Botulism, Bacillus cereus food poisoning, Food borne Listeriosis by Listeria monocytogenes, Food borne Gastroenteritis by Salmonella and Shigella, Vibrio, Campylobacter and Yersinia, fungal spoilage and Mycotoxins.
B) Food produced by Microbes: Microbial cells as food (single cell proteins) – mushroom cultivation. Bioconversions- production of alcohol-fermented beverages- beer and wine. Genetically modified foods.</td><td>B) Food produced by Microbes: Microbial cells as food (single cell proteins) – mushroom cultivation. Bioconversions- production of alcohol-fermented beverages- beer and wine. Genetically modified foods.
Unit III: Application of fungal pigments in food industry</td></tr>
</table>

AMENDMENT OF SYLLABUS FOR M.SC MICROBIOLOGY

IIIrd SEMESTER

<table>
<tr><th colspan="2">MB 3.3 Hard core INDUSTRIAL MICROBIOLOGY</th></tr>
<tr><td>UNIT IV 8 hours

A) Industrial production of food additives: amino acid production, methods of production, product recovery of L-Glutamic acid and L-lysine. Commercial uses of Amino acids Vitamins: Commercial production of Vitamin B12, and Riboflavin. Alcoholic beverages (Beer, Wine,)

B) Industrial production of health care product: Industrial production of β-lactum antibiotic (Penicillin): Biosynthesis, production and recovery. Streptomycin. Biosynthesis, production and recovery. Antitumours and anticholesterol agents, SCP and SCO, I P R: Patent Laws: Patent regulations of processes, products and microorganisms.</td><td>UNIT IV 8 hours

A) Industrial production of food additives: amino acid production, methods of production, product recovery of L-Glutamic acid and L-lysine (scaling downstream technique). Commercial uses of Amino acids Vitamins: Commercial production of Vitamin B12, and Riboflavin. Alcoholic beverages (Beer, Wine,)

B) Industrial production of health care product: Penicillin and Streptomycin: Biosynthesis, production and recovery.

C) I P R: Patent Laws: Patent regulations of processes, products and microorganisms.</td></tr>
<tr><th colspan="2">MB 3.4 Softcore: MEDICAL MICROBIOLOGY</th></tr>
<tr><td>UNIT II 8 hours

A) Nosocomial infection: Incidence of nosocomial infections, types of nosocomical infections, emergence of antibiotic resistant microorganisms, hospital infection control programmes, preventing nosomical infections and surveillance, General concepts for specimen collection and handing of specimen, specimen processing and biosafety.

B)Chemotherapeutic agents-antibiotics (Classification based on chemical structure, mode of action and range of effectiveness). Recent trends-Drug resistance and its consequences, antibiotic policy, NCCLS (CLSI) guidelines and standards, WHO guidelines.</td><td>G protein signaling-Establishment, spreading, tissue damage and anti-phagocytic factors; Evasion of host defense, non-specific host defense, toxigenesis-bacterial toxins and its types, Significance of quorum sensing in Gram positive and Gram negative.</td></tr>
</table>

AMENDMENT OF SYLLABUS FOR M.SC MICROBIOLOGY

IVth SEMESTER

MB 4.1 Hardcore: AGRICULTURAL MICROBIOLOGY	
EXISTING	**AMENDED**
UNITI 8 hours **A)Introduction to Agricultural Microbiology:**, Introduction to agricultural microbiology, concepts and scope of agricultural microbiology, Agronomy and production of important crop plants, Green revolution. Plant Pathology: Concept of disease, History of Plant Pathology, Significance of plant diseases, Symptoms and types of plant diseases. B) **Plant Pathology in Practice**: Plant Clinic and Plant Doctor Concept. Diagnosis of Plant Diseases –Infectious diseases, Non-infectious diseases, Kochs' rules;	**Transgenic Resistance: Gene-to-gene resistance (horizontal and vertical), functions of plant resistance genes, Resistance to viruses, fungi, bacteria and insects.**
UNIT IV 8 hours **A) Microbes and Plant interaction-** Mycorrhizae-Biology and their applications, Biofertilizers - microbial inoculants. Production and application of *Rhizobium, Azospirillum, Azotobacter*, phosphor bacteria and Cyanobacteria. PGPR's plant growth promoting *Rhizobacteria* and their uses. **B)Biopesticides:** Definition, types-bacterial, viral, fungal and protozoan, mode of action, target pests, use of transgenic plants. mode of action, Bacteria-endo and ecto-toxins production by *Bacillus thuringiensis, and Pseudomonas.* Fungi- *Beauveria*, *Cephalosporium*, and *Trichoderma.*	**Biological nitrogen fixation(BNF): Nitrification, denitrification; symbiotic nitrogen fixation (Rhizobium, Frankia), non-symbiotic nitrogen fixation (Azotobacter, Azospirillum); Nitrogenase enzyme, nif genes and molecular mechanism of nitrogen fixation. Role of nodulin genes in nodule development and symbiosis. Genetic engineering of BNF**

PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE [AUTONOMOUS]

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

Affiliated to University of Mysore

DEPARTMENT OF STUDIES IN

Master of Tourism &Travel Management

(MTTM)

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

PREAMBLE: Tourism is one of the world's fastest growing industries as well as the major source of foreign exchange earnings and employment for many developing countries. It is a labour intensive industry providing plenty of opportunities for employment and entrepreneurship. Indian tourism industry is growing rapidly offering excellent job opportunities for professionals.

The department of Tourism is established in the year 2007. This masters degree program in Tourism & Travel Management equips students to learn about the industry and its major components like travel agency, tour operation, Hotels, Aviation, Management, Accounts etc. The course also offers 2 months on the job training in Tourism industry and helps students to build a strong career in the industry.

1.0 TITLE OF THE PROGRAM AND DURATION OF THE PROGRAM.

M.T.T.M (2 years / 4Semesters)

NOTE:

1. These regulations are applicable to students taking admission to I semester MTTM from academic year 2019-20 onwards.

2. Each semester shall extend over to a Maximum period of Eighteen weeks including examination days.

3. The duration of the program shall be 2 years consisting of 4 semesters.

4. For MTTM program, a choice based credit system is followed. A student should register in a semester for a maximum of 24 credits.

2.0 DEFINITIONS:

Course

Every course offered will have three components associated with the teaching-learning process of the course, namely

(i) Lecture – L (ii) Tutorial- T (iii) Practical - P, where

L stands Lecture session. **T** stands Tutorial session consisting participatory discussion / self study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands Practice session and it consists of Hands on experience / Laboratory Experiments / Field Studies / Case studies that equip students to acquire the much required skill component.

In terms of credits, every one hour session of L amounts to 1 credit per semester and a minimum of two hour session of T or P amounts to 1 credit per semester, over a period of one

semester of 16 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

The total credits earned by a student at the end of the semester upon successfully completing the course are L + T + P. The credit pattern of the course is indicated as

L: T: P

Different courses of study are labelled and defined as follows:

Core Course

A course which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

A Core course may be a Soft Core if there is a choice or an option for the candidate to choose a course from a pool of courses from the main discipline /subject of study or from a sister/related discipline / subject which supports the main discipline / subject. In contrast to the phrase Soft Core, a compulsory core course is called a Hard Core Course.

Elective Course

Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline / subject of study or which provides an extended scope or which enables an exposure to some other discipline / subject/domain or nurtures the candidate's proficiency/ skill is called an Elective Course. Elective courses may be offered by the main discipline/ subject of study or by sister / related discipline / subject of study. A Soft Corecourse may also be considered as an elective.

An elective course chosen generally from an unrelated discipline / subject, with an intention to seek exposure is called an **open elective**.

An elective course designed to acquire a special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher is called a **Self Study**

Elective

A core course offered in a discipline / subject may be treated as an elective by other discipline / subject and vice versa.

3.0 ELIGIBILITY FOR ADMISSION

students who have passed any degree from a recognized University are eligible for admission to I semester MTTM.

4.0 Scheme of Instructions

4.1 MTTM program is of 4 semesters-two year's duration for regular candidates. A regular candidate can avail a maximum of 8 semesters – 4 years (in one stretch) to

complete MastersDegree (including blank semesters, if any). Whenever a candidate opts for blank semester(s)/DROP in a course or in courses or is compelled to DROP a course or courses as per the provision of the regulation, he/she has to study the prevailing courses offered by the department as per the prevailing scheme, when he/she continues his/her study.

4.2 A candidate has to earn a minimum of 76 credits, for successful completion of MTTM program.

4.3 A candidate can enroll for a maximum of 24 credits per semester.

4.4 Only such candidates who register for a minimum of 18 credits per semester in the first two semesters and complete successfully 76 credits in 4 successive semesters shall be considered for declaration of ranks, medals and are eligible to apply for student fellowship, scholarship, free ships

Course Type	**Credits**
Hard Core	44
Soft Core	24
Open Elective	08
TOTAL	76

5.0 ADMISSION PROCEDURE

At the time of admission all documents in original in support of the claims made in the application have to be produced along with the Transfer Certificate from the Institution last attended. All decisions taken by the University with regard to the program and any other matter not mentioned here are final and the candidates are bound to abide by them.

6.0 **Continuous Assessment, Earning of Credits and Award of Grades**

The evaluation of the candidate shall be based on continuous assessment. The Structure for evaluation is as follows:

6.1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified asC1, C2, and C3.

6.2 The performance of a candidate in a course will be assessed for a maximum of 100/50 marks as explained:

6.2.1 The first component (C1), of assessment is for 15/5 marks. This will be based on test/ assignment/seminar/quiz/group discussions. During the first half of the semester, the first 50% of the syllabus will be completed. This shall be consolidated during the 8th week of the semester. Beyond 8th week, making changes in C1 is not permitted.

6.2.2 The second component (C2), of assessment is for 15/5 marks. This will be based on test/ assignment/seminar/quiz/group discussions. The continuous assessment and scores of second half of the semester will be consolidated during the 16th week of the semester. During the second half of the semester the remaining modules in the course will be completed.

6.2.3 During the 18th -20th week of the semester, a semester-end examination of 3/2 hours duration shall be conducted for each course. This forms the third/final component of assessment (C3) and the maximum marks for the final component will be 70/40.

The details of continuous assessment are summarized in the following table:

Component	Syllabus in a course	Weightage	Period of Continuous assessment
C1	First 50% (2 units of total Units)	15%/10%	First half of the semester To be consolidated by 8th week
C2	Remaining 50% (Remaining units of the course)	15%/10%	Second half of the semester. To be consolidated by 16th week
C3	Semester-end examination (All units of the course)	70%/80%	To be completed during 18th-20th Week.
Final grades to be announced latest by 24th week			

Setting questions papers and evaluation of answer scripts.

Questions papers in two sets shall be set by the internal examiner and one set by external examiner for a course. Whenever there are no sufficient internal examiners, the BoE shall get the questions papers set by external examiners. Whenever there are no external examiners, The Chairman, BoE shall get the question papers set by internal examiner.

XXIX. The Board of Examiners shall scrutinize and approve the question papers and scheme of valuation.

III (i) There shall be single valuation for all theory papers by internal examiner. A review shall be done as per the common regulation.

(ii) The examination for Practical work/ Field work/Project work will be conducted jointly by one internal examiner and one external examiner.

(iii) If a course is fully of (L=0): T :(P=0) type, then the examination for C3 Component will be as decided by the BOS concerned.

IV Challenge Valuation

A student who desires to apply for challenge valuation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Controller of Examinations within 15 days after the announcement of the results. This challenge valuation is only for C3 component.

The answer scripts for which challenge valuation is sought for shall be sent to an external examiner. The marks awarded in the challenge valuation is final.

6.2.4 In case of a course with only practical component a practical examination will be conducted with two examiners of which one internal and one external examiner

A candidate will be assessed on the basis of

a) Knowledge of relevant processes

b) Skills and operations involved

c) Results / products including calculation and reporting.

If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the departmental council.

6.2.5 Finally, awarding the grades should be completed latest by 24th week of the semester.

6.2.6 **Project Work:**

A student in the fourth semester shall register for a Project Work which carries 3 credits. Continuous assessment criteria for the project work include:

Component-I (C1): Periodic Progress and Progress Reports –15 Marks

Component-II (C2): Results of Work and Draft Report–15 Marks.

Component-III (C3): Final Viva-voce and Project ReportEvaluation-70Marks, out of which The Project Report evaluation is for 50Marks and the Viva–Voce examination is for20 Marks.

6.2.7 **Industrial training**

1) Each student must undergo on the job training in any Tourism/Hotel/Aviation industry

2) The practical training shall preferably be undertaken in the beginning of the semester only. The minimum period of training shall be 2 months.

3) The trainer has to assess the student and award 100 marks along with a training certificate.

4) The students have to write a project report regarding their training which shall be valued for 50 marks. There shall be a training presentation & viva voce examination on the training for 50 marks.

6.2.8 STUDY TOUR EVALUATION

A student in the first three semesters should go for study tour and study the respective destination. A detailed study tour report should be prepared based on the observation.

Study tour project report should be evaluated for 30 marks and a viva voce to be conducted for 20 marks. Thus study tour component carries 50 marks.

6.3 In case a candidate secures less than 30% in C1and C2 put together in a course, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course. In case a candidate's class attendance in a course is less than 75%, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.

In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUP option.

In case a candidate secures more than or equal to 30% in C3, but his/her grade(G) = 4, as per section 6.6 below, then he/she may be declared to have been conditionally successful in this course, provided that such a benefit of conditional clearance based on G=4 shall not be availed for more than 8 credits for the entire programme of Master's Degree of two years.

A makeup examination will be conducted as odd with odd and even with even . If a candidate is still unsuccessful, he/she may opt for DROP or again take up MAKE UP examination; however, not exceeding double the duration norm in one stretch from the date of joining the course.

A candidate has to re-register for the DROPPED course when the course is offered again by the department if it is a hard core course. The candidate may choose the same or an alternate core/elective in case the dropped course is soft core / elective course. A candidate who is said to have DROPPED project work has to re-register for the same subsequently within the stipulated period. **The details of any dropped course will not appear in the grade card.**

6.4 The tentative / provisional grade card will be issued by the Controller of Examinations at the end of every semester indicating the courses completed successfully. This statement will not contain the list of DROPPED courses.

6.5 Upon successful completion of Masters Degree a final grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Controller of Examinations.

6.6 The grade and the grade point earned by the candidate in the subject will be asgiven below.

Marks	Grade	Grade Point (GP = V x G)
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

Here, P is the percentage of marks (P=[(C1+C2)+M] secured by a candidate in a course which is rounded to nearest integer. V is the credit value of course. G is the grade and GP is the grade point.

6.7 A candidate can withdraw any course within in ten days from the date of notification of final results. Whenever a candidate withdraws a paper, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is soft core/open elective.

A DROPPED course is automatically considered as a course withdrawn.

6.8 Overall cumulative grade point average (CGPA) of a candidate after successful Completion the required number of credits (76) is given by:

CGPA = ΣGP / Total number of credits

7.0 Classification of Results

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	FGP	
	Numerical Index	Qualitative Index
4 <= CGPA < 5	5	SECOND CLASS
5 <= CGPA < 6	6	
6 <= CGPA < 7	7	FIRST CLASS
7 <= CGPA < 8	8	
8 <= CGPA < 9	9	DISTINCTION
9 <= CGPA < =10	10	

Overall percentage = 10* CGPA or is said to be 50% in case CGPA<5

8.0 Medium of Instruction

The medium of instruction shall be English. A candidate will be permitted to write the examinations in English only.

9.0 Provision for Appeal

If a candidate is not satisfied with the evaluation of C1 and C2 components, he / she can approach the grievance cell with the written submission together with all facts, the assignments, and test papers etc., which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty as prescribed by the college on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she is found guilty. The decision taken by the grievance cell is final.

10.0 Any other issue not envisaged above, shall be resolved by the competent authority of the autonomous college/ university which shall be final and binding.

The details of subject and scheme of examination of MTTM is given below:

No.	**Subject**	**Theory**	**C.A**	**Credits allotted** L	T	P	**Total**
I Semester MTTM							
1.1HC	Tourism Principles and Practices	70	30	3	1	0	4
1.2HC	Air Travel Management	70	30	3	1	0	4
1.3HC	Marketing Management for Tourism	70	30	3	1	0	4
1.4HC	Communication Skills for Tourism	70	30	4	0	0	4
1.5SC	Hospitality and Hotel Operations **OR** Tourism Geography	40 40	10 10	2 2	0 0	0 0	2 2
1.6SC	Study tour, project report and Viva voce	Project report 30	Viva voce 20	0	0	2	2
				Total credits			**20**
II Semester MTTM							
2.1HC	Organizational Behaviour	70	30	2	1	-	3
2.2HC	Tour Operations Management	70	30	3	1	-	4

2.3HC	Travel Agency Management	70	30	2	1	-	3
2.4HC	Study tour, project report and Viva voce	Project report 30	Viva voce 20	0	0	2	2
2.5SC	Airline Ticketing **OR** Destination Planning and Development	70 70	30 30	3 3	1 1	- -	4 4
2.6OE	Travel and Tourism Management	70	30	3	1	-	4
Total credits							20
III Semester MTTM							
3.1HC	Accounting for Tourism Industry	70	30	2	1	0	3
3.2HC	International Tourism Destinations	70	30	2	1	-	3
3.3HC	Tourism Research Methods	40	10	2	0	0	2
3.3SC	Study tour, project report and Viva voce	Project report 30	Viva voce 20	0	0	2	2
3.4SC	<u>Choose any two soft core</u> Tourism Planning and Development	70	30	2	1	-	3
3.5SC	Event Management	70	30	2	1	-	3
3.6SC	Digital Applications in Tourism	70	30	2	0	1	3
3.7OE	Heritage of India	70	30	3	1	-	4
Total credits							20
IV Semester MTTM							
4.1HC	On the job training for a minimum period of 2 months in any tourism / hospitality industry	-	100	0	0	3	3
4.2HC	Training report and Viva voce.	-	100			3	3
4.3HC	Start up & Entrepreneurship Development	40	10	2	0	0	2
4.4SC	Project report and Viva voce	50 For project report, 20 for viva	30		0	3	3
4.5SC	Personality Development & Soft skills	70	30	2	1	0	2
4.6 SC	Wellness Tourism **OR** Air Cargo Management	40 40	10 10	2 2	1 1	0 0	3 3
Total credits							16
Grand total							76

SYLLABUS OF MTTM PROGRAM

I semester MTTM

Tourism Principles and Practices

Module-I:– Tourism: definition, meaning, nature and scope; Tourist, travelers, visitor, transit visitor and excursionist - definition and differentiation; Leisure, recreation and tourism and their Interrelationship; Brief history of tourism worldwide and in India- Forms of Tourism: Concept of tourism resource, attraction, product, market, industry and destination in the context of tourism; components (5A's Attraction, Accessibility, Accommodation, Amenities and Activities), Tourism system and Elements of tourism (Leeper's Model) – Characteristics of Tourism (Intangibility, Perishability, Variability, Inseparability, Heterogeneous, Multitude of industry, Pricing competitiveness/Flexibility)

inbound and outbound tourism, domestic, international tourism.

Module: II: Fundamentals of Management for Tourism: Meaning, concept and characteristics of management - Nature of management: Management as a science, arts, Functions of management and their relevance in tourism industry - Types of management.

Module III: Planning-The nature and purpose of planning- principles of planning- typesof planning- advantages and limitations of planning. **Organizing** – Nature and purpose of organizing- basis of departmentalisation, span of management- line and staff relationship line and staff conflicts-bases of delegation-methods ofdecentralization.

Module IV:Directing – Directing and problems in human relationship-motivation communication and leadership- coordinating. Management by objectives (MBO). **Controlling** – Concept and process of control, control of overall performance,human aspect of control.

Module V:Types of Tourism: Heritage Tourism, Adventure Tourism, Cultural tourism, Sports Tourism, MICE Tourism, Educational Tourism and Mass Tourism. **Alternative Tourism:** Eco Tourism, Rural Tourism, Agro/Farm Tourism,Yoga Tourism.

Reference:

- An introduction to Travel and Tourism, McGraw Hill Int. Edition. 1994.
- Mill and Morrison, (1992), The Tourism System: An Introductory Text, Prentice Hall.
- Cooper, Fletcher et al, (1993), Tourism Principles and Practices, Pitman.
- Burkart and Medlik, (1981), Tourism: Past, Present and Future, Heinemann, ELBS.
- Essential of Management – Harold Koontz and Heinz Weihrie
- Organization and Management – R.D.Agarwal.
- C.B. Memoria, Personnel Management.

- K. Aswathappa, Human Resource Management, Tata Mc-Graw Hill New York.
- C.S. VenkataRatnam, Personnel Management, Tata Mc-Graw Hill New York
- Cooper, Chris and Bonifare, Worldwide Destinations, the Geography of Travel andTourism, Butterworth.
- Inskeep E, Tourism Planning – An Integrated and Sustainable Development. Approach.
- JagmohanNegi, Tourism and Travel: Concepts and Principles.
- P.S. Gill, Dynamics of Tourism (4Vols) Anmol Publication.

AIR TRAVEL MANAGEMENT

MODULE–I History of aviation, types of aviation, Domestic and international Airlines, Scheduled, Non scheduled airlines, Chicago and Warsaw convention, five freedoms of Air,

Aviation terminology & Airline terms and abbreviations,

types of journey. IATA geography, Global alliances in airline

industry, countries – capital, currencies, city codes, Airport codes

MODULE –II , Types of civilian aircraft, seating, arrangement, Classes of service, theory of an Aero plane, profile of Air crew,

Aircraft exterior – External features of an Aircraft & its function.

Interior of an air craft – cabin layout, seating arrangements, doors, windows, galley, Air craft communication system, emergency exit. Theory of an Airplane,

MODULE-III Policies of Airlines – unaccompanied minor, Dangerous goods- classification, packing and marking, carrying of pet animals, trends in airline industry in new millennium.

MODULE-IV Baggage Handling – Checked baggage, Free baggage allowance – weight & piece concept, excess baggage charges, Baggage tracing – type of mishandled baggage, systems for tracing mishandled baggage, found & unclaimed baggage. Property irregularity report.

MODULE-V Health considerations in Air travel – cabin air pressure, Immobility and

circulatory problems, Jet lag, Travelers with medical conditions, Infants, pregnant women, pre-existing illness, Travelers with disabilities, communicable diseases, medical assistance.

REFERENCE BOOKS:

1. The Airline Business in the 21th Century- Dogains R.
2. Air Travel: A Social history – Hudson, Kenneth
3. Airline ticketing- Jagmohan Negi
4. Flight reservation and airline ticketing-Jitendra K.Sharma

MARKETING MANAGEMENT FOR TOURISM

MODULE – I Introduction to Marketing Management – meaning – nature – differences between selling and marketing – Marketing Mix - Promotion Mix: Meaning – elements of promotion mix, Public Relations and Sales promotion - Determinants of Promotion Mix.

MODULE II Role of promotion in the marketing mix for tourism management – difference between advertising and sales promotions – determinants of promotion mix – Advertisability for Hotel & Tourism.

MODULE - III Advertising - Need, scope and importance of advertising – Role of advertising in the Economic development, advertising and society, latest trends in advertisements – Different types of advertisements.

MODULE - IV Advertising campaign planning, advertising copy design and communication strategy, copy- visualization layout, advertising appeals and themes, classification of advertising copies, essentials of good copy.

MODULE - V Advertising media, types of media, media planning and scheduling – advertisement budget – approaches to advertising budgeting. Advertising agencies – legal and ethical aspects of advertising business in India. Advertisement aids – trade market – slogans – packages – point of purchase displays - below the line promotion.

REFERENCE BOOKS:

1. Advertising and Promotion – Belch and Belch
2. Advertising Management – Rathour
3. Advertising Management – Chunawalla
4. Advertising Management – Write & Ziegler
5. Advertising Management – Mahendra Mohan
6 Marketing for Hospitality and Tourism - Philip Kotler, Jon Bower, James Maken
7. Tourism Marketing: Les Lumsdon
8. Marketing for Tourism - J. Christopher Holloway & Chris Robinson
9. Marketing Management - V.S. Ramaswamy , S. Namakuman
10. Tourism Marketing & Management Handbook - Stephen F. Wilt and Luiz Mountinho
11. Marketing in Travel and Tourism - Victor T.C. Middleton
12. Marketing Management Analysis, Planning and Control, Kotler, Philip. PHI.
13. Principles of Marketing, Kotler Philip and Armstrong, G. PHI.
14. Fundamentals of Marketing, Stanton, William J, McGraw Hill.

COMMUNICATION SKILLS FOR TOURISM

MODULE I Meaning and characteristics of Communication – Role of Communication in Business - Process of Communication – Objectives – Methods of Communication – Verbal – Oral – Written – Non Verbal - Barriers to Communication – Physical Barriers – Language (Semantic Barriers) – Socio Psychological Barriers – Cross Cultural Barriers – How to overcome Barriers.

MODULE II Media and Modes – Conventional Modes – Mail – courier – Telegraph – Telex – Electronic Communication – Telephone – Cellular phones – Fax – Email – Tele Conferencing - Internet – Use of Computers for Communication – Media of Mass Communication – Notice Board – Hoarding – Newspaper – Magazines – Film – Television – Internet (Social Media).

MODULE III Layout of a Business Letter – Job applications – resume - Enquiries and replies – Order and replies – Complaints and Claims – Sales Letters – Credit letters and Status Enquiries - Meeting Notice – Agenda – memos – e-mails– Reports – Structure of a report – executive Summaries – Representation.

MODULE IV Communication through speaking, discussing, listening and negotiating - Use of body language – business etiquettes – making speeches - Dialogue skills – Feedback skills – Telephone Dialogue – Telephone Etiquette

MODULE V Presentations – Making a Presentation – Preparing the text using Audio - Visual Aids – Power point Presentations

REFERENCE BOOKS:

1. Business Communication - Urmila Rai and Rai S M
2. Business Correspondence and Report writing - Sharma R C and Krishna Mohan
3. Business Communication - Edward Rothschild and Helen Burnett E Rebecca
4. Lesikar – Pettit – Flatery, Business Communication.

HOTEL AND HOSPITALITY OPERATIONS

Module 1: Introduction to hospitality industry: Definition, characteristics, Inter-relationship between hotel and tourism industry. Introduction to Hotels, definition, Growth and development of hotel industry, pioneer companies in hotel and accommodation sector in India, types of tourist accommodation, types of rooms, meal plans

Module 2: Classification of Hotel-Star categorization-Location – Size- Ownership, Organization Structure-operational department – Front office, Housekeeping, Food & Beverage Service and Food Production and non-operational department –Human Resource, Sales & Marketing, Finance, IT, Purchase & Receiving, Engineering & Maintenance, Store, Security department.

Module 3:ORGANISATION OF FRONT OFFICE AND BELL DESK – Layout, staff, dutiesand responsibilities of front office staff, symbols used in Front Office, Co-ordination of Front Office with other departments, Functions of receptionist. Guest Cycle. LOBBY & BELL DESK OPERATION – Role of Lobby Manager, Functions of Bell Desk, staff organization and luggage handling procedure on guest arrival and departure, LeftLuggage Procedure.

Module 4: Organisation of Housekeeping –importance of housekeeping, Layout, Staff Organization, brief outline of duties of executive Housekeeper, role of control desk

Module 5: Future trends in Hospitality Industry – Usage of CRS in Hotel Industry,operational usage through chain of hotels. FHRAI, Role of FHRAI in hotel industry- Functions and operations.

Reference

- Gray and Ligouri: 'Hotel and motel management and operations' PHI,NewDelhi,2000.
- Negi, 'Hotels for Tourism Development', S.Chand, New Delhi.
- Negi: Professional Hotel Management (Delhi: S.Chand).
- Jones & Lockwood – The Management of Hotel Operations.
- Prof.JagmohanNegi, Gaurav Manoher, Hospitality Management, Published by Laxmi Publications, Ltd.
- S. Kannan (2003) Hotel Industry in India, Deep and Deep Publications, Pvt. Ltd., New Delhi

TOURISM GEOGRAPHY

Module-1: Introduction-Concepts-leisure, Recreation and tourism-Geography and Tourism-Spatial scale-the geographical components of the Tourism system-nature of Tourism system-Market-Distance travelled.

Module-2: The geography of Demand for Tourism-Concepts and Definition-Actual demand-Suppressed Demand-Effective demand-Political influences-lifestyle Determinants-personality factors-Cohen's classification of Tourist-Deferred Demand.

Module-3: Importance of geography in the World Tourism-Latitudes and longitudes, Local time, Standard time, Greenwich mean time, Location of a Destination, International date line - Time zones-Flying Time calculations.

Module-4: Climate and Tourism-climate elements and tourism-Climate Zones-Climate Change-Indian climate patterns-North-South-East and West-Indian Tourism Regions and zoning-Western arid region-Semi-arid region-canal Region-Aravali region-Eastern agro-

industrial region-Southeastern Agricultural region and Chambal ravine region-Case studies on Bali(Indonesia), Maldives and Costa Rica.

Module-5: The geography of Resources for Tourism-Characteristics and management of tourism Resources-Tourism Planning –Visitor management strategies and Action-Tourism resource at the Global Scale-tourism resources at the National scale-classification of recreation resources-tourism resources at the local scale-resorts and other tourist Centres-Typology of Tourist Centres-Case study on Italy, Singapore ,Japan and USA.

References:

1. Geetanjali –Tourism Geography,Centrum Press,New delhi.
2. Subhash Chandra Sharma-geography of Tourism,rajat publications,New delhi.
3. Brian Boniface and Chris Cooper-The Geography of Travel and Tourism, BH Publications.
4. Dr.Rana Pratap and Dr.Kamla Prasad-Tourism Georaphy,Shree publishers and Distributors, New Delhi.
5. Velvet Nelson-An Introduction to the Geography of Tourism, Rawat publications, New Delhi.
6. Mohinder Chand-Travel Agency management, Anmol publications PVT Ltd,.New Delhi **Study tour, Project report and viva voce**

II SEMESTER MTTM

ORGANISATIONAL BEHAVIOUR

MODULE – I Foundation of Organisational Behaviours – Psychologyy as a Science of Human

Behaviour – Contribution of behaviour Science to Management – Personal Growth – Meaning and Concepts of personal Growth, Personal Life style choices, personal growth and Training Individual conflict.

MODULE – II Individuals and organization, individual differences – Attitudes – Aptitudes and interest – personality theories – personality tests – personality determination – perception – beliefs – values- problems and perception.

MODULE – III Employee Counseling: Meaning – need – Manager's role in changing behaviour.

Negotiation Skills: Creating Climate – Opening Process – Conducting the negotiation – Preparing for Negotiation- Styles of Negotiating – Rules of Negotiating.

MODULE – IV Motivation- Concepts and Application, Definition, Early and Contemporary theories, From Concept of Applications – Job design, goal setting and other programmes.

Stress: Meaning, Nature and levels of stress, causes, effects and coping strategies. Employee discipline – standing orders – discipline and disciplinary procedures – charge sheet – enquire – punishment – dismissal – appeal

MODULE – V Organisational culture – creativity and innovation - types of culture – Authoritarian and participative culture- Dominent and sub- culture – strong and weak culture – healthy and unhealthy culture – how to acquire good culture.

REFERENCE BOOKS:

1. Gregory Moorehead and Ricky W Griffin, Organizational Behaviour – Managing People and Organizations,Biztantra, 7/e, 2005
2. Negotiation Hand Book – PHI
3. Essentials of Negotiation, HBS, 2003
4. Bill Scott, The Skills of Negotiating, Jaico, 2003
5. Organizational behaviour – Hartman and Harris – Jaico
6. Organizational behavior- Rhanka.
7. Organizational behavior – B.S. P. Rao

TOUR OPERATIONS MANAGEMENT

Module I: Tour operators and Tour operations, Definition – Functions and types– Departmentalization, The Travel Market: Business Travel, Corporate travel, Commercial group travel, Institutional travel – Leisure Travel: Family Travel, Single resort travel, special interest travel – Segments of travel industry: Travel agencies – Airlines – Lodging establishments – Tour wholesalers – Cruise liners – Car rentals – Rail transportation.

Module II: Rules for Recognition – Role of Tour operator – Income of Tour operator –Tour Wholesalers – Designing a Tour – Tour order – Input and Output of Tour operation – Reservation systems – Centralized Reservation systems (CRS) and Global Distribution System(GDS).

Module III: Package Tours, types and forms of tour package, Components of Package Tour – Basic Principles in packaging – factors affecting tour packaging and package selection –Mass Market Package holidays, inbound and out bound package tours – Free Independent Traveller (FIT'S) Packages or Inclusive Tours, Merits and demerits of package tour, special requirements for outbound packages, Sources of earning: commissions, service charges.

Module IV: Stages of Package Tour formulation: Initial Research- pre experience and post experience; Development of itinerary; Appointment of destination Coordinators; Negotiation with vendors, designing tour brochure, Developing reservation system, Common package types, different trip types, Itinerary preparation, and important considerations for preparing itinerary, Different types of tour itinerary, Travel Terminology.

Module V: Tour costing and pricing- components of tour cost, consumer trends affecting the future of tour operating, consumer issues in tour operating.

Reference:

- Chand.M., 'Management of Travel Agency and Tour Operation', Anmol, New Delhi.
- JagmohanNegi, 'Tourist Guide and Tour Operation: Planning & Organising' Kanishka, New Delhi, 2005.
- Kamra, K.K. and Chand, Mohinder (2002). Basics of TourismTheory, operation and Practice, New Delhi: KanishkaPublishers, and distributors.
- Swain, S. K., & Mishra, J. M. (2012). Tourism: Principles andPractices. Oxford University Press.
- Goeldner, C. R., & Ritchie, J. B. (2007). Tourism principles,practices, philosophies. John Wiley & Sons.
- Holloway, J.C. (2008). The Business of Tourism, London: PersonEducation Limited.

Yale P. (1995). The Business of Tour Operations, London: Pitman.

TRAVEL AGENCY MANAGEMENT

Module I: Introduction to Tourism Industry, History & Growth of Travel Agency Business,Emergence of Thomas Cook and American Express, Scope, Travel trade- Concept of travel & tourism – Nature and features of tourism as an industry. Role of TAAI and UFTA in travel agency business.

Module –II: Travel agency– Definition of Travel Agency and Tour Operations, Differentiation, Interrelationship, Role and contributions of travel agency in the growth and development of tourism.

Module –III: Travel Agent: Organization Structure of Travel Agency, Travel formalities – Passport & Visa – Types, Types and Functions of a Travel Agent, Ancillary tourism service. Sources of income for the travel agency: Commission, Service charges. Dealing with Principal Suppliers: Dealing with air travel, tourist transport and accommodation. Supplier challenges, travel search engines.

Module IV: Introduction to Online Travel Agency business, Business Model, Case study on Expedia/ Make my trip/ trip advisor. Travel Agent access to GDS and CRS, booking cruises, USA rail pass, Eurail pass, Brit rail pass, India rail pass. International car hires.

Module V: How to set up travel agency: Market research, sources of funding, comparative study of various types of organisation proprietorship, partnership, private limited and limited, Govt. rules for getting approval, IATA rules, regulation for accreditation, Documentation, Office automation, Practical exercise in setting up a Travel Agency.

Reference:

- J.M.S.Negi, 'Travel Agency Operation, Concepts and Principles' Kanishka, New Delhi,2005
- Victor.T.C. 'Marketing & Selling of Airline products', 2004, England.
- Holloway, J.C., 'The Business of Tourism', PH, London, 2002
- Chand.M., 'Management of Travel Agency and Tour Operation', Anmol, New Delhi
- JagmohanNegi, 'Tourist Guide and Tour Operation: Planning & Organising' Kanishka, NewDelhi, 2005.
- P. C. Sinha, Encyclopedia of tourism management.
- Gee, Chuck and Y. Makens (1990). Professional Travel Agency Management, New York: Prentice Hall.
- Mohinder Chand (2007) Travel Agency Management: An Introductory Text. New Delhi:Anmol Publications Pvt. Ltd.

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AIRLINE TICKETING

Module-1: Introduction- Concepts-IATA Area Number-I, II and III-City Codes-Airport Codes-airline Codes- Standard meals and Codes- CRS/GDS.

Module-2: Travel Classes and class codes: Fare types, normal and special fares. Computerized and manual ticketing, Accurate ticketing as a specified in the IATA ticketing hand book (THB)-TIM-OAG- Miscellaneous charges order (MCO), prepaid ticket advice (PTA).

Module-3: Fare construction Terminology- Global Indicators-Sales Indicators-Types of Journeys- One way Trip-Round Trip-circle Trip-Open Jaw-Origin open jaw-Turn around open jaw-Stop over-Transfer point-ARNK-Alligators neck-one Country Rule.

Module-4: Basic Principles of International Fares and Ticketing-Currency System-Rule-NUC-MPM-TPM-EMA-EMS-HIP-AF-BHC-IROE-LCF-Problems on Inbound and outbound-Half RT fare and E-Ticket.

Module-5: Amadeus: PNR Generation-Encoding and Decoding –Time Availability-Seat availability-Time table-Requests-Meal-seat-Refund-cancellation (Theory and Practical).

References:

1. Jitendra K Sharma-Flight Reservation and Airline Ticketing, Kanishka Publishers and distributors, New Delhi.
2. K M Unnikrishnan-Air Cargo and Airport handling,A Manual for Beginners.
3. Dr.Jagmohan Negi-Travel agency and Tour operation, Kanishka Publishers, Distributors,New delhi.
4. Mohinder Chand-Travel Agency management, Anmol publications PVT Ltd,.New Delhi.
5. IATA hand book on Ticketing

DESTINATION PLANNING AND DEVELOPMENT

Module-1: Destination Development - Types of destinations, Characteristics of destinations - Destinations and products - Destination Management Systems - Destination planning guidelines - Destination Selection Process - The Values of Tourism.

Module-2: Destination Planning Process and Analysis - National and Regional Tourism Planning and Development - Assessment of tourism potential - Planning for Sustainable Tourism Development - Contingency Planning - Economic, Social, Cultural and Environmental considerations - Demand and supply match - Design and innovations.

Module-3: Destination Image Development - Attributes of Destinations: Person's determined image, Destination determined image, measurement of destination image - Destination branding perspectives and challenges-Creating the Unique Destination Proposition -Destination image formation process; unstructured image - Product development and packaging - Destination branding and the web - Case Study of Karnataka as a brand.

Module-4: Destination Promotion and Publicity - Ten 'A's framework for tourism destinations - The dynamic wheel of tourism stakeholders - Destination Marketing Mix - Destination Competitiveness – Distribution Channels- Marketing Communication and Strategies and Role of DMO's in destination marketing strategies-Case studies.

Module-5: Institutional Support: Public Private Partnership (PPP) - National Planning Policies for Destination Development- WTO Guidelines for Planners - Role of urban civic bodies: Town planning -Characteristics of rural tourism plan - Environmental Management Systems – Destination Vision- The focus of Tourism Policy: the competitive sustainable Tourism destination-Case studies.

References:

1. Nigel Morgan, Annette Pritchard & Roger Pride (2001), Destination Branding: Creating the Unique Proposition, Butterworth and Heinemann.
2. Richard W.Butler (2006), The Tourism Area Life Cycle: Applications And Modifications, Channel View Publications.

Claire, Haven Tang & Eleri Ellis Jones (2005), Tourism Smes, Service Quality And Destination Competitiveness, CABI Publishing

OPEN ELECTIVE

TRAVEL AND TOURISM MANAGEMENT

Module-1: Concepts of Tourism-Meaning-Definitions-Visitors-Excursionist-Tourist-Traveller-Hospitality- Nature- Forms –Types of tourism-Tourism System-Purpose of Travel-Travel Motivators-Five 'A'S of Tourism-Historical development of Tourism-Tourism in India.

Module-2: Impacts of Tourism-Significance of Tourism-Multipliers Effect-Economic-Social-Cultural-Environmental impacts of Tourism (Positive and Negative)- Case Studies.

Module- 3 : Travel Intermediaries: Travel agents and Tour operators, types and functions-Tour Packages-Types-Formulation of Tour Packages-Itinerary-Types-Steps in Itinerary preparation-Tour Packaging and Costing- Interrelationship between tour operator and travel agents.-Government rules for getting approval- IATA rules & regulations for accreditation.

Modulet-4: Travel Formalities and Regulations: Passport-Visa-Customs-Currency Exchange-Health Regulations and Travel Insurance.

Module-5: Tourism Transportation- Tourist transport-Air-Road-Water-Rail-essential Features of tourist transport-Civil Aviation in India and its role-Airports Authority of India, Airports In India.

REFERENCES

Tourism development – Principles and practices – AK Bhatia

Tourism in India – A.K. Bhatia

Tourism in India – V.K. Goswamy

Tourism principles and practices- Sampad Kumar Swain, Jitendra Mohan Mishra

Travel agency management-Mohinder Chand

III SEMESTER MTTM

ACCOUNTING FOR TOURISM INDUSTRY

MODULE 1 Introduction to Management Accounting

Definitions – Objectives - Characteristics – Advantages and limitations of Management Accounting - Differences between Financial Accounting and Management Accounting.

MODULE 2 Analysis of Financial Statements

Meaning – Types – Tools of Financial Statement Analysis – problems on Comparative Statements, Common Size Statements and Trend Percentages

MODULE 3 Fund Flow Statement and Cash Flow Statement.

Meaning of Fund Flow statement – utility of fund flow statement – Advantages and disadvantages – Simple problems on preparation of Fund flow statement - meaning of Cash Flow statement – advantages and Limitations of Cash Flow statements – Differences between Fund Flow statement and Cash flow statement – Problems on preparation of Cash Flow statements as per the Accounting standards 3

MODULE 4 Multiple Accounts

Accounts of Customers – Guest Accounts - Creation and Maintenance of Guest Accounts – Correction of errors – Corrections and Allowance – Accounts of Non-Resident Guests – City Ledger – Advances received in Cash – Paying bills by credit cards.

MODULE 5 Front office Account System

Responsibilities of Front Office Accounting System – General concepts of Front office accounting – Accounts – Folios – Vouchers – Point of Sales (POS) – Ledgers – Credit Monitoring – Methods of Settlement of Accounts – Differences between Ordinary Cheques and Travelers cheques – Procedure for accepting foreign currency – Visitor Tabular Ledger – Posting procedure of VTL.

Reference Books:

Management Accounting – Greg Shields

Financial Management – I. M Pandey

Financial Management – Prasanna Chandra

Management Accounting – Khan and Jain

Hotel Accounting – Anil Kathuria

A text book on Hotel Accounting – Shyam Lal Arora

INTERNATIONAL TOURISM DESTINATIONS

Module-1: Tourism Geography of North America/South America-Tourism Destination and activities in USA-Canada-Mexico –West Indies-Brazil-Argentina-Venezuela and Colombia.

Module-2: Tourism Geography of Europe- Tourism Destination and activities in England-Italy-France-Germany-Austria-Switzerland-Finland and Spain

Module-3: Tourism Geography of Africa- Tourism Destination and activities in Egypt-Kenya-Tanzania-South Africa and Ethiopia.

Module-4: Middle East Tourism Destination and activities in UAE-Turkey-Iran –Iraq and Saudi Arabia.

Module-5: Tourism Geography of Asia and Australia- Tourism Destination and activities in India -China-Japan-Singapore-Malasia-Thailand-Indonesia-Sydney-Canberra and New Zealand.

References:

1) Travel Geography, Burton and Rosemary Longmen Edn. 1999.

2) Worldwide destination, Geography of Travel and Tourism by Cooper, Chris and Bomifade.

3) Geography of Travel and Tourism, Hudson, Lyods and Jackson,Delmar Publishers 1999.

4) International destinations by Perlitz, Lee and Elliots, Prentic Hall Edn. 2001.

5) World Geography – By Majid Hussain

TOURISM RESEARCH METHODS

Module I: Introduction to Research, Definition of Research – Characteristics – Purpose ofresearch, Role of research in tourism business, requisites of a good scientific method – components of scientific approach, Types of Research, Research problem,Review of literature, Classification, Purpose and Sources of literature, Steps in Research.

Module 2:RESEARCH DESIGN: Definition, Types of research, Steps Involved in Research Process. Research Design-Various Methods of Research Design. hypotheses: meaning – types, Sources of hypotheses – functions/role of hypotheses.

Module 3: Sampling and Tools for Data Collection: Concept of Sample, Sample Size and Sampling Procedure, Various Types of Sampling Techniques, Sampling errors, Types of Data: Secondary and Primary, Various Methods of data Collection,

Module 4: Processing of data: introduction – editing – classification and coding – transcription– tabulation and graphic representation, Statistical analysis of data: introduction – measures of central tendency, mean, mode and median.

Module 5: Data presentation, Report Writing: Introduction – types of reports – planning report-writing – researchreport format – steps in report of writing – documentation: footnotes and bibliography.

Reference:

- Brunt, P.'Market Research in Travel & Tourism", Butterworth Heinemann: UK,1997.
- Clark, M.,Riley, M., Wilkie,E. and Wood, R.C. 'Researching and Writing Dissertations in Hospitality and Tourism', ITBP: UK,1998.
- Jennings, G. 'Tourism Research', John Wiley & Sons,2001.
- Poynter, J. 'How to research and write a thesis in Hospitality and Tourism: A step by step guide for College students, Wiley: UK1993.
- Ritchie, J.R.B. and Goeldner, C.R.(eds)'Travel, Tourism and Hospitality Research: A Handbook for Managers and Researchers', Wiley: UK.1994.

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TOURISM PLANNING AND DEVELOPMENT

Module I:Sustainable Tourism: Definition – Forces which promote Sustainable Tourism – Economic Forces which resistSustainable Tourism – Principles of Sustainable Tourism – Carrying Capacity – TheEnvironmental Impact of Tourism.

Module II:Tourism Planning: Common Features of Tourist Destinations – Components of Destination Amalgam. –Essential facilities and Services for Tourism Development, Conceptual meaning ofTourism Planning, Evolution of Tourism Planning, General Concepts of Planning, Levels andTypes of Tourism Planning.

Module III:Tourism Policy: Study of National Tourism Policy 1982 and 2002, National ActionPlan on Tourism, 1992: Special Tourism Area Development Programme. The concept of NationalTourism Board, National Committee on Tourism.

Module IV: Tourism and Ecosystem: Basic Properties of Ecology – Definition of Ecology– Environment – Ecosystem – Relationship of Ecology and Tourism – Tourism Activities and their Linkages to Ecology and Environment

Module V: **Global Concerns** – Factors creating the issues of Global Concerns – Rise in Temperature– Melting of Snow Caps – Rise in Sea Level – Monsoon and its Changes – The Impact ofGlobal Concern on Tourism – Prevention of Hazards.

Reference:

- Singh Ratandeep: Handbook of Environmental Guidelines for Indian Tourism– Kanishka Publishers, New Delhi.
- A.K.Bhatta Tourism, Principles & practices.
- Praveen Seth- Successful tourism planning and Management, Cross-section Publications.
- Dash M.C. (1993) fundamentals of Ecology (New Delhi), Tata McGraw HillCo.Ltd., Publishing Co.Ltd.)
- Eagles P.F.J. 1987. The Planning and Management of Environmentallysensitive areas. (U.S., A.Lengman).
- Page.J. Stephen. Brunt Paul, Connel Jo et al, Tourism A Modern Synthesis, ThomsonPublishers, London.

EVENT MANAGEMENT

Module I: History of Meetings Conventions and Expositions, Conceptual foundations of events; Major characteristics; Five C's of event management; Advantages of events- to the Organizer, Event Planner, Participants, Economy and Society; Broad classification of Events.

Module II: Introduction to MICE: Components of MICE; Economic and social significance of MICE. Introduction to professional meeting planning- definition, types and roles; associate, corporate & independent meeting planners; TA's and TO's as meeting planner; Convention visitor Bureaus – functions, structure and funding sources.

Module III: Events venues: concept and types; Conference venues- facilities, check-in and check-out procedures, requirements; conference room lay-outs; Convention manager; inter-related venues; Introduction to conference facilities in India. Role and functions of CVB, ICPB and ICCA.

Module IV: The Process of Meeting and Convention Management – Goals – Objectives – Targeting Population – Designing the programme – Budget – Site Selection – F&B – On the management – Services provided at meetings. Meeting Technology – Video Conferencing – Computers and LCD – Technology for meeting attendee, Concept of incentive tour and special requirements for its organization.

Module V: Case studies: Tourism festivals: Ellora Festival, Taj Festival, Khajuraho Festival, Desara festival, Hampi Festivals (Any two) Trade Fairs: World Travel Mart, TTF, SATTE.

Reference:

- A.K. Bhatia, 'Event Management', Sterling Publishers Pvt.Ltd. Delhi,2001

- Anton Shone & Bryn Parry, 'Successful Event Management', 2002Dr.Joe Gold Blatt, 'Special Events'
- Avrich,Barry 'Event and Entertainment Marketing', Vikas, Delhi,1994
- Panwar J.S, 'Marketing in the New Era', Sage, Delhi, 1998
- Montgomery, R.J. and Strick, S.K. (1995). Meetings Conventionsand Expositions- An Introduction to the Industry. New York:Van Nostrand Reinhold.
- Weirich, M.L. (1992). Meetings and Conventions Management.New York: Delmar Publishers Inc.
- Fenich, G.G. (2005). Meetings, Expositions, Events andConventions- An Introduction to the Industry. New Delhi:Pearson/Prentice Hall.

DIGITAL APPLICATIONS IN TOURISM

MODULE – I

ICT and Tourism: Concepts of ICTs, benefits & limitations of ICTs - implementations of ICTs in tourism, tourism stakeholders and interfaces – challenges in the tourism industry induced by ICTs.

MODULE -II

Travel & Tourism Information Systems: Geographic information system (GIS) - Global Positioning System (GPS) – Central Reservation System (CRS), Global Distribution System (GDS), Intermediaries, Infomediaries - Electronic Payment Systems (EPS) - Electronic Fund Transfers (EFT) – Electronic Data Interchange (EDI) - Enterprise Resource Planning (ERP) - Management Information Systems (MIS) - Executive Information System (EIS) - Knowledge Based systems.

MODULE – III

ICT usage by Supply side: ICTs in the Hospitality and Airline Industry, GDS and CRS - ICTs in Tour Operators and Travel Agencies, Business process reengineering (BPR) - Bank Settlement Plan (BSP) - ICTs for Tourism Destination Management - ICT supported Consumer Relationship Management - knowledge management, business intelligence - social media marketing in tourism and mobile services in tourism

MODULE IV

ICT usage by Demand side: Travel news groups, electronic bulletin boards and chat rooms-access to GDS - automated ticket machines - Information Kiosks - TV based tourism information retrieval and booking, videotext system, interactive TV - Voice input and recognition systems - Social media and ICT influence in travel decision making, Virtual Tourist Commmoduleies

MODULE V

Travel & Tourism Business models & Cyber security: Business intelligence and smart business networks, online business models - website optimization – Online Travel Agency (OTA), travel agency automation, voyager systems, tour package planning systems, managing e-service centre, delivering e-value to customers - cyber crimes, cyber laws and security.

PRACTICALS

Practical exposure on

1. Online reservation system & payment system
2. Web designing
3. Blog writing
4. GDS (AMADEUS/GALILEO or related)

REFERENCE BOOKS:

1. Robson Wendy, Strategic Management and Information Systems Pitman Publishers
2. Elmansic/Navathe, Fundamentals of Database Systems
3. Information technology for tourism ,Gary Inkpen
4. Computers today by S.K Basandra

OPEN ELECTIVE:

HERITAGEOF INDIA

Module- I: Definitions, Scope and Nature of Heritage, Kinds of Heritage – Tangible and Intangible. Relationship between Heritage and Tourism. Heritage tourism in India

Module- II : Indian Art – Paintings- Different school of Paintings, Sculptors, Architecture – Nagar style of architecture, Dravidian style of architecture, Vesara style of architecture and Indo-Islamic architecture.

Module- III : Indian Dance forms-Classical-Folk-Comparison between Classical and Folk-Dance festivals in India-Indian Music-Types-Major Fairs and festivals and its importance in Tourism.

Module –IV: UNESCO World Cultural Heritage Sites in India-: Ajanta and Ellora Caves (1983), Churches and Convents of Goa (1986),), Fatehpur Sikri (1986), Group of Monuments at Mahabalipuram (1984) Khajuraho Group of Monuments (1986), Mountain Railways of India (1999), Qutb Minar and its Monuments, Delhi (1993), Sun Temple, Konârak (1984), Taj Mahal (1983).**UNESCO World Natural Heritage Sites in India:** Great Himalayan National Park Conservation Area (2014), Kaziranga National Park (1985), Keoladeo National Park (1985), Nanda Devi and Valley of Flowers National Parks (1988), Sundarban National Park (1987).

MODULE V – ASI-Functions and Laws related to Heritage protection in India-Study on important heritage tourism destinations of Karnataka – Group of Monuments at Pattadakallu (1987),), Group of Monuments at Hampi (1986), Bijapur and Gulbarga.

REFERENCES

Heritage and Cultural tourism – Romila chawla

Tourism products - Robinet Jacob, Sindhu, Mahadevan

Cultural tourism - Harish Badan

IV SEMESTER MTTM

Industrial training

1) Each student must undergo on the job training in any Tourism/Hotel/Aviation industry

2) The practical training shall preferably be undertaken in the beginning of the semester only. The minimum period of training shall be 2 months.

3) The trainer has to assess the student and award 100 marks along with a training certificate.

4) The students have to write a project report regarding their training which shall be valued for 50 marks. There shall be a training presentation & viva voce examination on the training for 50 marks.

START-UP AND ENTREPRENEURSHIP

Module 1: Entrepreneurship- Definition, Role and expectation. Entrepreneurial motivations, Types;Characteristics, functions and importance of Entrepreneurship, opportmoduleies in tourism;Entrepreneurial traits and qualities; A brief study of forms of Business Organization – sole trading partnership, limitedliability, co-operative, Partnership producers' companies – public privatepartnership – steps involved in establishing a new tourism enterprise.

Module 2: Start-up Idea: How to get a start-up idea, Idea assessment. Identifying target segment and Market Segment: Understanding target segment, sizing the market. Analysing Environment and Competitive advantage: Analysing the environment, Understanding the industry (Porter's 5 force model), Competitive Advantage.

Module 3: Building a Legal Structure: Introduction, Common legal mistakes, Types of Legal Structures, Entity registration process, choosing a base location, Selecting legal expert. Permits Registration and Compliances, Intellectual Property Rights, Importance and Types, IP registration process, Contracts: Key aspects, Founder and Employee agreement, Vender and customer contracts.

Module 4: Understanding Financial Basics: Introduction to Financial Basics, MIS, Financial Key Performance Indicators, Working Capital Management: Introduction, Operating Cycle, Financing and Management of Working Capital, Vendor contracts, Financial management and long term investments, Capital Structure and Taxation, Break Even Analysis,

Module 5: Business Planning: Components of BP, Importance of BP, Elements of BP, Format of BP, building an effective BP, Marketing strategy for an effective BP, Building BP Projections. Funding Overview: Seeking external funding, Funding stages, Qualities to look for investors, Approaching investors. Valuation: Decoding Valuation, Valuation and dilution, Cap tables.Pitching and Term sheet: Investors pitch, Components of a pitch, Term Sheet and Post Term Sheet, Program completion. Facebook for business.

Reference:

- Entrepreneurship Development by S. Anil Kumar, S.C. Poornima M.K.Abraham & K. Jayashree.
- Entrepreneurship & Small Business Management by C.B. Gupta & Khanka.
- Xcess' Board of Editors, Guide to Starting a Travel Agency and Tour Operation Business – The Business of Tourism, XcessInfostorePvt. Ltd. (2013).
- Roy A. Cook D.B.A, Laura J. Yale Ph.D. Emerita and Joseph J. Marqua, Tourism: The Business of Travel (4th Edition), ISBN-13: 978-0137147298.

PROJECT REPORT AND VIVA VOCE

PERSONALITY DEVELOPMENT AND SOFT SKILLS

Module-1: Introduction to Personality Development The concept of personality - Dimensions of personality –The concept of success and failure: What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success – What is failure - Causes of failure. SWOT analysis.

Module-2: Attitude & Motivation Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude – Advantages –Negative attitude- Disadvantages - Ways to develop positive attitude - Differences between personalities having positive and negative attitude. motivation - Significance - Importance of self- motivation- Factors leading to de-motivation.

Module-3: Self-esteem Term self-esteem - Symptoms - Advantages - Do's and Don'ts to develop positive self-esteem – Low self-esteem - Symptoms - Personality having low self esteem - Positive and negative self esteem. Interpersonal Relationships – Defining the difference between aggressive, submissive and assertive behaviors - Lateral thinking.

Module-4 : Other Aspects of Personality Development- Body language - Problem-solving - Conflict and Stress Management - Decision-making skills - Leadership and qualities of a successful leader – Character building -Team-work – Time management - Work ethics –Good manners and etiquette.

Module-5: Employability Quotient Resume building- The art of participating in Group Discussion – Facing the Personal (HR & Technical) Interview -Frequently Asked Questions - Psychometric Analysis - Mock Interview Sessions.

References:

1. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.
2. Tata McGraw-Hill 1988. 2. Heller, Robert.Effective leadership.

3. Essential Manager series. Dk Publishing, 2002 3. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003
4. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill. 2001
5. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company, (2004).
6. Pravesh Kumar. All about Self- Motivation. New Delhi. Goodwill Publishing House. 2005.
7. Smith, B . Body Language. Delhi: Rohan Book Company. 2004

WELLNESS TOURISM

Module I Origin and development of wellness tourism over ages - health as a motivator to travel, - Ancient canters of healing and bath. - Concept, Definitions and dimensions of Health, wellness and well-being – spirituality – Typologies of Health tourism - Factors affecting growth of health tourism.

Module II Leisure, lifestyle and tourism: – Tools for wellness: medicine, therapy, Factors influencing health and wellness tourism. Forms of health tourism- medical tourism, spa tourism, Ayurveda tourism, Yoga & Meditation tourism, holistic tourism, spiritual tourism, Ashram tourism.

Module III Concept and Dimensions of holistic health care: – the body, Mind and Spirit relationship. AYUSH- Ayurveda, Yoga & Naturopathy, Siddha, Unani, Homoeopathy, Aromatherapy.

Module IV Yoga and Meditation: Origin and development of yoga and meditation in India. Different forms of yoga and meditation. The impact of yoga and meditation in the body and mind. International Yoga Day. Some of the important yoga centres in India.

Module V Medical tourism: - concept, typology evolution of Medical Tourism. Benefits of medical tourism. Economics of medical tourism. Global medical tourism scenario. Countries promoting medical tourism. Indian medical tourism, potential and problems, market size and growth.

Reference:

- Smith, M. and Puczko, L. (2009) Health and wellness tourismSivananda Yoga Vedanta Centre (2000) The New Book of Yoga, EburyPress.
- Vishnudevananda Swami, The Complete Illustrated Book of yoga.
- Kulkarni,Sonali (2008) Spa and Health Tourism, Book Enclave, Jaipur.
- Pruthi , Raj (2006) Medical Tourism in India, Arise Pub, New Delhi
- Rajagopalan , S., (2006) Health Tourism – An Introduction, The ICFAIUniversity Press, Hyderabad,.

AIR CARGO MANAGEMENT

Module 1 Introduction to Air Cargo

Definition and Abbreviation of Air Cargo – History of Air Cargo - Types of Goods/ Products shipped by Air – Characteristics of Air Cargo – Trends and Performance of Air Cargo in Asia

Module 2 Loading of Cargo

Procedure for Loading and Unloading of Cargo – Export-Import License – Types and Nature of Cargo – Sea Cargo – Introduction – an overview of Sea Cargo industry.

Module 3 Important Components of air Cargo Planes and their functions

Elementary theory of Flight – Theory of Gravitation – Condition of Equilibrium – Load and Trim – Limitations of Cargo Carrying Capacity.

Module 4 Airport Familiarization for Air Cargo Handling

Equipment used near the Aircraft – Engineering and Commercial equipment – Special Service codes – Transportation times (Flying time)

Module 5 Overview of Logistics Management

Origin of Logistics – Need for logistic Management - Types of Logistics – Essentials of Logistics in International Trade – case studies on FedEx, UPS, DHL, Cathay Pacific, Lufthansa, Emirates, Menzies Aviation Bobba.

Reference Books:

Air Cargo Management – Unnikrishnan

Air Cargo Management; Air Freight and the Global Supply Chain – Michael Sales

Air Cargo Freight – Patrick Kinley

Logistics Management – Rakesh Singh and Satish C. Ailawadi

Supply Chain and Logistics Management – Closs and Cooper

Mahajana Education Society (R)

SBRR Mahajana First Grade College (Autonomous)

PG Wing Pooja Bhagavat Memorial Mahajana Education Centre

KRS Road, Metagalli, Mysuru-570016

Affiliated to University of Mysore,

Re-Accredited by NAAC with 'A' Grade, College with Potential for Excellence

PG WING OF SBRR MAHAJANA FIRST GRADE COLLEGE [AUTONOMOUS]

Accredited by NAAC with 'A' grade

Pooja Bhagavat Memorial Mahajana Education Centre

Affiliated to University of Mysore

DEPARTMENT OF STUDIES IN

MASTER OF SOCIAL WORK - MSW

SYLLABUS

REGULATIONS, STRUCTURE AND SYLLABUS

JUNE/JULY 2019

Regulations of the Programme Master of Social Work (MSW)

Preamble:

Social Work is a relatively young discipline among Social Sciences. It is a help rendering profession. Social Work teaches the art and science of rendering help to people in need of such help. Its philosophical premise is that Every Individual is worthy and capable. This profession is most suited for all those who are interested in bringing a difference among the people, society and the world around them.

The MSW programme offered by the SBRR Mahajana First Grade College PG Wing aims to train young graduates in the art and science of Social Work discipline. The two years, four semester course is a combination of theory and field work components. The department of Social Work, through its professional training in field work and application of theory into practice facilitates its students to become competent professional social works who can be readily absorbed by the job market. The student can also pursue M.Phil and Doctoral programme after the completion of the MSW programme. The opening for the trained social workers are in varied fields such as Industries, Hospitals, Communities, Correctional settings, Governmental welfare sectors, Family and Child welfare, non- governmental sector and many more.

2. Objectives of the Course (Master of Social Work):

B) To provide education and training in social work to those desirous of making a career in social work practice.

C) To provide opportunities through intensive field practicum to work with variety of people in their development and provide service to those who are in need of it.

D) To provide inter-disciplinary collaboration for better understanding of human problems, services and issues related to human development.

4. To link theory with practice in every sphere of human service endeavors.

4. To develop requisite knowledge, skills and values in working with people.

5. To promote among learners a sense of responsibility and commitment to work with different sections of people and especially of the vulnerable sections of the society

6. To promote opportunities and to create awareness for personal growth.

7. To acquire knowledge and skills in undertaking practice-based research and to administer human service organizations.

8. To develop Professional Social Workers towards socio- economic and culturally responsible .

2.1 SOCIAL WORK PRACTICUM

The practicum with different learning opportunities is designed to provide scope to develop and enhance professiona1 practice skills. Learning is aided through observation, analysis of social realities and experience of participation in designing and providing social work intervention.

The tasks are organized to help the learner acquire beginning skills, practice those already acquired, and master them from simple to complex. The learner is gradually encouraged to become an independent worker during the course of study.

Objectives

The objectives are met by providing a variety of experiences to learners to:

1. i . Develop the ability to observe and analyze social realities.
   ii. Understand the characteristics of social systems and their dynamics.
   iii. Appreciate society's response to people's needs, problems and social issues.
   iv. Develop critical understanding of the application of legislation, legal process, and social policy.
2. i. Develop the ability to examine the process of programme management and participate in the effort at various levels.
   ii. Develop the ability to recognize the need for newer programs, initiate and participate in them.
   iii. Use Human Rights tools, understanding of gender justice, and need for equity in all intervention.
   iv. Develop an understanding of organizational structure, resource management, and day-to-day administration for human service programmes - developmental and welfare programmes
   v. Develop the capacity to integrate knowledge and practice – theory by participating in intervention.
3. i. Clarify and imbibe values which sustain positive attitude and professional ethics.
   ii. Develop the capacity for self-direction, growth and change through self awareness.
4. i. Enhance writing skills to document practice appropriately. Recordings to be viewed as an expression of interest, motivation and involvement in practice and as evidence of enrichment in the process of professional growth.

To meet these outcomes, several opportunities with specific objectives are designed. The different sets of opportunities with details of content and related tasks are listed separately.

3.Eligibility for Admission

Candidates who have passed BSW/ BA/ B.Sc. / B.Com. / BBA/BBM/ B.C.A / LLB of the University of Mysore or any other university recognized as equivalent there to, are eligible for admission to MSW course. Candidates will be selected for admission as per the general guidelines issued from the University of Mysore from time to time. The Department/University shall conduct entrance examination for admission to the course.

A minimum of 45% aggregate marks for GM and 40% aggregate marks for SC/ST in the qualifying examination is needed to appear for the entrance examination and as well as eligibility for the course.

The examination is of two hour duration and the question paper comprises of 100 objective type questions - 20% questions from general knowledge, 60% from science & social sciences, and another 20% questions will be from present social issues. Merit will be assessed on the basis of performance in the entrance examination and performance in the undergraduate examination on equal weightage.

Note: Four seats shall be allotted to Graduates in Social Work of the University of Mysore and one seat shall be allotted to Graduates in Social Work of other University. The unfilled seats, if any, shall be shifted to the general category.

4 Scheme of Instructions:

4.1 Name of the Course:

The course shall be called ' Master of Social Work' (MSW).

4.2 Duration of the Course:

The Course of study **for MSW Degree** shall extend over a period of four semesters spreading over two academic years. A candidate can avail maximum of 8 semester – 4 years (in one stretch) to complete master Degree (including blank semesters, if any).Whenever a candidate opts for blank semesters, he/she has to study the prevailing courses offered by the department when he/she continues his/her studies.

4.3 Period of the Programme:

Semester I and III From July to December

Semester II and IV from January to June

4.4 Credits(Minimum) Matrix:

A candidate has to earn a minimum of 76 credits, for successful completion of a Master Degree. The 76 credits shall be earned by the candidate by studying Hardcore, Soft core and Open Elective.

A candidate admitted to Masters of Social Work programme can exercise an option to exit with Bachelor Honors Degree/ PG diploma after earning 40 credits successfully.

4.5 Degree Awarding:

On successful completion of Two year programme, the students will be awarded the Master of Social Work Degree by the University of Mysore.

4.6 Attendance and Conduct:

Master of Social Work is a full time programme and students SHALL NOT take up any employment/course, part time or full time during their study. Students found violating this rule shall be removed from the course. Minimum attendance of 75% of actual working hours in all the courses is required. A student who does not satisfy the requirements of attendance and conduct shall not be permitted to write examination.

4.7 Medium of Instruction:

The medium of instruction shall be English. However a candidate will be permitted to write the examination either in English or in Kannada.

5. <u>CHOICE BASED CREDIT SYSTEM (CBCS):</u>

5.1Course- The course is governed by the regulations of Choice Based Credit System.

5.2 Every Course offered will have three components associated with teaching-learning process of the course, namely (i) Lecture - L (ii) Tutorial – T (iii) Practical – P , where

L Stands for lecture session,

T stands tutorial session consisting participatory discussion / self-study/ desk work/ brief seminar presentations by students and such other novel method make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands Practical session and it consists of hands on experience / Laboratory Experiments/ Field Studies/ Case studies that equip students to acquire the much required skill component.

In terms of Credits, every one hour session of L amounts to 1 credit per semester and a minimum of two hour session of T or P amounts to 1 credit per semester, over a period of one semester of 16 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components.

The total credits earned by a student at the end of the semester upon successfully completing the course are L+T+P. the credit pattern of the course is indicates as L:T:P.

If a course is of 4 credits then the different credit distribution patterns in L: T: P: format could be

4 : 0 : 0,	1 : 2 : 1,	1 : 1 : 2,	1 : 0 : 3,	1 : 3 : 0,
2 : 1 : 1,	2 : 2 : 0,	2 : 0 : 2,	3 : 1 : 0,	3 : 0 : 1,
0 : 2 : 2,	0 : 4 : 0,	0 : 0 : 4,	0 : 1 : 3,	0 : 3 : 1,

The concerned BoS will choose the convenient credit pattern for every course based on the requirement.

5.3 Different courses of study are labeled and defined as follows.

Hard Core a course which should compulsorily be studied by a candidate as a core requirement

Soft Core is a course where there is a choice or an option for the candidate to choose a course from a pool of courses from the main discipline/ subject of study.

Open Elective an elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure.

6.0 SCHEME OF EXAMINATION

The evaluation of the candidate shall be based on **continuous assessment**. The structure for evaluation is as follows:

6.1 Assessment and evaluation processes happen in a continuous mode. However for reporting purposes, a semester is divided into 3 discrete components identified as C1, C2 and C3.

6.2 The performance of the candidate in a course will be assessed for a maximum of 100 marks as explained as below:

6.3 The first component (C1), of assessment is for 15 marks. This will be based on test/assignment/ group study/field work/case analysis/seminar. During the first half of the semester, the first 50% of the syllabus will be completed. This shall be consolidated during the 8^{th} week of the semester. Beyond 8^{th} week, making changes in C1 is not permitted.

6.4 The second component (C2) of assessment is for 15 marks. This will be based on test/assignment/ group study/field work/case analysis/seminar. The continuous assessment and scores of second half of the semester will be consolidated during the 16^{th} week of the semester. During the second half of the semester the remaining units in the course will be completed.

6.5 The outline for continuous assessment activities for Component-I (C1) and Component-II (C2) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective Departmental Council. The students should be informed about the modalities well in advance. The evaluated courses/assignments during component I (C1) and component II (C2) of assessment are immediately returned to the candidates after obtaining acknowledgement in the register maintained by the concern teacher for this purpose.

6.6 At the end of the semester final examination of 3 hours shall be conducted for each course. This forms the third/ final component of assessment (C3) and the maximum marks for the final component will be 70. Question paper setting and evaluation of answer scripts will follow General regulations of the College. Pattern of question paper is given in Appendix I.

6.7 Assessment of Social Work Practicum

A viva - voce examination shall be conducted for each candidate in all semesters. The performance of the candidate shall only be assessed by a committee consisting of one faculty member of the Department of Social Work of Pooja Bhagavat Memorial Mahajana Education Centre and an external examiner. The number of such committees depends on the number of candidates. In case of non-availability of a qualified teacher, the two-member committee constituted for viva-voce examination will stand.

6.8 Minor/Major Project Evaluation

Students are given broader guidelines for undertaking empirical evidence-based project in the fourth semester, either independently or by forming a small team comprising of three to four students which carries 4 credits. Evaluation of the Project will be done along with the viva-voce examination by the viva-voce committee constituted for the assessment of social work practicum or similar committee may be constituted, if required.

6.9 In case of a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED the course, and such a candidate is not allowed to appear for C3 in that course.

In case a candidate's class attendance in a course is less than 75% , the candidate is said to have DROPPED that course, and such a candidate is now allowed to appear for C3 in that course.

In case a candidate secures less than 30% in C3, he/she may choose DROP/Make-Up option.

The candidate has to exercise his/her option immediately within 10 days from the date of notification of results.

A MAKE UP examination for C3 shall be conducted in all the semesters. Candidates can register for the MAKE UP examination within 10 days from the date of notification of results.

The MAKE UP examination will be conducted within one month of the notification of the results.

If a candidate is still unsuccessful, A MAKE UP Examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with next regular even semester examinations; however, not exceeding double the duration norm in one stretch from the date of joining the course.

A candidate has to re-register for the DROPPED course when the course is offered again by the department if it is a hard core course. The candidate may choose the same or an alternative core/elective in case the dropped course is soft core/elective course. A candidate who is said to have DROPPED project work has to re-register for the same subsequently within the stipulated period. **The details of any dropped course will not appear in the grade card.**

6.10 If a candidate is not satisfied with the evaluation of C1 and C2 components, he/she can approach the grievance cell with the written submission together with all facts, the assignments, test papers etc., which were evaluated. He/She can do so before the commencement of semester end-examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty on the candidate is his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/ corrective action on an evaluator if he/she is found guilty. The decision taken by the grievance cell is final.

6.11 Challenge Valuation

A student who desires to apply for challenge evaluation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Controller of Examinations within 15 days after the announcement of the results. This challenge evaluation is only for C3 component.

The answer scripts, for which challenge evaluation is sought for, shall be sent to external examiner. The marks awarded in the challenge evaluation will be final.

6.12 The grade and the grade point earned by the candidate in the subject will be as given below.

Marks	**Grade (G)**	**Grade point GP=V x G**
30-39	4	V*4
40-49	5	V*5
50-59	6	V*6
60-64	6.5	V*6.5
65-69	7	V*7
70-74	7.5	V*7.5
75-79	8	V*8
80-84	8.5	V*8.5
85-89	9	V*9
90-94	9.5	V*9.5
95-100	10	V*10

V is the credit value of the course: G is the Grade: GP is the Grade point.

6.13 Overall cumulative grade point average (CGPA) of a candidate after successful completion the required number of credits (80) is given by

CGPA = sum of GP / Total number of credits

6.14 Classification of Results

The final grade point to be awarded to the student is based on CGPA secured by the candidate and is given as follows,

CGPA	Numerical Index	Qualitative Index
4<= CGPA <5	5	Second Class
5<= CGPA <6	6	
6<= CGPA <7	7	First Class
7<= CGPA <8	8	
8<= CGPA <9	9	Distinction
9<= CGPA <10	10	

Overall percentage = 10*CGPA or is said to be 50% in case CGPA <5

MASTER OF SOCIAL WORK

DISTRIBUTION OF COURSE CONTENT AND CREDITS

Honor's level

Papers offered

MSW-I Semester

Core papers for odd Semesters - Honor's level

Sl No.	Code No.	Paper title	L	T	P	Credits
1	SWHC-1	Social Work – History and Ideologies	2	1	0	3
2	SWHC-2	Society and Dynamics of Human Behavior	2	1	0	3
3	SWHC-3	Work with Individuals and Families	2	1	0	3
4	SWHC-4	Work with Groups	2	1	0	3
5	SWHC-5	Work with Communities	2	1	0	3
6	SWHC-6	Social Work Practicum – I	0	0	3	3
		Total Credits				**18**

MSW-II Semester

Core papers for even semesters - Honor's level

Sl No	Code No.	Paper title	L	T	P	Credits
1	SWHC-7	Management of Developmental and Welfare Services	2	1	0	3
2	SWHC-8	Social Work Research and Statistics	2	1	0	3
3	SWHC-9	Social Work Practicum – II (Social Work Camp and Summer Placement)	0	0	3	3
4	SWHC-10	Social Work Practicum - III	0	0	3	3
5	**SWSC-1**	Communication and Counseling / or Gandhian Approach to Welfare and Development	2	1	0	3
6	**SWSC-2**	Personal and Professional Growth / or Population and Environment	2	1	0	3
		Total				**18**

7	**SW0E -1**	Social Work Practice with Children / or Science of Crime, Penology and Social Work Practice	3	1	0	**4**

MSW-III Semester
(Odd semester) Masters level

Sl No.	Code No.	Paper title	L	T	P	Credits
1	SWHC - 11	Human Resource Management	2	1	0	3
2	SWHC –12	Social Work Practicum - IV	0	0	3	3
3	**SWSC - 3**	Social Work with Tribal and Rural Communities/ or Organisational Behavior and Organisational Development	2	1	0	3
4	**SWSC – 4**	Preventive and Social Medicine and Medical Social Work/ or Rehabilitation and Aftercare Services	2	1	0	**3**
5	**SWSC - 5**	Social Policy, Planning and Development / or Legal System in India	2	0	0	**2**
		Total Credits				**14**

6	**SWOE-2**	Gerentological Social Work /or Management of Non-Governmental Organizations	3	1	0	**4**

MSW-IV Semester
Master's level - even Semester

Sl No	Code No.	Paper title	L	T	P	Credits
1	SWHC – 13	Employee Relations and Legislation	2	1	0	3
2	SWHC – 14	Mental Health and Psychiatric Social Work	2	1	0	3
3	SWHC – 15	Major Project	0	0	4	4
4	SWHC – 16	Social Work Practicum – V	0	0	3	3
5	SWHC – 17	Social Work Practicum – VI (Block Placement)	0	0	3	3
6	**SWSC - 6**	Human Resource Development and Employee Wellness /or Case studies	2 0	0 0	0 2	2 or 2
		Total Credits				**18**

7	**SWOE-3**	Disaster Management / or Correctional Administration and Services	3	1	0	**4**

MASTER OF SOCIAL WORK
DISTRIBUTION OF PAPER CODE AND CREDITS
Honor's level
Paper Codes and Credits
Core papers for odd semesters I semester MSW

Paper Code	Paper	L	T	P	Credits
SWHC-1	HC	2	1	0	3
SWHC-2	HC	2	1	0	3
SWHC-3	HC	2	1	0	3
SWHC-4	HC	2	1	0	3
SWHC-5	HC	2	1	0	3
SWHC-6	HC	0	0	3	3
Total					**18**

Core papers for even semesters II semester MSW

Paper Code	Paper	L	T	P	Credits
SWHC-7	HC	2	1	0	3
SWHC-8	HC	2	1	0	3
SWHC-9	HC	0	0	3	3
SWHC-10	HC	0	0	3	3
SWSC-1	SC	2	1	0	3
SWSC-2	SC	2	1	0	3
Total					**18**

SWOE-1	SWOE	3	1	0	4

Master's level

Core papers for odd semesters. III semester MSW

1 Paper Code	Paper	L	T	P	Credits
SWHC - 11	HC	2	1	0	3
SWHC – 12	HC	0	0	3	3
SWSC - 3	SC	2	1	0	3
SWSC – 4	SC	2	1	0	3
SWSC - 5	SC	2	0	0	2
Total					**14**

SWOE-2	SWOE	3	1	0	4

Master's level - even semester

Paper code	Paper	L	T	P	Credits
SWHC – 13	HC	2	1	0	3
SWHC – 14	HC	2	1	0	3
SWHC – 15	HC	0	0	4	4
SWHC – 16	HC	0	0	3	**3**
SWHC – 17	HC	0	0	3	**3**
SWSC - 6	SC	2 0	0 0	0 2	**2** **Or** **2**
Total					**18**

SWOE-3	SWOE	3	1	0	4

HC= Hard Core Paper, SC= Soft Core Paper, OE= Open Elective, SWP= Social Work Practicum, BP=Block Placement,

SP=Summer Placement, CS= Case Studies, RP= Research Project.

SYLLABI

Honor's level odd semester (I Semester)

Odd semester

Paper Title: SOCIAL WORK - HISTORY AND IDEOLOGIES

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

This course aims at introducing the learners to a critical inquiry into the history and ideologies of social change and professional social work.

OBJECTIVES

a. Understand the history of evolution of social work profession, both in India and the West.

b. Develop insights into the origin and development of ideologies, approaches to social change.

c. Understand rationale, goals, ideals and ethics for social change.

d. Understand the perceptions of people and social problems, the status of benefactors and their motives.

e. Develop skills to understand contemporary reality in its historical context.

f. Understand self as a part of own environment and explore own assumptions, ideals, values to develop sensitivity to marginalization of vulnerable groups.

Course Content:

UNIT I

Introduction to Social Work: Social Work Definitions and meaning of Social Work; Basic assumptions of social work, Scope/Fields of Social Work; Social Work and other concepts: social service, social welfare, social development, social reform, social security - Interrelation between social work and other disciplines; - History of social work education in Western countries and India.

Professionalization of social work values, education, knowledge and professional associations - Goals, values, functions/roles and process of social work - Interface between professional and voluntary social work, social work ethics.

UNIT II

Indian History of Ideologies for Social Change -Ancient period: Vedic, Vedantic and non-Vedic Ideologies, Spirituality - Medieval period: Zoroastrianism and Islam in India - Mysticism of Bhakti and Sufi movements and Sikhism.

Modern period: Christianity in India - Hindu reform movements - Dalit movements - Gandhian ideology and Sarvodaya movement – Nationalism - Ideology of the Indian Constitution - Ideology of voluntary organisations and voluntary action. Relevance of

Ideologies for contemporary Social Work practice.

UNIT III

Contemporary Ideologies for Social Change: Neoliberalism and Globalisation - Post modernism - Multiculturalism - Ideology of action groups and social movements -Ideology of non-governmental organisations. Role of state in providing social welfare services.

UNIT IV

Organized and scientific charity - Clinical social work - Ecological social work - Attributes of a profession.

Western History of Ideologies for Social Change: Western History of Social Work Profession - Medieval period: Judeo-Christian ideologies- Secular humanism and Protestantism - Modern period: Rationalism and Welfarism - Liberalism and democracy - Utilitarianism and Social Darwinism - Socialism and human rights.

Emerging ideologies of professional social work. Relevance of Ideologies for Contemporary Social Work practice

Challenges for social workers in contemporary world.

REFERENCES

1. Agarwal, M. M. 1998 — Ethics and Spirituality, Shimla: Indian Institute of Advanced Study
2. Alastair, Christie (Ed.) 2001 — Men and Social Work: Theories and Practices, New York, Palgrave.
3. Banerjee, G. R. 1973 — Papers on Social Work: An Indian Perspective, Bombay, Tata Institute of Social Sciences.
4. Banks, S. 1995 — Ethics and Values in Social Work: Practical Social Work Series, London: Macmillan Press Ltd.
5. Borgatta, E. F. (Ed.) 1992 — Encyclopedia of Sociology, New York: Macmillan.
6. Brieland, Donald; Costin Lela B.; Atherton, Charles R. and Contributors 1975 — Contemporary Social Work - An Introduction to Social Work and Social Welfare, New York, McGraw-Hill Book Company.
7. Butrym, Zofia T. 1976 — The Nature of Social Work, London, Macmi1lan Press Ltd.
8. Chatterjee, P. 1996 — Approaches to the Welfare State, Washington,

D.C.: National Association of Social Workers.

9. Congress, E. P. 1998 — Social Work Values and Ethics, Chicago: Nelson- Hall Publishers.

10. Desai, Armaity S. 1994 — A Study of Social Work Education in India, Bombay, Tata Institute of Social Sciences, Vol. I and II

11. Desai, M. 2000 — Curriculum Development on History of Ideologies for Social Change and Social Work, Mumbai: Social Work Education and Practice Cell.

12. Diwakar, V. D. (Ed.) 1991 — Social Reform Movements in India: A Historical Perspective, Bombay: Popular Prakashan.

13. Encyclopedia of Social... — Encyclopedia of Social Work, Silver Spring, Maryland: National Association of Social Workers.

14. Encyclopedia of Social... 1987 — Encyclopedia of Social Work in India, New Delhi: Ministry of Welfare.

15. Feibleman,J. K. 1986 — Understanding Philosophy: A Popular History of Ideas, New York: Souvenir Press.

16. Fink, A. E. 1945 — The Field of Social Work, New York, Henry Holt and Co.

17. Friedlander, Walter A and. Apte, Robert Z. 1982 — Introduction to Social Welfare, NewDelhi, Prentice–Hall

18. Ganguli, B. N. 1973 — Gandhi's Social Philosophy, Delhi: Vikas Publishing House.

19. Gore, M. S. 1993 — The Social Context of Ideology: Ambedkar's Social and Political Thought, New Delhi: Sage.

20. Gore, M. S. 1965 — Social Work and Social Work Education, Bombay, Asia Publishing House.

21. Jacob, K. K. (Ed.) 1994 — Social Work Education in India – Retrospect and Prospect Udaipur, Himansu Publications.

22. Joseph, Sherry (Ed.) 2000 — Social Work: In the Third Millennium (Some Concerns and Challenges), Sriniketan, Department

of Social Work, Visva-Bharati.

23. Kappen,S.1994 — Tradition Modernity Counterculture: An Asian Perspective, Bangalore: Visthar

24. Kothari, S. and Sethi, H. (Eds) 1991 — Rethinking Human Rights, New Delhi: Lokayan.

25. Moorthy, M. V. 1974 — Social Work - Philosophy, Methods and Fields, Dharwar, Karnatak University.

26. Noel and Timms, Rita 1977 — Perspectives in Social Work, London, Routledge and Kegan Paul.

27. Nigel Parton and Patrick, O'Byrne 2000 — Constructive Social Work - Towards a New Practie, New York, Palgrave

28. Panikkar, K. N. 1995 — Culture, Ideology Hegemony: Intellectual and Social Consciousness in Colonial India, New Delhi: Tulika.

29. Skidmore, Rex A. and Thackeray, Milton G. 1982 — Introduction to Social Work, New Jersey, Prentice-Hall, Englewood Cliffs

30. Stroup, H. H. 1960 — Social Work - An Introduction to the Field, New Delhi, Eurasia Publishing House.

31. Tata Institute of Social Sciences Social Work Educators Forum (TISSSWEF) 1997 — Declaration of Ethics for Professional Social Workers, The Indian Journal of Social Work, 58(2), 335-341

32. The Cultural Heritage... — The Cultural Heritage of India (Vols. 1-6), Calcutta: The Ramakrishna Mission.

33. United Nations 1992: — Human Rights: Teaching and Learning About Human Rights. UN: New York.

34. University Grants Commission1980, 1990 — Review of Social Work Education in India: Retrospect and Prospect, New Delhi: UGC. Curriculum Development Centre's Report: New Delhi, University Grants Commission.

35. Wadia, A.R. 1968 — History and Philosophy of Social Work in India, Bombay, Allied Publishers.

36. Woodrofe, K. 1962 — From Charity to Social Work, London: Routledge, and Kega Paul.

37. Yelaja, S. A. 1982 — Ethical Issues in Social Work, Springfield, Charles, C. Thomas.

38. Young, Pat 1985 — Mastering Social Welfare, Macmillan Master Series, London, Macmillan Education Ltd.

39. Younghusband, E. 1967 — Social Work and Social Values, Vol. III, London, George Allen and Unwin.

Journals/ Magazines.

Economic and Political Weekly, The Indian Journal of Social Work, Lokayan Bulletin and Vikalp.

Odd Semester

Paper Title: SOCIETY AND DYNAMICS OF HUMAN BEHAVIOUR

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

This course provides the learners basic understanding of relevant concepts from social sciences, the social phenomena and development process. Besides, helping/enabling the learner develop skills for social analysis, it aims to introduce the learners to the development of individual across the life span, with a system and an ecological perspective. It also provides an understanding of human development and behavior in contextual influences, including individuals in disadvantaged or special contexts. The theoretical inputs are to enhance the understanding of people's growth, health, and development at various stages as bio-psycho-socio-spiritual being over the life span.

OBJECTIVES

a. Understand the concepts to examine social phenomena.

b. Develop skills to analyse Indian society and change.

c. Understand the concepts **change and conflict**.

d. Understand interactional nature of growth and behavior at various stages in the life span and impact of cultural aspects on the individual.

e. Apply the information of growth, development and health in social work practice in general and to individuals, groups and communities in particular.

Course Content

UNIT I

Society and Culture: Social Structure – meaning, status and roles; Culture: meaning and contents - traditions, customs, values, norms, folklore and mores.

Socialization: Meaning, process of socialization – The development of self – Agencies of socialization.

Indian Society: Composition of Indian Society: The concept of unity amidst diversity-

Social stratification in India: Meaning, caste, class divisions, Gender;

Types of social institutions: Marriage, Family, Religion, State and Law-Meaning and Functions; Social Control exercised through the social institutions;

Social Change: Meaning, characteristics and factors inducing change with reference to India.

UNIT II

Social Groups, and Social Control – Primary and Secondary Groups, in-groups and out-groups. Social control through social groups and social institutions. Social Process.

Development – social ideals of Indian Constitution. Fundamental Rights.

Social Analysis: Significance of social analysis: A brief analysis of socioeconomic, political and cultural systems – Inter-linkages in the Indian context.

Theories of Economic Development, Globalization and its impact on Developing Countries: Stages of growth theory – Structural internationalist theory.

Privatization, liberalization and structural adjustment programmes – Role of international financial institutions.

UNIT III

Life Span: Beginning of life – Human reproductive system, Fertilization and Foetal development – Delivery, Pre-natal and post-natal care and their importance in development.

Development stages: Infancy, babyhood, childhood, puberty, adolescence, adulthood and aging:

Growth, characteristics, developmental goals, psycho-social adjustment and other adjustments, hazards, lifestyle effects – as relevant to each of these stages;

Principles of growth and development: methods of studying human behaviour, role of heredity and environment, social customs, traditions, values in parenting and child rearing practices; deprivation and development during stages of life span; Indian concept of life span stages.

UNIT IV

Basic human needs: Maslow's hierarchy of needs, physical, psychological and intellectual needs; Stress – Coping and social support.

Motivation, frustration and conflicts – Emotions and emotional behaviour. Personality: Definition, nature, types and assessment of personality.

Intelligence: Concept, levels of intelligence, influence of heredity and environment, assessment of intelligence.

Relevance of psychology to social work practice across the stages of development period specific needs, tasks and challenges.

REFERENCES

UNIT I AND II

1. Acuff, F. Gene; Allen, Donald E. and Taylor Lloyd, A. 1973 — From Man to Society, Hinsdale, Illinois, The Dryden Press.

2. Agrawal, A. N. and Lal Kundan 1989 — Economics and Development and Planning, Delhi, New Vikas Publishing House Private Limited

3. Bert N. Adams. 1975 — A Sociological Interpretation, Chicago: Rang McNally College.

4. Bhushan, Vidya and Sachdev, D.R. 1999 — An Introduction to Sociology, Allhabad, Kitab Mahal

5. Broom, Leonard, Charles M. Bonjean, Dorothy, H. Broom. 1990 — Sociology, Wadsworth Publication Co. Belmount.

6. Descrochers, John. 1977 — Methods of Social Analysis, Bangalore: Centre for Social Action.

7. Ely Chinoy. 1967 — Society - An Introduction to Sociology, New York: Random House.

8. Haralambos, Michael. 1980 — Sociology, Delhi: Oxford University Press.

9. Kapadia, K. M. 1966 — Marriage and Family in India, London: Oxford University Press.

10. Kingsley, David. 1969 — Human Society, New York.

11. Kolenda, Pauline. 1987 — Regional differences in Family Structure in India, Jaipur: Rawat Publication.

12. Maudelbaum, David M. 1970 — Society in India, Vol. I and II, University of California Press.

13. Nagardra, S. P. 1994 — Development and Change, New Delhi: Concert Publishing Company.

14. Nana Poku Lloyd — Rebuilds up the Third World, London:

Pettiford (Ed.) 1998 Macmillan Press Limited.

15. Narang, B. S., and Dhawan , R. C. 1983 Introduction to Social Sciences, Delhi: C.B.S. Publication.

16. Panday Rajendra. 1986 The Caste System in India-Myth and Reality, New Delhi: Criterion Publication.

17. Rao, D. Bhaskar, 1998 World Summit for Social Development, New Delhi: Discovery Publications.

18. Rao, V. Lakshmana 1994 Essays on Indian Economy, New Delhi: Ashish Publishing House.

19. Reddy, D. V. 1994 Development and New International Economic Order, New Delhi: Deep and eep Publications.

20. Rugman, Alan 2000 The End of Globalization, London: Random House.

21. Sharma, S. L. (Ed.) 1986 Development: Socio-Cultural Dimensions, Jaipur: Rawat Publications.

22. Sharma, K. L. (Ed.) 1999 Caste and Race in India, Mumbai: Popular Prakashan.

23. Sharma, R. K. 1997 Indian Society - Institution and Change, New Delhi: Atlantic Publishers.

24. Singh, K. S. 1985 Tribal Society in India, New Delhi: Manohar Publishing House.

25. Srinivas, M. N. 1996 Village, Caste, Gender and Method (Essay in Indian Social Anthropology), Delhi: Oxford University Press.

26. Steveus Smart M., Laura S. Smart. 1976 Families Developing Relationships, New York: Macmillan Publishing Co.

27. Tandon, B. B., and Tandon, K. K. 1997. Indian Economy, New Delhi: Tata McGraw-Hill Publishing Company Limited

28. Verghese, K 1992 General Sociology, Delhi: Macmillan Co,

UNIT III AND IV

29. Anastasi, Anne 1988 Psychological Testing, New York, Macmillan Publishing Company.

30. Baltes, P. B. (Ed.) (1978) Life span Development and Behaviour. New York: Academic Press, Inc.

31. Chowdary, D. P. 1992 Aging and the Aged, New Delhi: Inter-India Publications.

32. Feldman Robert S 1997 Understanding Psychology, 4th Edition, Tata McGraw Hill Publishing Company Limited, New Delhi

33. Gore, M. S. 1978 Changes in the Family and the Process of Socialisation In India, In Anthony, E. J. & Colette, C. (Eds.). The Child in his Family, Wiley, 365-374.

34. Gore, M. S. 1992 Aging and the Future of the Human Being, The Indian Journal of Social Work, 53 (2), 210-219.

35. Hurlock, Elizabeth B. 1978 Child Growth and Development, New Delhi, Tata McGraw-Hill Publishing Company Ltd.

36. Hurlock, Elizabeth B. 1975 Developmental Psychology, New Delhi, Tata McGraw-Hill Publishing Company Ltd.

37. Kail, R. V. and Cavanangh, J. C. 1996 Human Development, Pacific Grove, CA: Brooks/ Core Publishing Company.

38. Kakar, S. 1979 Indian Childhood, Cultural Ideals and Social Reality, Delhi: Oxford University Press.

39. Kakar, S. 1982 Identity and Adulthood, Delhi: Oxford University Press.

40. Kakar, S. 1970 Conflict and Choice - Indian Youth in a Changing Society, Bombay: Somaiya Publications.

41. Kakar, S. 1978 Images of the Life Cycle and Adulthood in India, In Anthony, E. J. and Colette, C.

(Eds.) The Child in his Family, Wiley. 319-332.

42. Kaplan, P. S. 1988 — The Human Odyssey: Life-Span Development, St.Paul, West Publishing Company.

43. Le francois, G. R. 1990 — The Life Span, Third Edition, University of Alberta.

44. Magmesson, D. and Allen, V. C 1983 — Human Development: An International Perspectives, New York: ,Academic Press. Chapters 1,5,6,11,14,16,19,21.

45. Pai V B, 2000 — Coping with Retirement, UNESCO CLUB Publication, Naganur, Karnataka

46. Rapoport, Rhona and Rapoport, Robert 1980 — Growing through Life, Lifecycle Book, New York: Harper & Row Publishers.

Journals/ Magazines

Sociological Bulletin (Journal of the Indian Sociological Society). Contribution to Indian Sociology.

Social Change, Issues and Perspectives (Journal of the Council for Social Development).

Economic and Political Weekly, EPW Research Foundations, Mumbai.

Odd Semester

Paper Title: WORK WITH INDIVIDUALS AND FAMILIES

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

This course aims to develop simple to complex skills of working with individuals and families in various situations like crisis, preventive, facilitative and developmental.

OBJECTIVES

a. Understand casework as a method of social work, and appreciate its place in social work practice.

b. Understand the values and principles of working with individuals and families.

c. Develop the ability to critically analyze problems of individuals and families and factors affecting them.

d. Enhance understanding of the basic concepts, tools and techniques in working with individuals and families, in problem-solving and in developmental work.

e. Develop appropriate skills and attitudes to work with individuals and families.

Course Content

UNIT I

Social case work: Definitions, scope, historical development - Influence of psychoanalysis on casework - Introduction of casework as a method of social work - Concepts of adjustment and maladjustment - Philosophical assumptions and casework values.

Principles of casework: Individualization, acceptance, non-judgmental attitude, participation, relationship, effective communication of feeling, client self-determination, and confidentiality.

Components of social casework: The person, the problem, the place and the process. Process in casework: Study, assessment, intervention, evaluation, follow-up, and termination.

UNIT II

Types of problems faced by Individuals and families; individual differences and needs - Family assessment in casework practice.

Theories and approaches: Psycho-social approach, Functional approach, Problem-solving approach, Crisis Theory, Family intervention, Behavioural modification, Transactional analysis, Client Centered Approach and Holistic approach.

UNIT III

Tools for Help: Case work tools: Interview, home visit, observation, listening,

communication skills, rapport building.

Records: Nature, purpose and principles of recording.

Techniques of casework: Supportive, resource enhancement and counseling.

Self as a professional: Professional self - Conflicts and dilemmas in working with individuals and families.

UNIT IV

Application of Method: Primary and secondary settings - Application of methods in family, women, and child welfare settings, marriage counselling centres, schools settings, medical and psychiatric settings, correctional institutions and industry.

REFERENCES

1. Banerjee, G. R. 1967 — "Concept of Being and Becoming in the Practice of Social Work", Indian Journal of Social Work, Mumbai: Tata Institute of Social Sciences.

2. Banerjee, G. R. 1971 — "Some Thoughts on Professional Self in Social Work", Indian Journal of Social Work, Mumbai:Tata Institute of Social Sciences.

3. Banerjee, G. R. 1973 — Papers on Social Work - An Indian Perspective, Bombay, Tata Institute of Social Sciences.

4. Barba, J. G. 1991 — Beyond Casework; London: Macmillan.

5. Bergh, M. V. 1995 — Feminist Practice in the 21st Century, Washington: National Association of Social Workers.

6. Biestek, F. P. 1957 — The Case Work Relationship, London, George Allen and Unwin.

7. Hamilton, G. 1946 — Principles of Social Case Recording, New York, Columbia University Press.

8. Hamilton, G. 1950 — Theory and Practice in Social Case Work, New York, Columbia University Press

9. Hartman, A. and Laird, J. 1983 — Family Centered Social Work Practice, New York: The Free Press.

10. Hollis, Florence. 1964 — Case Work - A Psychological Therapy, New York: Random House.

11. Joel Fisher. 1978 — Effective Case Work Practice - An Eclectic Approach, New York: McGraw Hill.

12. Mathew, Grace 1992 — An Introduction to Social Case Work, Bombay, Tata Institute of Social Sciences.

13. Nursten, Jean. 1974 — Process of Case Work, G.B: Pitman Publications.

14. Perlman, H. H. 1957 — Social Case Work: A Problem Solving Process, Chicago. The University of Chicago Press.

15. Pippins, J. A. 1980 — Developing Case Work Skills, California: Sage Publications.

16. Richmond, M. E. 1922 — What is Social Case Work? An Introductory Description, New York: Sage Foundation.

17. Richmond, M. E. 1917 — Social Diagnosis, New York, Free Press.

18. Sainsbury,Eric, 1970 — Social Diagnosis in Case Work, London: Routledge and Kegan Paul.

19. Sena F. Fine and Paul H. Glass. 1996 — The First Helping Interview Engaging the Client and building Trust, Sage Publication.

20. Timms, N. 1964 — Social Case Work : Principles and Practice, London Routledge and Kegan Paul.

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Odd Semester

Paper Title: Work with Groups

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION:

This course aims at developing the understanding of Group Work as a method, developing skills for intervention, and gaining knowledge of the scope of this method in various settings.

OBJECTIVES :

a. To develop awareness about the specific characteristics of Group Work and its contributions as a method of social work intervention,

b. To gain knowledge about group formation and the use of a variety of group approaches.

c. To develop understanding of concepts, dynamics and small group theory in relation to all types of groups, e.g. family, staff, committee, long - term client groups.

d. To identify the various situations and settings where the method could be used in the context of social realities of the country.

UNIT I

Introduction and history of Group Work: Understanding of groups - Characteristics and significance of group - Definition of Social Group Work - Characteristics of Social Group Work - Purpose of Social Group Work; Historical evolution of group work with special emphasis on the Indian Context.

Type of Groups: Types and approaches based on objectives and purpose – Type of Membership – Time -Duration

Values and Principles in group work and Characteristics of Group formation: Values in social group work- Principles in group work - Assumptions underlying social group work - Factors of group formation - Formulation of goals - Identification of problems for work.

UNIT II

Group Processes and Group Dynamics: Importance of group processes - Typical patterns - Processes in different type of groups - Worker's skills in identifying and understanding processes.

Pre-group and Initial Phase: Planning model - Characteristics of pre group phase - Group structures Facilitation skills and role of worker in pre-group and initial phase.

Bond, sub-groups, role. Leadership - Isolation - Decision making - Conflict –

Communication -Relationships.

UNIT III

- Middle Phase and Use of Program: Characteristics of middle phase - Group structures - Group dynamics - Facilitation skills - Role of group workers - - Comparison across phases - Concept and principles - Program planning - Skills in program planning- Models and Approaches of group work

Facilitation: Knowledge of skills and techniques for effective work with groups/problem solving.

UNIT IV

Recordings in Group work: Importance of recording in social group work - Principles of recording - Recording structure -Types of recording.

Evaluation in Groups and Termination Phase : Importance of evaluation - Types of evaluation - Methods of evaluation - Need for termination - Types of termination - Characteristics of termination phase - Worker's skills.

Application of Group Work: Application in health settings, school settings, family welfare settings, industrial settings, women and child welfare settings.

REFERENCE :

1. Alissi, A. S. 1980	Perspectives on Social Group Work Practice: A Book of Readings, New York: The Free Press.
2. Balgopal, P.R. and Vassil, T.V. 1983	Groups in Social Work – An Ecological Perspective, New York : Macmillan Publishing Co.Inc.
3. Brandler S. and Roman, C. P. 1999	Group Work: Skills and Strategies for Effective Interventions, New York: The Haworth Press.
4. Davies, Bernard 1975	The Use of Groups in Social Work Practice, London, Routledge and Kegan Paul.
5. Garland, J. A. (Ed.) 1992	Group Work Reaching Out: People, Places and Power, New York: The Haworth Press.
6. Garwin, C. 1987	Contemporary Group Work, New York: Prentice-Hall Inc.
7. Kemp, C. G. 1970	Perspectives on the Group Process, Boston:

Houghton Miffiin C.

8. Klein, A. F. 1970 — Social Work through Group Process: School of Social Welfare, Albany: State University of New York.

9. Konopka, G. 1963 — Social Group Work: A Helping Process, Englewood Cliff. N J: Prentice- Hall Inc.

10. Milson, Fred 1973 — An Introduction to Group Work Skills, London, Routledge and Kegan Paul.

11. Northen, H. 1969 — Social Work with Groups. New York: Columbia University Press.

12. Pepell, C.P. and Rothman, B. — Social Work with Groups, New York: The Haworth Press.

13. Sundel, M., Glasser, Sarri, R., and Vinter, R. 1985 — Individual Change through Small Groups, New York: The Free Press.

14. Tom, Douglas 1978 — Basic Group Work, London, TavistockPublications Ltd.

15. Toselane, R. W. and Rivas, R. F. 1984 — An Introduction to Group Work Practice, New York: Macmillan Publishing Co.

16. Trecker, Harleigh B. 1970 — Social Group Work: Principles and Practice, New Work:Association Press.

17. Wilson, G. and Ryland, G. 1949 — Social Group Work Practice, Boston: Houghton Mifflin, Co,

Odd Semester

Paper Title: WORK WITH COMMUNITIES

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

Community organization / development, as a method of social work practice, is seen as a means to facilitate communities towards self-directed change. It takes as its basis the inequalities in society manifested through processes of marginalization, Discrimination or disempowerment of groups, which have resulted in the loss of control over resources, be they tangible or intangible. The strategies of Community Organization practice being addressed as part of the course cover a range spanning different ideologies, from those being people-initiated, and those that are initiated by the elite. Community organization is seen as a means as well as an end, where Collective processes are to sustain the community's capacity to bring about change.

OBJECTIVES:

a. Understand the critical elements of community organization practice.

b. Enhance critical understanding of the models and strategies for community Organization practice.

c. Make the micro-macro connections between the ranges of complex issues in Practice.

d. Develop attitudes conducive to participatory activities for civil society.

Course Content

UNIT I

Community: Concept, characteristics, types and functions.

Community organization practice: Definition of community organization. Values and principles of Community Organizations. Ethics of community

organization practice.

Understanding Human Rights in community organization practice.

Historical development of community organization practice.

Gender and Empowerment: Gender sensitive community organization practice

UNIT II

Models and Strategies of Community Organization - Locality Development Model - Social Planning Model - Social Action Model

Select methods of public interest: Mobilization, litigation, protests and demonstrations, Dealing with authorities

Public Relations, Planning, Monitoring and Evaluation - Roles in different models attributes and attitude.

UNIT III

Community Organization as a Method: Relevance of community organization as a Method across different spheres of social work intervention and relook at own attitudes.

Skills of Community Organization Practitioner: Participatory approaches - Problem analysis, resource mobilization, conflict resolution, organizing meetings, writing and documentation, networking, training.

Role of community organizer: Organizer, enabler, motivator, counselor…

Fund raising and its techniques.

UNIT IV

Human rights : Understanding human rights, need for the protection of human rights.

Strategy and Roles: Unionization as a strategy – Advocacy in community organization.

Current debates in Community Organization Practice: Emerging issues - Impact of Macro policies. NGO working with Community.

REFERENCES

1. Arora R. K. (Ed.) 1979 — People's Participation in Development Process: Essays in Honour of B. Mehta, Jaipur: the HCM State Institute of Public Administration.
2. Battern, T. R. 1962 — The Non-Directive Approach in Group and Community Work, London: Oxford University Press.
3. Brager, G. and Specht, H. 1969 — Community Organisation, New York: Columbia University Press.
4. Battern, T. R. 1965 — The Human Factor in Community Work, London: Oxford University Press.

5. Dandavate, M. 1977 — Marx and Gandhi, Bombay: Popular PrakashanPvt. Ltd.

6. Dayal, R. 1960 — Community Development Programme in India, Allahabad: KitabMahal Publishers.

7. Dunham, Arthur E. 1970 — The Community Welfare Organisation, New York, Thomas Y. Crowell.

8. Gandhi, M. K. — Sarvodaya (I'he Welfare of All), Ahmedabad: Navjivan Publishing House.

9. Gangrade, K. D. 1971 — Community Organisation in India, Bombay, Popular Prakashan.

10. Henderson, Paul; Jones, David and Thomas, David N. 1980 — The Boundaries of Change in Community Work, Boston, George Allen and Unwin.

11. Lal, A. K. 1977 — Politics of Poverty: A Study of Bonded Labour. New Delhi: Chethana Publications.

12. Marulasiddaiah, H. M. 1987 — Community: Area and Regional Development in India, Bangalore, Bangalore University.

13. Mayo H., Jones D. 1974 — Community Work, London: Routledge and Kegan Paul.

14. McMiller, W. 1945 — Community Organisation for Social Welfare, Chicago: University of Chicago Press.

15. Murphy, C. G. 1954 — Community Organisation Practice, Boston: Houghton Mifflin Co.

16. Patnaik, U. and Dingwaney, M. 1985 — Chains of Servitude, Bondage and Slavery in India. Madras: Sangam Books Pvt. Ltd.

17. Polson and Sanderson. 1979 — Rural Community Organisation, New York: John Wiley and Sons.

18. Ramchandra Raj, G. 1974 — Functions and Dysfucntions of Social Conflict, Bombay: Popular Prakashan.

19. Ross Murray G. 1967 Community Organisation: Theory, Principles and Practice, New York: Harper and Row.

20. Siddiqui, H. Y. 1997 Working with Communities: An Introduction to Community Work, New Delhi: Hira Publications.

21. Shivappa R. 2009 STREAMS IN THE RIVER- A Journey Into Inclusive Concerns, DhatriPustaka, Bangalore

22. Sussman, M. B. 1959 Community Structure and Analysis, New York: Thomas Y. Crowell Co.

23. Volken, H. et. al. 1982 Learning from the Rural Poor: Shared Experiences of the Mobile Orientation and Training Team, New Delhi: Indian Social Institute.

24. Warren, R. L. 1965 Studying Your Community, New York: Free Press.

25. Zaltman, G. and Duncan, R. 1977 Strategies for Planned Change, New York: Association Press.

Journals

Community Development journal : An International Forum, UK, Oxford University Press.

Development and change, Hague Blackwell Publisher.

Odd semester

Title: SOCIAL WORK PRACTICUM - I

Credit pattern: L:T:P::0:0:3 **Total Credits: 3**

Orientation provides information regarding.

i. The importance and place of the practicum in the educational programme.

ii. The purpose, functions and ethics in professional practice.

In the first four weeks, the learners may make a local directory to include emergency numbers of Hospitals/ PHCs/ Police/ Panchayath Office and Network Agencies along with references to other developmental and welfare services in the location.

Visits - provide an exposure to and understanding of the services provided in responses to people's needs. (Agencies in health setting, education, community, institutional services, criminal justice system, civic administration, rehabi1itation etc.)

Structured experience laboratory - is a classroom activity, which provides opportunities through the games/activities, to form the involvement of self in various practice skills. These laboratory experiences are designed in small groups to encourage participation, sharing of the experience and aid in examining learning and applications of skil1s. These sessions have a specific objective of experiencing self, and applying /using self in practice. (Relationship skills, Communication skills etc., will be focused)

Concurrent practice learning of two-days a week - on going learning of practice is an opportunity to develop intervention skills in reality situations. This entails learning social work practice for two, or two and a half days or its equivalent, each week of the semester.

The learners may be placed in agencies or in communities to initiate and participate in direct service delivery. Practice learning is a vital component of the educational opportunity to be provided to the learner. The teaching-learning process must be designed to help the learner to move on the mastering strategies, skills and techniques to practice social work.

Honor's level even semester (II Semester)

Even semester

Paper Title: MANAGEMENT OF DEVELOPMENTAL AND WELFARE SERVICES

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

The course aims to develop management competencies to function in organizations, participate as a team member and understand the role of a social work programmes manager.

OBJECTIVES

a. Understand the overall environment and its impact on the nature, structure and development of organizations in corporate, public and voluntary sectors in the context of social work profession.

b. Understand policies and procedures involved in establishing and maintaining human service organizations.

c. Acquire skills to network and participate in the management of resources – human, material and environmental.

d. Develop skills to participate in management of programmes, as a part of the inter-disciplinary team and initiate as well as develop new programmes.

e. Develop ability to analyze the practices applied in specific settings

Course Content

UNIT I

Social Services: Social service, Social security, social development and social welfare – concept- Need for welfare and developmental organisations, Factors determining social welfare programmes, Development and Welfare organizations‟ response to societal needs; role of state, voluntary and corporate sector.

Management services: Types of settings, organizational characteristics like origin, nature, size, structure, and design, organizational climate and impact of socio-political environment -

Management process: Vision, Planning, Organizing, Directing, Staffing, Coordination, Reporting, Budgeting.

Establishment: Registration, different types of legislations, legal status, constitution, rules and procedure, goals - Financial resources: Organizational Budget, Sources of finance, Fund Raising, Records, Audit.

UNIT II

Physical: All activities related to acquiring, hiring and maintaining importable structure and infrastructure, maintenance of premises and daily upkeep.

Enhancing the involvement and the potential of people in organization's executive boards, committees; professionals and other staff-relationship, communication, team work, and facilitating team building, supervision, and participation in training.

UNIT III

Programme Development: Programme management: long term, short term, and Documentation.

Project proposals based on felt-needs, nature of resources, eligibility criteria, records, evaluation and research.

Impact analysis - Qualitative and quantitative.

UNIT IV

Public Relations: Public relations need and its promotion by all in the organisation. Representing the organization, networking, public, corporate and voluntary sector, resource building, accountability, transparency, use of media for publicity.

Change and its Management: Understand and manage change, innovation in a rapidly changing social environment: for policy programmes and structure.

Organizational understanding: Conflict, conflict resolution, creating positive climate.

REFERENCES

1. Choudhari, D. Paul. 1983 — Social Welfare Administration, Delhi: Atma Ram and Sons.

2. Garain, S. 1998 — Organizational Effectiveness of NGOs, Jaipur: University Book House.

3. Garain, S. — Towards a Measure of Perceived Organizational Effectiveness in Non-government Organization, Mumbai: Indian Journal of Social Work, 54 (2), 251 - 270.

4. Goel, S. L. and Jain, R. K. 1988 — Social Welfare Administration: Theory and: Practice, Vol. I and II, New Delhi: Deep and Deep Publications.

5. Government of India — Evaluation of Social Welfare Programmes, Encyclopedia of Social Work. Vol. 1, 297 - 310.

6. Haimann, A. 1982 — Professional Management and Practice, Delhi: Eurasia Publications.

7. Hasenfeld, Y and English, R. (Eds.) 1978 — Human Service Organizations. Ann Arbor: University of Michigan Press.

8. Hauman, A. 1962 — Professional Management and Practice, Delhi: Eurasia Publications.

9. Jackson, J. 1989 — Evaluation for Voluntary Organizations. Delhi: Information and News Network.

10. Kapoor, K. K. 1986 — Directory of Funding Organizations, Delhi: Information and News Network.

11. Lauffer, A. 1977 — Getting the Resources You Need, New Delhi: Sage Publications.

12. Lauffer, A. 1977 — Understanding Your Social Agency, London: Sage Publications.

13. Luthans, Fred. 1990 — Organizational Behaviour, Boston, Irwin McGraw Hill.

14. PRIA. 1990 — A Manual on Financial Management - An Accounts Keeping for Voluntary Organizations, New Delhi: Society for Participatory Research in Asia.

15. PRIA b — Training of Trainers: A Manual for Participatory

Training Methodology in Development, New Delhi: Society for Participatory Research in Asia.

16. Sachdeva, D. R. 1998 — Social Welfare Administration in India, Allahabad, Kitab Mahal.

17. Siddiqui, H. Y. 1984 — Social Work and Social Action, New Delhi: Hamam Publications.

18. Skidmore, R. A. 1983 — Social Work Administration, New Jersey, Prentice-Hall.

19. Slavin, S. (Ed.) 1978 — Managing Finance, Personnel and Information in Human Services, New York: Howorth Press.

20. Slavin, S. (Ed.) 1978 — Social Administration, New York: The Haworth Press.

21. Weiner, M. 1982 — Human Service Management, Illinois: The Dorsey Press.

22. Young, Pat 1985 — Mastering Social Welfare, London, Macmillan Master Series, Macmil1an Education Ltd.

Even semester

Paper Title: SOCIAL WORK RESEARCH AND STATISTICS

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

This course is to equip learners to utilize, and conduct research as service managers to improve services, evaluate, and develop new services and intervention methods: strategies and techniques and also, be an effective consumer of other researches.

OBJECTIVES

a. To develop an understanding of scientific approach to human inquiry in comparison to the native or common sense approach in various aspects, and its process.

b. To understand major research strategies, meaning, scope and importance of social work research.

c. To develop an ability to see the linkages between practice, research, theory and their role in enriching one another.

d. To develop ability to conceptualize, formulate and conduct simple research projects/exercises (This would include a broad range of basic research skills such as conceptualization of a research strategy and problem; writing a research proposal; developing tools for col1ecting data; use of sampling, strategies; data collection, processing, presentation, analysis and interpretation; and writing research report etc).

e. To make informed assessment and judicious use of research studies and findings.

f. To develop skills for use of library and documentation services for research.

Course Content

UNIT I

Science - Meaning and assumptions, scientific approach in comparison to the native or common sense approach.

Scientific attitude; Scientific method; application of scientific method for the study of social phenomena.

Research: Definition and objectives, Social Work Research: Meaning, objectives, functions and limitations; Scope of social work research in India; Agencies sponsoring and conducting social work research, ethics in research.

Problem identification: Criteria for the selection of research problem; Problem formulation.

Concepts, constructs, variables, conceptual and operational definitions. Hypothesis: Meaning,

importance, uses and requirements.

UNIT II

Design of research: Definition and importance; types of research design; exploratory,

descriptive, experimental, evaluative design, participatory research and action research.

Source and Types of Data: Primary and secondary, objective and subjective, qualitative and quantitative.

Sampling: Sample and population: Rationale and Characteristics of sampling; methods of sampling, general considerations in the determination of sample size.

Methods of collection of primary data:

Observation: Structured and unstructured; participant and non-participant. Questionnaire, interview schedule and interview guide. Pilot study and Pre-testing.

Scales: Need for scales, some prominent scaling procedures.

Case study: Meaning, uses, steps.

Secondary data: Official data, personal documents, problem in the use of secondary data

UNIT III

Processing of data: Content, editing, coding data classification, manual and mechanical tabulation of data; frequency distribution, diagrammatic and graphic presentation - use of computers.

Issues related to Social Work Research: Interpretation of data, research reporting: contents of research report: foot-note, references, bibliography, preparation of abstract; the art of making book review.

UNIT IV

Statistics: Definition, functions and importance Measures of Central Tendency; Measures of Dispersion.

Chi-square, Correlation Coefficient, ‘t’ distribution; Analysis of Variance and „ ‘F’ distribution.

SPSS package.

REFERENCES

1. Ackoff, R. L. 1962 Scientific Method: Optimizing Applied Research Designs, New York: John Wiley and Sons.

2. Anderson, J. et al. 1970 Thesis and Assignment Writing, New Delhi: Wiley

Eastern Limited.

3. Bailey, Kenneth, D. 1987 — Methods of Social Research, New York: The Free Press

4. Blaikie, Norman. 1993 — Approaches in Social Enquiry, Cambridge: Polity Press.

5. Blalock, H. M. 1972 — Social Statistics, New York: McGraw Hill.

6. Blalock, H. M. and Blalock, A. M. (Eds.) 1968 — Methodology in Social Research; New York: McGraw-Hill.

7. Coolidge, Frederick L. 2000 — Statistics: A Gentle Introduction, New Delhi: Sage Publications.

8. Crabtres, B. F. and Miller, W. L. (Eds.) 2000 — Doing Qualitative Research, New Delhi: Sage Publications.

9. Cranstein, A. and Phillips, W.R.1978 — Understanding Social Research: An Introduction, Boston: Allwyn and Bacon.

10. Denzin, Norman, K. & Lincoln, Y. S. (Eds.) 2000 — Handbook of Qualitative Research (II ed.), New Delhi: Sage Publications.

11. Field, Andy. 2000 — Discovering Statistics Using SPSS for Windows: Advanced Techniques for Beginning, New Delhi: Sage Publications.

12. Foster, J. J. 1998 — Data Analysis Using SPSS for Windows: A Beginner's Guide, New Delhi: Sage Publications.

13. Gahan, Celis and Hannibal, Mike. 1998 — Doing Qualitative Research Using QSR, NUD, IST, New Delhi: Sage Publications.

14. Geltung, J. 1961 — Theory and Methods of Social Research, London: George Allen & Unwin

15. Goode, W. J. and Hatt, P. K. 1962 — Methods in Social Research, New York, McGraw-Hill.

16.Gupta, S. P. 1984 — Statistical Methods, New Delhi, Sultanchand and Sons.

17. Jefferies, J. and Diamons, I. 2000 — Beginning Statistics: An Introduction for Social Scientists, New Delhi: Sage Publications.

18. Krishnaswamy, O. R. 1993 — Methodology of Research in Social Sciences, Bombay, Himalaya Publishing House.

19. La1das, D. K. 2000 — Practice of Social Research, Jaipur, Rawat Publications.

20. Manheim, Henry, L. 1977 — Sociological Research: Philosophy and Methods, Illinois:The Dorsey Press.

21. Marshal1, Gatherine and Rosaman, G. B. 1999 — Designing Qualitative Research, III Edition, New Delhi: Sage Publications.

22. May, Tim. 1997 — Social Research: Issues, Methods & Process, Buckingham: Open University Press.

23. Moser, C. A. and Kalton, G, 1977 — Survey Methods in Social Investigation, London: Heinemann Educational Books

24. Mukherji, Partha N. (Ed.) 2000 — Methodology in Social Research: Dilemma, and Perspectives, New Delhi: Sage Publications.

25. Nagel, Ernest. 1984 — The Structure of Science: Problems in the Logic of Scientific Explanation.

26. Padgett, Deborah, K. 1988 — Qualitative Methods in Social Work Research, New Delhi: Sage Publications.

27. Polansky, N. A. (Ed.) 1960 — Social Work Research, Chicago, University of Chicago.

28. Ramchandran, P. 1990 — Issues in Social Work Research in India, Bombay: Institute for Community Organisation Research.

29. Ramachandran, P. 1990 — Issues in Social Work Research in India, Bombay, Tata Institute of Social Sciences.

30. Reid, William J. and Smith, Andrey D. 1981 — Research in Social Work, New York: Columbia University Press.

31. Rosenberg, M. 1968 — The Logic of Survey Analysis, New York: Basic Books.

32. Rubin, A. and Babbie, K. 1993 — Research Methods for Social Work, California: Brooks Cole Publishing Co.

33. Sellits, Glaire et al. 1976 — Research Methods in Social Relations, New York:Holt, Rinebart and Winston.

34. Shah, F. V. 1977 — ReportingResearch,Ahmedabad:Rachna Prakashan.

35. Shaw, Ian and Lishman, Joyce. (Ed.) 1999 — Evaluation and Social Work Practice, New Delhi: Sage Publications.

36. Silverman, David (Ed.) — QualitativeResearch,.NewDelhi:Sage Publications.1997

37. Society for Participatory Research in Asia, 1995 — Participatory Research: An Introduction, Participatory Research, Network Series, No.3, New Delhi: PRIA.

38. Stewart, Alex. 1998 — The Ethnographer's Method, New Delhi: Sage Publications.

39. Yanow, Dvora. 1999 — Conducting Interpretive Policy Analysis, New Delhi: Sage Publications.

40. Yin, Robert, K. 1.994 — Case Study Research: Design and Methods, New Delhi: Sage Publications

41. Young, Pauline V. 1982 — Scientific Social Survey and Research, New Delhi, Prentice-Hall of India Pvt. Ltd.

Even semester

Title: SOCIAL WORK PRACTICUM - II:

Credit pattern: L:T:P::0:0:3 **Total Credits: 3**

SOCIAL WORK CAMP:

Rural/ Tribal camps with a duration of 10 days - provide opportunities to experience rural life, analyze rural dynamics, and observe the functioning of local self government and voluntary organisations. This experience aids peer participation in planning for activities for own group and those for local people. It also helps develop skills to carry out, evaluate, and report the experience.

SUMMER PLACEMENT:

Summer Placement - provides an opportunity to experience day-to-day work in a setting. The learner gets involved with direct practice with the client system and with the ongoing management operations of the setting. The time frame recommended for this experience is about three weeks, after the first year of the post-graduate programme. The learner may use the same setting for data collection of Term project.

The student has to execute a term project during the summer placement and is expected to select a theme relevant to current social issues in consultation with the supervisor and make an exhaustive survey of literature on the chosen theme including empirical studies made on the same.

Further, the student shall also collect the experiences or opinions of people on the issues and make a detailed presentation.

Flexibility is accorded in planning and executing the term project. Creative and analytical approaches are to be carried out.

Even semester

Title : SOCIAL WORK PRACTICUM - III

Credit pattern: L:T:P::0:0:3 **Total Credits: 3**

Concurrent practice learning of two-days a week - on going learning of practice is an opportunity to develop intervention skills in reality situations. This entails learning social work practice for two, or two and a half days or its equivalent, each week of the semester. The learners may be placed in agencies or in communities to initiate and participate in direct service delivery. Practice learning is a vital component of the educational opportunity to be provided to the learner. The teaching-learning process must be designed to help the learner to move on the mastering strategies, skills and techniques to practice social work.

Even semester

Paper title: COMMUNICATION AND COUNSELING

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

This paper relates the relevance of components of communication and counseling in social work practice.

OBJECTIVES

a. Understand the meaning and importance of communication in day-to-day life.

b. Focus on interpersonal communication of interviewing and allied aspects.

c. Develop holistic understanding of counseling as a tool for help.

d. Acquire knowledge of various approaches: their theoretical under-pinnings for goals, values, processes and techniques,

e. Develop skills of application to real life situations.

UNIT I

Communication: Meaning and importance of communication.

Process of communication: Key elements in the communication process - Communication, message, audience; channel of communication. Verbal and non-verbal communication.

Basics of Communication.

Education and communication for national development.

Interpersonal communication: Interviewing - Objectives, principles of interviewing; listening, qualities of effective communicator.

Seminars, conferences, lectures, group discussion, panel discussion, symposium, workshop, role playing, simulation exercises, written communication, report writing, letter writing, article/essay writing, games, brain storming, street play, field work exposure.

UNIT II

Visual aids in communication: Poster making, use of notice boards, flip charts, charts, flash cards, photographs, pamphlets, slide shows.

Mass Communication: Television, exhibition, newspapers and magazines, advertisements, radio, film, VCD/ DVD, e-mail, internet.

Impact of mass communication on society, family, marriage and child development. Communication Analysis and Planning: Planning and executing a communication campaign on an issue using various methods of communication.

UNIT III

Counseling: Definition, nature and goals, areas of counseling; Historical background and origins of counseling, ethical nature of counseling, qualities of an effective counselor.

Counseling Situations: Developmental, preventive, facilitative, and crisis.

Counseling and Psychotherapy - Skills in counseling - Establishing the relationship.

Process of Counseling.

Approaches to Counseling: Approaches; Theoretical base, thrust, goals, key concepts, techniques - Approaches like person-centered, rational-emotive, behavioral approaches, gestalt, existential approaches, Egan's three stage model, eclectic model.

Indigenous Approach: Indigenous approaches of help and self-help like yoga, reflection. Act of Prayashchit.

UNIT IV

Couple and Family Counseling: Issues in such counseling, its process and stages.

Crisis Counseling, Group Counseling: Counseling for groups - Process, advantages and disadvantages of group counseling.

Practice of counseling in family counseling centers, family courts, counseling bureau. Premarital and marital counseling, vocational counseling centers, mental health centres, child guidance clinics, correctional institutions, deaddiction and rehabilitation centres, educational institutions.

REFERENCES

1. Brown, Leland 1970 — Communicating Facts and Ideas in Business, New Jersey: Prentice-Hall Inc., Englewood Cliffs.

2. Chandrashekar, C. R. (Ed.) 1999 — A Manual on Counseling for Lay- Counselors, Bangalore, Prasanna Counseling Centre.

3. Dave, Indu 1983 — The Basic Essentials of Counseling, New Delhi: Sterling Publishers Pvt., Ltd.

4. Desai, M. M.(Ed.) 1979 — Creative Literature and Social Work Education, Bombay: Somaiya Publications Pvt. Ltd.

5. Desai, Murli (Ed.) 1994 — Family and Interventions - A Course Compendium, Bombay, Tata Institute of Social Sciences.

6. D'souza, Y. K. 1999 — Communication Today and Tomorrow, New Delhi: Discovery Publishing House.

7. Fisher, Dalmar 1999 — Communication in Organisations, Second Edition, Mumbai: Jaico Publishing House.

8. Fullmer, D. W. and Bernard, H. W. 1972 — Counseling: Content and Process, New Delhi: Thomson Press India.

9. Fuster, J. M. 2000 — Personal Counseling, Eighth Updated Edition, Mumbai, Better Yourself Books.

10. Kennedy, E. 1977 — On Becoming a Counselor - A Basic Guide for Non-professional Counsellors, Delhi: Gill and Macmillan.

11. Lakshmipathi Raju, M (Ed.) 1999 — Family Counseling: Perspectives and Practices, Tirupati, Sri Padmavati Mahila Visvavidyalayam.

12. Lewis,E. Patterson and Elizabeth, Reynolds Welfel 2000 — The Counseling Process, Stamford, Brooks / Cole Thomson Learning,

13. Melkote, Srinivas R. 1991 Communication for Development in the Third World – Theory and Practice, New Delhi: Sage Publications.

14. Mohan, Krishna and Banerji, Meera. 1990 Developing Communication Skills, Delhi Macmillan India Ltd..

15. Murphy, Robert D. 1977 Mass Communication. and Human Interaction, Boston:Houghton Miffiin Company.

16. Narang, Vaishna 1996 Communicative Language Teaching, New Delhi: Creative Books.

17. Narayana, Rao S. 1981 Counseling Psychology, New Delhi: Tata Mc Graw Hill Publishing Company Ltd.

18. Pollock, Thomas C1ark; Sheridan, Marion C; Ledbetter, Frances and Doll , Ronald C. 1955 The Art of Communicating, New York: The Macmillan Compan

19. Robert, G. Madden 1998 Legal Issues in Social Work Counseling and Mental Health, Sage Publications India Pvt. Ltd.

20. Small, Jacquelyn 1990 Becoming Naturally Therapeutic: A Return to The True Essence of Helping, New York, Bantam Books.

21. Venkatramani, S. H. 1998 Corporate Communications - The Age of Image, New Delhi: Sterling Publishers Private Ltd.

Even semester

Paper Title : GANDHIAN APPROACH TO WELFARE AND DEVELOPMENT

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

The course aims at sensitizing the learner to the Gandhian approach and to utilize some of the skills in practice.

OBJECTIVES

a. Develop an understanding of Gandhi‟s concept of society and his approach to social transformation.

b. Develop knowledge of the specific programmes formulated by Gandhi for rural reconstruction and the development of the weaker sections of society, with the focus on strategies and skills.

c. Develop the ability to identify similarities and differences between the Gandhian and professional social work approaches to social change, welfare and development.

Course Content

Unit I

Gandhian thought: Salient features of Gandhian thought; Gandhian values; Concepts and methods; Concept of a healthy society; Sarvodaya.

Unit II

Gandhian Approach: Economic and its organization: Ownership of property; Concept of trusteeship, distribution and economic equality; System of production, problems of mechanization, decentralization of production, rural- urban relationship

Unit III

Social Organisation: Marriage and family, position of women, social stratification, caste and untouchability, education and its role; Basic education.

Unit IV

Constructive programmes: Contents training of constructive workers, skills involved, nature of programmes; Boodan, Gramdan.

Gandhian and Vinbobha’s movements with special reference to Bhoodan and

Gramdan

Gandhian and Professional Social Work Approach: Similarities and differences between Gandhian and professional approach to social development and welfare

REFERENCES

1. Dasgupta, S (Ed.) 1967 Towards Philosophy of Social Work in India, New Delhi: Popular Book Service
2. Bandopadhyaya, J 1969 Social and Political Thought to Gandhi, Bombay: Allied Publishers
3. Gandhi, M.K Social Service, Work and Reform; 3 Volumes, Ahmedabad: Navijivan Press
4. Ganguli, B.N 1972 Gandhi‟s Vission of Ideal Society, Hyderabad: Andhra Mahila Sabha
5. Iyer, R 1986 Moral and Political Writings of Gandhi, Vol 3, Delhi: Oxford University Press
6. Kumarappa, J.C 1951 Gandhian Economic Thought, Bombay: Vora and Co.
7. Mishra, R.M 1972 Bhoodan Movement in India, Delhi : S Chand.
8. Nanda, B.R 1985 Gandhi and His Critics, Delhi: Oxford University Press
9. Narayan, J 1965 From Socialism to Sarvodaya, Varanasi: Sarva Seva Sangh
10. Palkhiwala, N 1986 Relevance to Gandhi, New Delhi: Gandhi Peace Foundation.
11. Unitahna, T.K.N 1979 Gandhi and Social Change, Jaipur: Rawat Publications

Even semester

Paper title: PERSONAL AND PROFESSIONAL GROWTH.

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

The course aims at enhancing personal and professional effectiveness by developing a continuous awareness and deeper insight into one's being. It encourages value clarification, upholding of professional ethics, and ability to make effective choices for integration. It provides opportunities to understand stress, stressors and methods to handle stress experienced.

OBJECTIVES

a. Understand self as a being, as one in the process of becoming and experience self-awareness.

b. Examine own values and attitudes and explore choices made to express self in own environment.

c. Develop positive life skills and practice self-help methods for integration and for stress reduction.

d. Understand and uphold professional values and ethics.

Course Content:

UNIT I

Self and Self Awareness: Understand self through a cognitive construct/paradigm (two/three models from among those available may be offered as workshops). Suggested approaches are: Rational Emotive Therapy, Gestalt Approach, Transactional Analysis, Reality Therapy, Yoga for Therapy, Meditation Techniques.

Explore self as being, and understand the process of becoming. (through observation)

Practice consciously measures to sustain and experience continuous awareness. Observation and Reflection: Theory and techniques.

Communication Choices: Communication mode and patterns and effectiveness, Interpersonal communication, nature of choices made.

UNIT II

Emotions and their Expression: Emotions, nature of expression.

Understand own pattern of communication, choices made to express emotions, modes used, examine need for change.

Communication: Informal and knowledge and skills of rapid reading, writing, creative writing, report writing and public speaking.

UNIT III

Creativity and Self: Understand brain functions: Creativity, need and development

Life Style: Conscious life style - enhanced life skills: Communication, decision making, empathy, critical thinking, use of time and money, building and sustaining bonds-relational, colleagial and personal.

Self defeating behaviour - nature and impact. Choices for change.

UNIT IV

Values, Attitude and Professional Ethics: Values and attitudes - their role in life, Value conflict - its impact, value clarification.

Integration: Through Eastern and Western approaches experience the processes of integration. Approaches recommended are: Yoga as a science, meditation (tool for meditation - own choice).

Stress / Burn out - Self help Methods: Stress, Stressors, nature and impact of stress, its expression, and burnout.

Spirituality and Growth.

REFERENCES:

1. Becavar, D. (Ed.) 1997 — The Family, Spirituality and Social Work, Journal of Family Social Work, Vol.2, No.4,
2. Bhattacharya, K. 1971 — The Indian Concept of Self, Bulletin Ramakrishna Mission Institute of Culture, 22(8), August 1971. 304 - 13.
3. Burke, R, 1. 1982 — Personality, Self-Image and Situational Characteristics of Effective Helpers in Work Settings, The Journal of Psychology, Vol. 112,213.
4. Byrne, D. 1966 — Self-Concept, Ch. 12, 434. An Introduction to Personality: A Research Approach. New

Jersey: Prentice Hall Inc.

5. Crum,J. K. 1976 — The Art of Inner-listening. Theosophist, 97 (8), May 1976, 64-65.

6. Feldman Robert S 1997 — Understanding Psychology, 4th Edition, Tata McGraw Hill Publishing Company Limited, New Delhi.

7. Grossbard, H 1954 — 'Methodology for Developing Self-Awareness, Journal of Social Casework, Vol. 35, No.9, 380-386.

8. Hamilton, G. 1954 — Self-Awareness in Professional Education', Journal of Social Casework, Vol. 35, No.9, 371-379.

9. Haskar, S. L. 1976 — Know Thyself, Triveni 45(2), 88.

10. Paul, Brunton. 1975 — The Hidden Teaching Beyond Yoga, Triveni, 44 (3), 91.

11. Ramakumar,. O. 1970 — Intelligence and Self-concept, Education and Psychology Review, 10 (3), 154 -57.

12. Ritajanada. (Translated by John Phillip) 1996 — The Practice of Meditation, Mylapore, Chennai: Ramakrishna Math Printing Press.

13. Singh, N. P. 1970 — The Concept of Self in Modern Psychology, Indian Education Review, 5 (1), 84 -99.

Even semester

Paper Title : POPULATION AND ENVIRONMENT

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

The content has two aspects to it. Population dynamics and its relatedness to the environment, natural resources, utilization and their preservation.

OBJECTIVES:

a. Understand characteristics, determinants of population growth.

b. Examine population policy, plan and initiatives.

c. Understand inter-relatedness of human life, living organisms and environment.

d. Examine utilization and management of resources.

e. Develop skills to participate in activities related to the two areas.

Course Content

UNIT I

Characteristics of population: Population, determinants of growth. global concerns - Characteristics of Indian Population – Distribution by age, sex, literacy and occupation – Fertility trends - Birth and death ratio.

Population Policy, World Action Plan, Population Policy of India- Implementation; Initiatives – Government and NGO.

UNIT II

Family Planning: Objectives, scope, methods, implementation, mechanisms and progress.

Concept and Scope of Population education, family life education, sex education, and family planning education.

Population and Environment: Interrelatedness of human life, living organisms; Environment and natural resource – Environment, lifestyle, degradation. Environment management, maintaining, improving, enhancing – Current issues of Environment.

UNIT III

Natural Resources and Diversity: Utilisation and management – Forest, land, water, air, energy sources - Pollution - Sources, treatment, prevention - Soil, water, air, noise - Waste matter - disposal, recycling, renewal, problems, issues - Programmes for forest, land and water management.

UNIT IV

Environment Protection Laws and Role of Social Worker: Acts related to environmental protection – Forest conservation- Water pollution – Standards and tolerance levels – Unplanned urbanization- Environmental movements in India - Role of NGOs in Environmental issues – Government agencies in environmental protection – Social work initiatives at different levels.

REFERENCES

1. Cassen, R.H 1978 — India Population, Economy and Society, London: Macmillan.

2. Family planning Association of India — Family planning Counseling Guide, Population Reports Service Series J.N 35 and 36

3. Fisher, W.F 1997 — Towards Sustainable Development (Struggling over India‟s Narmada River), New Delhi: Rawat Publications.

4. Gadgil, and Guha. 1997 — This Fissured Land – An Ecological History of India: Delhi: Oxford University Press.

5. Klieinman.R (Ed.) 1998 — Family Planning Handbook for Doctors, Hertford: IPPF

6. Krishna. M. 1995 — Air Pollution and Control, Kakinada: Kaushal and Co.

7. Miller, Jr. Tyler, G and Armstrong. 1982 — Living in the Environment, California: Wordsworth International Group.

8. Mohan, R. 1985 — "Urbanization in India's Future", Population and Development Review, Vol. 11(4)

9. Oxford, 1987 — Our Common Future, Delhi: Oxford

University Press.

10. Prasad, R.K — Population Planning, Policy and Programmes, New Delhi: Deep and Deep Publications.

11. Reddy, Laxmi, M.V.1994 — Population Education, New Delhi: Asish Publication.

12. Ryding, S.O. 1992 — Environmental Management Handbook, Ahmedabad: IOS Press.

13. Sapru, R.K (Ed.) 1987 — Environment Management in India, Vol. II, New Delhi: Ashish Publishing House

14. Satapathy, N. 1998 — Sustainable Development (An Alternative Paradigm), Ahmedabad: Karnavati Publications.

15. Seshadri and Pandey, J (Eds.) 1991 — Population Education, A Natural Source Book, New Delhi: NCERT.

16. Sharma, P.D. 1995 — Ecology and Environment, New Delhi: Rastogi Publishers.

Open Elective

Paper Title: SOCIAL WORK PRACTICE WITH CHILDREN

Credit pattern: L:T:P::3:1:0 **Total Credits: 4**

INTRODUCTION

Children are the future of human society. Profession of social work has to work with children in difficult circumstances while rendering services in varied settings. There is a need for social workers specially trained in working with the children and adolescents. Such trained social workers can render valuable services to children in need of professional help.

The current paper focuses on children as a special group for focused social work intervention through facilitating acquisition of knowledge about children from different perspectives, types of settings where the children can be helped and application of social work methods to render social work intervention to children.

OBJECTIVES

a. To understand children facing difficult circumstances and the impact of difficult circumstances on children's development.

b. To gain an overview of agencies where children form the major client group, and appropriate evaluation of children's problems.

c. To impart to the trainee, specific Social Work intervention methods in dealing with children as a client group; to understand the Rights of children in the legal, national and international context.

Course Content

UNIT I

Human reproductive system - beginning of life till beginning of adulthood. Understanding the children and adolescents from different perspectives - developmental, demographic, economic, psychological, sociological, environmental, familial, educational dimensions of child development. Issues in adolescence - self image, peer group, career choice, sexuality, education, vocation and other issues Healthy child development, importance of supportive environment in upbringing of the children.

UNIT II

Children in difficult circumstances - developmental delay, physical and intellectual handicaps; chronic illnesses, nutritional deficiencies, accidents, poverty, child labour, abandoned and orphaned children, adoption issues, children in institutions, psychological problems in children, self harm and suicides in children, addiction related problems in

children, children brought up by single parent due to death, divorce and other related issues, problems in formal schooling, children living in difficult situations - children in streets, slums, war zones, migration, children in conflict with law, truancy, drug abuse, running away from homes, neglected children, child abuse, child trafficking, child marriage and any other. Special focus on adolescent issues as applicable.

UNIT III

Children in difficulties – Helping agencies, Settings and issues - paediatric hospitals, nursing homes, child care centres, child guidance clinics, residential care services for children - residential schools, orphanages, homes for children in conflict with law, agencies dealing with differently abled children, any other.

Assessment, intervention, follow up and evaluation of children and adolescents facing difficulties.

UNIT IV

Social Work Intervention Programmes - Case work, group work, community organisation methods in helping children, school mental health programmes, home visits, school visits, life skills training, family life education for adolescents, creative use of play therapy, art, dance, drama and other mediums for helping children, child help lines, child care centres, adoption services, special rehabilitation services for rescued children and any other.

Legislations pertaining to children, legal protection, International, National and non-governmental organisations working with children, Rights of the children.

REFERENCES

1. Bhargava. Vinita. 2005 — Adoption in India, New Delhi, Sage Publications,

2. Beck, Laura — Developmental Psychology. New Delhi, Pearson Education Inc..

3. Government of India, Dept. of Women and Child Development 1992. — Plan of Action – A Commitment to the Child.

4. Hegarty S and Arul, M. 2002 — Children with Special Needs - From segregation to Inclusion, New Delhi, Sage Publications.

5. Hurlock, Elizabeth. 1981 Developmental Psychology. 5th Edition. New Delhi, Tata McGraw Hill Publications,.

6. Hurlock, Elizabeth. 1996 Personality Development. New Delhi, Tata McGraw Hill Publications.

7. Kantha Amod and Varma, R.M, 1993 Neglected Child – Changing Perspective, New Delhi, Prayas Juvenile Aid Centre,.

8. NIPCCD,1989. Perspective Plan on Child Development (1980-2060), New Delhi

9. NIPCCD.1992. National Evaluation of Integrated Child Development Services, New Delhi.

10. Rani, Asha 1986. Children in Different situation in India – A Review, Bombay, Tata Institute of Social Sciences.

11. Reddy, Suma Narayan,1989. Institutionalized Children, Allahabad, Chug Publication,

12. UNICEF Publication The State of The World‟s Children. Annual Report. http://WWW. unicef.org

13. Ved Kumar and Brooks, Susan. L. 2004 Creative Child Advocacy, New Delhi, Sage Publications,

14. Venkatesan. S. 2004 Children with Developmental Disabilities, New Delhi, Sage Publications,.

Open Elective

Paper Title: **SCIENCE OF CRIME, PENOLOGY AND SOCIAL WORK PRACTICE**

Credit pattern: L:T:P::3:1:0 **Total Credits: 4**

INTRODUCTION

The course aims at introducing to the students the concepts of crime, punishment and the impact of crime on victims. The focus is on facilitating understanding of the learner to deliberate social work interventions with the prevention of crime, handling the issues related to those clients who are in conflict with law as well as helping the victims to recover from the impact of crime.

OBJECTIVES

a. To understand the concept of criminology and crime, as applicable to the Indian context with the impact of individual in conflict with law

b. To learn the dimensions of penology, Indian prison system, the impact of imprisonment on the individuals and prison administration

c. To understand the impact of crime on victims, compensation and hurdles in getting justice in the Indian context

d. To assimilate the practice of social work interventions in crime prevention, promotion of social health, dealing with persons in conflict with law, Human Rights issues in the context of under - trials, imprisonment, rehabilitation of released prisoners and victims.

Course Content

UNIT I

Crime: Meaning and definition, historical perspective; Nature and Scope of Criminology, Causation of Crime, Characteristics and Classification of Crimes, Crime patterns - Habitual, Professional, Organised, White collar, Public order crimes; Gender related issues in crimes; Classification of offenders under Indian Penal Code. Trial duration and pending cases, its impact.

UNIT II

Penology: Meaning, definition, historical perspective, scope.

Theories of Punishment: Deterrent theory, retributive theory, preventive theory and

reformative theory.

Efficacy of punishment.

Essentials of an ideal penal system, penal policy in India.

Forms of Punishment: Corporal and capital punishment - pros and cons. Agencies involved in criminal justice system: Correctional institutions. Impact of imprisonment, maintenance of prisons, staff dynamics.

UNIT III

Victimology: Meaning, definition, historical perspective, scope of the study. Problems of victims - physical, psychological, socio-cultural.

Victim offender relationship.

Hurdles in crime reporting, investigation and justice delivery in the Indian context.
Compensation and restitution measures.

UNIT IV

Social Work Practice in Correctional Setting: Scope for social work practice in institutional and non institutional settings.

Application of Social Work interventions with under - trials, prisoners, rehabilitation of prisoners, work with families of prisoners, work with victims of crime.

Human Rights in the context of crime and punishment - Agencies to protect Human Rights - National Human Rights Commission, State Human Rights Commissions, Right to information Act and in the context of Human Rights violation,

Social Work measures with the Police, the Judiciary and the prison staff - Job stress, burn out and other issues.

REFERENCES:

1. Ahuja, Ram 1996 — Youth and Crime, Jaipur, Rawat Publications

2. Ahuja, Ram 2006 — Criminology: New Delhi, Rawat Publications

3. Bhattacharya, S.K 1985 — Social Defence: An Indian Perspective, Delhi, Manas Publications

4. Chadha, K 1983 — Indian Jail: A Contemporary Document, New Delhi, Vikas Publications.

5. Chang, D.H 1976 — Criminology – A Cross-cultural Perspective, Vol.I, New Delhi, Vikas Publications.

6. Gandhi B.M, 2006 — Indian Penal Code- Lucknow, Eastern Book Co

7. Paranjape, N.V 1998 — Criminology and Penology; Allahabad: Central Law Publications

8. Sarkar, Chandan 1987 — Juvenile Delinquency in India – An Etiological Analysis, Delhi, Daya Publishing House.

9. Siddique, A 1983 — Criminology, 2nd Edition, Lucknow, Eastren Book Co.

Masters level- odd semester (III Semester)

Odd Semester

Paper Title: **HUMAN RESOURCE MANAGEMENT**

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

The main objective of this course is to prepare young graduates for management and administrative positions in various industrial, business, governmental/non-governmental organisations and service sector organisations.

OBJECTIVES

a. Develop managerial skills in different functional areas of management with practical focus on HRM.

b. Develop the competence to evolve the problem-solving approaches by applying conceptual and behavioural skills.

c. Develop interpersonal skills/ competence and leadership qualities to work in a group with team building approach.

d. Develop sound theoretical base in various concepts and theories to enable the student to develop a broad perspective of the management field.

e. Distinguish the strategic approach to Human Resources from the traditional functional approach.

f. Understand the relationship of HR strategy with overall corporate strategy.

Course Content

UNIT I

Human Resource Management: Concept, scope, philosophy and objectives; Evolution; Approaches, Structure and Functions; Line and staff relations of HRM; HRM Model. Hierarchy, formal and informal structure, Organogram, reporting structure.

Human Resource Planning: Concept and objectives; Human resource inventory; Human resource planning process; job analysis; job description; job specification; job design; career planning and career paths; job rotation.

UNIT II

Talent Acquisition: Goals; polices, sources and methods. Selection: Concept, process. Talent

Acquisition Tests, Theories and issues in psychological testing, Intelligence testing – theoretical background, Aptitude Testing, Personality Assessment, MBTI. Placement, Induction and socializing the new employee. Talent retention: Concept, importance and methods.

UNIT III

Compensation Management: Factors influencing compensation plans and policies; Job evaluation - Fixation of salary, components of salary. Pay for performance – Incentive Schemes, principles and types, Employee Stock Option Plan, compensation survey / review

UNIT IV

Strategic Human Resource Management (SHRM): Business strategy and organizational capability, SHRM: aligning HR with Corporate strategy, Strategic HR planning and Development, Change Management and restructuring and SHRM, Corporate Social Responsibility (CSR), Corporate Ethics, Values and SHRM, Competencies of HR professional in a SHRM scenario.

REFERENCES

1. Agarwal, R. D. (Ed.) 1973 — Dynamics of Personnel Management in India, New Delhi: Tata McGraw-Hill Publishing Company.
2. Bhargava, P. P. 1990 — Issues in Personnel Management, Jaipur: Print well Publishers.
3. Chalofsky, Neal E and , Reinhart, Carlene. 1988 — Effective Human Resource Management London : Jossey Bass.
4. Chatterjee, Bhaskar 1999 — The Executive Guide to Human Resource Management,New Delhi, Excel Books
5. Desai, K. G. 1969 — Human Problems in Indian Industries, Bombay, Sindhu
6. Famularo, Joseph 1987 — Handbook of Human Resource Administration, McGraw-Hill.
7. Fisher, Cynthia; Schoenfeldt Lyle F. and Shaw, James, G. 1997 — Human Resource Management, Third Edition., Boston, Houghton Mifflin Company.
8. Gary Desslar 1997 — Human Resource Management, 7th Edition, New Delhi: Prentice Hall of India Pvt. Ltd.
9. Mamoria,C.B. 1989 — Personnel Management, Bombay: Himalaya Publishing House.

10.	10. McKenna, Eugene and Beech, Nic 1997	The Essence of Human Resource Mangaement, New Delhi, Prentice – Hall of India Pvt. Ltd.
11.	Moorthy,.M. V. 1992	Human Resource Management: Psycho-Sociological Social Work Approach, Bangalore, R & M Associates.
12.	Pareek, Udai and Rao, T. V. 1982	Designing and Managing Human Resources, New Delhi, Oxford & IBH
13.	Rudrabasavaraj, M. N. 1984	Human Factors in Administration, Bombay: Himalaya Publishing House
14.	Rudrabasavaraj, M. N. 1986	Cases in Human Resource Management, Bombay: Himalaya Publishing House
15.	Subba Rao, P.1996	Essentials of Human Resource Management and Industrial Relations, Himalaya Publishing House.

Odd semester

Title: SOCIAL WORK PRACTICUM - IV

Credit pattern: L:T:P::0:0:3 **Total Credits: 3**

Workshops: Skills Development - help learners acquire specific skills for situations encountered during practice and acquire skills for intervention. These may be for problems/ concerns, issues or situations like work with alcoholics, HIV/AIDS affected persons, adolescents for life ski11s development, youth for leadership development and couples for marital relationship and enrichment work with elderly. These workshops are to enhance skills/ develop new skills for practice in specific situation, specific problems and issues.

Concurrent practice learning of two-days a week -on going learning of practice is an opportunity to develop intervention skills in reality situations. This entails learning social work practice for two, or two and a half days or its equivalent, each week of the semester.

The learners may be placed in agencies or in communities to initiate and participate in direct service delivery. Practice learning is a vital component of the educational opportunity to be provided to the learner. The teaching-learning process must be designed to help the learner to move on the mastering strategies, skills and techniques to practice social work.

Odd semester

Paper Title : SOCIAL WORK WITH TRIBAL AND RURAL COMMUNITIES.

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

This course aims at introducing the learner the programmes of tribal and rural development, and the importance of social work practice with tribal and rural communities.

OBJECTIVES

a. Develop an understanding of tribal and rural communities.

b. Understand the characteristics and problems of tribal and rural communities.

c. Acquire knowledge about the contribution of Governmental and Non-governmental Organisations to tribal and rural development.

d. Develop an understanding of the functions of Panchayath Raj Institutions with particular reference to Karnataka.

e. Gain knowledge about the application of social work in tribal and rural development programmes.

Course Content

UNIT I

Tribe in relation to caste and nation - Nature and Characteristics of Primitive Cultures.

Tribes in India and their ecological distribution.

Emerging Trends in Tribal Social Institutions - Family and Kinship Systems, Jati Structure, Economic Structure, Political organizations.

Characteristics of Tribal Society - Economic, Social, Political and Cultural.

Problems of Tribal Life.

UNIT II

Government Programmes since Independence and their Impact on Tribal Societies

Programmes of Voluntary Agencies and their Impact on Tribal Societies.

Analysis and Assessment of Tribal Community Problems - Special Problems of the Tribals in a particular area.

Social Work Practice in Tribal Development: Community organization as a method of intervention, Participatory Rural Appraisal (PRA), Logical Framework approach/Analysis (LFA), Intervention strategies in community settings: awareness buildings, organizing, activating, people's participation, negotiating,• lobbying and, resolving group conflicts.

UNIT III

Rural Society and Poverty - Historical perspective - Dynamics in the village Society: Caste/class relationships - Control and Power, Conflict and Integration.

Poverty in the rural context - Its nature and manifestations.

Analysis of Basic Problems - Issues faced by the rural poor such as Indebtedness, Bonded labor, Low wages, Unemployment, Underemployment, and other forms of exploitations.

UNIT IV

Current Rural Development Programmes in India:

Council for the Advancement of People's Action and Rural Technology (CAPART) and other Rural Development.

Poverty alleviation programmes.

Panchayath Raj System in Karnataka and its role in rural and tribal development.

Role of social worker in tribal and rural development programme.

REFERENCES:

1. Barnabas, A. P. 1987 — Rural Community Development in India, In Encyclopedia of Social Work in India, Vol. II, New Delhi: Ministry of Welfare, Government of India,

2. Bhalla, Alok and Bumke, Peter J. (Eds) 1992 — Images of Rural India in the 2nd Century, New Delhi; Sterling Publishers Pvt. Ltd.

3. Bharadwaj, A. N. 1979 — Problems of Scheduled Castes and Scheduled Tribes in India, New Delhi: Light and Life Publishers.

4. Bose, Nirmal Kumar 1971 — Tribal Life in India, National Book Trust India, New Delhi.

5. Brahmananda, P. R., Narayan, B. K. and Kalappa, A. (Eds.) 1987 — Dimensions of Rural Development in India, Bombay: Himalaya Publishing House.

6. Desai, A. R. (Ed.) 1978 — Rural Sociology in India, Bombay: Popular Prakashan,

7. Desai, A. R (Ed.) 1981 — Peasant Struggles in India, New Delhi: Oxford University Press.

8. Debey, S. N. and Murdia, R. 1977 — Land Alienation. and Restoration in Tribal Communities, Bombay: Himalaya Publications,

9. Dube, S. C. 1987 — Welfare of the Scheduled Tribes, In. Encyclopaedia of Social Work in India, VoL, III, New Delhi: Ministry of Welfare, Government of India.

10. Epstein Scarlet J 1973 — South India: Yesterday, Today and Tomorrow; Mysore Villages Revisited, London and Basingstoke: Macmillan Press

11. KuturnbaRao, M. and PerrajuSharma,P, (Eds.) 1989 — Human Resource Development for Rural Development, Bombay: Himalaya Publishing House.

12. Mahajan, V. S, (Ed.) 1993 — Employment through Rural Development - Towards Sustainability, New Delhi: Deep & Deep Publications.

13. Mahanti, Neeti 1994 — Tribal Issues - A Non-conventional Approach, New Delhi, Inter-India Publications.

14. Nair, T. K. and Anbarasan, R. S. (Eds.) 1981 — Training Social Workers for Rural Development, ASSWI.

15. Panwalkar, V. G. 1987 — Social Work in Rural Settings, In. Encyclopedia of Social Work in India, Vol. Ill, New Delhi: Ministry of Welfare, Government of India.

16. Patel, M. L. 1994 — Tribal Development without Tears, New Delhi, Inter-India Publications.

17. Ramaiah, P. 1988 — Issues in Tribal Development, Allahabad, Chugh Publications.

18. Singh, K. 1986 — Rural Development: Principles, Policies and Management, New Delhi: Sage Publications.

19. Sinha, B. B. 1982 — Society in Tribal India, Delhi, B,R Publishing Corporation.

20. Sodhi, J. S. 1990 — Poverty Alleviation of Rural Development, New Delhi: Criterion Publications.

21. Swaminathan, M. S. 1982 — Science and Integrated Rural. Development, New Delhi: Concept Publishing company.

Odd Semester

Paper Title: ORGANIZATIONAL BEHAVIOUR AND ORGANIZATIONAL DEVELOPMENT

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

The course aims to provide an understanding of human behavior at work so that the learner may acquire the skills required to analyze problems and develop a problem-solving approach.

OBJECTIVES:

a. To impart knowledge about individual, group and organizational dynamics and their consequences,

b. To make clear the concepts and approaches that help in developing models or systems that support human ingenuity.

c. To acquaint the students with the knowledge of theories and practices that govern human behavior at work,

d. To help the learner understand the value and worth of human resources in an organization.

e. To enable the students to become aware of their communication skills and sensitize them to their potential to become successful managers.

f. To gain self-confidence and healthy self-respect while retaining respect for other's rights.

g. To understand the application of Transactional Analysis in several areas of employee management.

Course content

UNIT I

Conceptual Framework: Organization Behavior: Definition, concept, approaches and scope, historical background of Organization Behavior.

Introduction to Enneagram, personality types according to Enneagram. Emotional Intelligence; Attitude, Values, Personality; Job satisfaction, Employee Morale : Meaning, influences and outcomes - Measuring job satisfaction.

Assertiveness Training: Benefits of assertiveness – components of assertive behavior, measuring assertiveness, handling fear, handling anger, handling

depression, developing assertive behavior skills, assertiveness on the job, assertiveness in interpersonal relations.

UNIT II

Transactional Analysis (TA), TA and self awareness, Winners and Losers, Structural analysis, Life positions, transactions, games and strokes, Life scripts, TA applications in motivation, Leadership and Teamwork, TA in counseling.

Motivation: Concept and theories, techniques of motivation, role of reinforcement and punishment, motivation and organization reward system, awards, employee empowerment and engagement.

UNIT III

Leadership: Meaning, roles, skills, and styles, leadership theories, types of leadership, powerful persuasion strategies.

Group dynamics: Concept, types of groups, dynamics of group formation, decision making in groups.

Organization Development: Concept, emerging approaches and techniques, Foundations of OD, Organizational Diagnosis, OD interventions – An overview, individual and interpersonal interventions, team/group interventions, comprehensive interventions, organizational transformation, success and failure of OD, Planned Organizational change, feedback and OD.

UNIT IV

Organizational Conflict: Concepts, causes and types, conflict-resolution strategies.

Organizational change: Concept, forces of change and resistance to change, managing organizational change and diversity, facilitating creative and divergent thinking, planned organizational change.

Stress and Burn Out: Concepts, causes, consequences and coping strategies. Managerial Ethics: Individual ethics, ethical dilemmas in management, Ethical practices of Indian Managers, Corporate ethics.

REFERENCES

1. Andrew, Dubrin J, 2006 — Leadersip – Research Findings, Practice, and Skills,NewDelhi,Biztantra Publication.

2. Aswathappa K, 2008 — Organisational Behaviour- Text, Cases and Games, Mumbai, Himalaya Publication House.

3. Donald, Hislop, 2007 — Knowledge Management in Organisation- A Critical Introduction, Oxford University Press.

4. Khanka, S S,2008 — Organisational Behaviour, New Delhi, S Chand and Co., Ltd.

5. Hellriegul Don and Slocum John W., Jr,2004 — Organisational Behaviour, New Delhi, Thomson South-Western.

6. ICFAI, 2004 — Organisational Behaviour, Hyderabad, Centre for Management Research.

7. Kumar Arun and Meenakshi N, 2009 — Organisational Behaviour- A Modern Approach, NIILM Center for Management Studies, New Delhi.

8. Luthans Fred, 2005 — Organisational Behviour, New York, McGraw Hill International Edition.

9. Moorhead Gregory and Griffin Ricky W, 2005 — Organisational Behaviour- Managing People and Organisations, New Delhi, Biztantra Publications.

10. Nelson, Debra L and Quick, James Compbell, 2007 — Organisaional Behaviour- Foundations, Realities and Challenges, New Delhi, Thomson South-Western,.

11. Northouse Peter G, 2003 — Leadership- Theory and Practice, New Delhi, Response Books: A Division of Sage Publications.

12. Robibins, Stephen P, 2007 — Organisational Behaviour, New Delhi, Pearson Education.

13. Ryan, Rosemary K C, 2008 — Leadership Development – A Guide for HR and Training Professionals, New Delhi, Elever

14. Sadler, Philip, 2004 — Lerdership- Styles, Role Models, Qualities, Behaviours, Concepts, New Delhi, Kogan Page India Pvt., Ltd.

15. Subba Rao, P, 2004 — Organisational Behaviour, Mumbai, Himalaya Publications House. Publications

Odd semester

Paper code: SWSC-4

Paper Title: PREVENTIVE AND SOCIAL MEDICINE AND MEDICAL SOCIAL WORK

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

This course introduces the basic health issues and the application of social work in health setting both in hospital and community.

OBJECTIVES

a. Understand the concept and dimensions of health.
b. Understand the issues related to the prevention, clinical features and treatment of major communicable and non-communicable diseases.
c. Trace the historical development of medical social work in India and abroad.
d. Understand the nature of medical social work services.
e. Understand the tenets of National Health Policy of India and modernization of community based health care services. .
f. Understand the health care services at different levels.

COURSE CONTENT

UNIT I

Concept of health : Physical, social, mental and spiritual dimensions of health - Positive health - Determinants of health - Health and development - Indicators of health. Concept of Prevention: Levels of prevention - Hygiene, public health, preventive medicine, community health, social medicine, community medicine.

Health Care of the Community; Concept of health care - Levels and principles of health care.

UNIT II

Communicable and Non-communicable Diseases: Leprosy, Tuberculosis, Sexually Transmitted Diseases (STDs), HIV/AIDS. Cancer, Hypertension, Accidents, Diabetes, Blindness, Neurological problems, Mental illnesses.

Maternal and Child Health Services - Immunization – Integrated Child Development Services (ICDS) Scheme - School health programmes.

UNIT III

Medical Social Work: Meaning, Definition and Scope - Historical background and nature: Medical Social Work in India and Abroad - Team work and Multidisciplinary approach in health care; Organization and administration of medical social work departments in hospitals.

Patient as a person and Role of Social Worker: Understanding the patient as a person; Illness behaviour and treatment behaviour of the patient - Impact of illness on the patient and family.

Role of social worker with patients and their families - Rehabilitation.

UNIT IV

National Health Policy of India, Directorate General of Health Services, Indian Council of Medical Research (ICMR), Health as a concurrent subject.

Health System in India - at the Centre, at the State level, at the district level, and village level. Health Education and Communication.

Voluntary Health Agencies in India - International health - World Health Organisation (WHO), UNICEF, UNDP, FAO, ILO, World Bank.

Non - governmental and other Agencies - Ford Foundation, CARE, International Red Cross, Indian Red Cross and others.

REFERENCES:

1. Bajpai, P. K. (Ed.) 1998 Social Work Perspectives on Health, Jaipur, Rawat Publications.

2. Brody, Elaine M. and Contributors. 1974 A Social Work Guide for Long-Term Care Facilities, U. S. Dept. of Health, Education and Welfare, Public Health Service, Maryland: National Institute of Mental Health.

3. Butrym, Zofia and Horder, John. 1983 Health, Doctors and Social Workers, London: Routledge and Kegan Paul.

4. Clark, D. W. and MacMahon, B. (Ed.) 1981 Preventive and Community Medicine, Boston. Little, Brown and Company,

5. Friedlander, W. A. 1967 Introduction to Social Welfare (Chapter 12: Social Work in Medical and Psychiatric Settings), New Delhi: Prentice-Hall of India.

6. Hilleboe, H. E. and Larimore, G.W.1966 Preventive Medicine, Philadelphia, W. B. Saunders Company.

7. Humble, Stephen and Unell Judith (Ed.)1989 Self Help in Health and Social Welfare, London: Routledge

8. Jordan, William. 1972 The Social Worker in Family Situations, London: Routledge and Kegan Paul

9. Lathem, W. and Newbery, A. 1970 Community Medicine - Teaching, Research and Health Care, London, Butter worths.

10. Mathur,J. S. 1971 Introduction to Social and Preventive Medicine, New Delhi, Oxford and LB.H. Publishing Company,

11. Mechanic, David 1968 Medical Sociology- A Selective View, New York, Free Press.

12. Mishne, Judith (Ed.) 1980 Psychotherapy and Training in Clinical Social Work, New York: Gardner Press.

13. Nichols, P. J. R. (Ed.) 1980 Rehabilitation Medicine, London: Butterworths.

14. Park, K. 2002 Park's Textbook of Preventive and Social Medicine, Jabalpur, Banarsidas Bhanot.

15. Pathak, S. H. 1968 Medical Social Work, Chapter.25, In Wadia, A R (Ed.) : History and Philosophy of Social Work in India, Bombay: Allied Publishers.

16. Ramachandrudu, G. 1997 Health Planning in India,' New Delhi, A. P. H. Publishing Corporation.

17. Rusk, Howard A. 1977 Rehabilitation Medicine, Saint Louis: Mosby Company.

18. UNICEF Health and Basic Services, New Delhi, UNICEF South Central Asia Regional Office.

Odd Semester

Paper Title: **REHABILITATION AND AFTER CARE SERVICES**

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

Rehabilitation of differently abled people is a noble and worthy endeavor, requiring the combined knowledge of the psycho-social theory and practical skills and techniques of social work. The current paper facilitates social work students to work with the specific group of clientele suffering from various types of disabilities and impart application of specific professional social work methods to cater to the needs of this population.

OBJECTIVES:

a. To understand the concept of handicap, rehabilitation and the scope for practice.

b. To identify the specific client categories requiring the rehabilitation services, problem specificity and rehabilitation service interventions.

c. To acquaint oneself with different rehabilitation settings, different therapeutic approaches to rehabilitation process.

d. To acquire the social work skills adapted to facilitate the process of rehabilitation, the rights and legal provisions provided for differently abled people and assimilate the knowledge of social work practice to disability specific client service.

Course Content

UNIT I

Rehabilitation: Definition and scope for social work interventions; definition of Impairment, Disability, Handicap; causes of Handicap - heredity, acquired, Major illnesses - physical, neurological and psychiatric; Stress, vulnerability, coping and competence to deal with handicaps; Need for comprehensive rehabilitation – psycho-social rehabilitation

UNIT II

History, philosophy and principles of psycho-social rehabilitation; specific problem areas – physical handicap - vision, hearing, orthopedic, speech and language difficulties, mental retardation and others; neurological, psychiatric problems, disasters, alcohol and drug usage, terminal illnesses and any other.

Intervention in rehabilitation: Assessment, planning, intervention, evaluation, tools for assessment, follow-up services.

UNTI III

Rehabilitation Settings: Hospital based, day-care, night-care, quarter-way home, half- way-home, group home, hostels, long-stay homes, vocational guidance centre, sheltered workshop, occupational therapy centre, community based rehabilitation centre, home care, inclusive education and others

Approaches: Therapeutic community, behavior modifications, transactional analysis and eclectic approach

UNIT IV

Practice of Social work methods in the process of rehabilitation: Case work, group work, community organisation, research, administration and social action.

Legal provisions for differently abled people – The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995, Rehabilitation Council of India: Formation, scope and functions, governmental policies and programmes, initiatives from the non- governmental sectors.

International trends and national initiatives in the rehabilitation scenario.

REFERENCES

1. Anthony, William. A. 1980. The Principles of Psychiatric Rehabilitation. Baltimore University Part Press
2. Chowdhary, Paul. D. 1995. Introduction to Social Work: history, concept, methods and fields. Delhi, Atma Ram & Sons.
3. Corey, Gerald. (6th ed.)2004. Theory and Practice of Group Counseling. Thomas Brooks/ Cole Belmont
4. Dorothy Stock Whitaker. 1985. Using Groups to help people. London & New York, Tavistock/ Routledge,.
5. Danda, Amita. 2000. Legal order and Mental Disorder, Sage Publications.
6. Delhi Law House. 1998. The Mental Health Act-1987, Law Publishers.
7. Thakur Hari Prasad Institute of Research and Rehabilitation of the Mentally Handicapped Publication, Hyderabad. Enabling the Disabled.1999
8. Feldman, Robert. S (1997) Understanding Psychology. New Delhi, Tata McGraw Hill.
9. Hume, Clephane and Pullen Ian. 1986 Rehabilitation in Psychiatry. Edinburgh Churchill Livingstone
10. International Labour Office. 1985. Vocational Rehabilitation of Disabled persons, ILO.

11. International Labour Office. 1982. — Vocational rehabilitation of the Mentally Retarded (second impression) ILO.

12. Kalyanasundaram S. and Verghese,Mathew,(Eds).2000 — Innovations in Psychiatric Rehabilitation Richmond Fellowship Society, Bangalore, India.

13. Kapur, Malavika and Others. (Ed). 1979. — Psychotherapeutic process. NIMHANS Publication. Bangalore

14. Lakshman Prasad. 1994. — Rehabilitation of the Physically handicapped. Konark Publishers Pvt. Ltd.

15. Liberman, Robert. P. (ed). 1988. — Psychiatric Rehabilitation of Chronic Mental Patients. Washington D.C., American Psychiatric Association.

16. Madan, G.R. 2000 — Indian Social Problems Vol.2 Social Work (3rd ed). New Delhi, Allied Publishers.

17.Manning, Nick. 1989 — Therapeutic Community Movement. London, Routledge Publications.

18. Pandu Naik. G. 1992 — A Review of Social Legislation in India. Lambani Publishers.

19. Schizophrenia Research Foundation. 1998 — Community Mental Health and Community Based Rehabilitation. Chennai, SCARF Publication.

20. Sen, Anima. 1988 — Psycho-social integration of the Handicapped, New Delhi, Mittal Publishers.

21. Sharma, S and Chadda, R.K 1997 — Essential Psychiatry, New Delhi, Interprint Publishers.

22. Wolberg, L.R. 1977 — The Technique of Psychotherapy Part I & II, 3rd edition. New York, Grune and Stratton,.

Odd semester

Paper Title: SOCIAL POLICY, PLANNING AND DEVELOPMENT

Credit pattern: L:T:P::2:0:0 **Total Credits: 2**

INTRODUCTION

The course introduces the learner as to how policy is a link between Constitutional Principles, Development Plans, Legislative and Executive Actions. The analysis of these processes is to enable utilization of the knowledge to improve social work practice.

Further, it provides a critical and analytical framework to understand key concepts, development processes and current issues, pertaining to different parts of the world, with specific reference to India. This course is expected to provide the social work students with a context for micro-level interventions.

OBJECTIVES

a. Gain knowledge of policy analysis and the policy formulation process.

3. Acquire skills in critical analysis of social policies and development plans.

4. Develop an understanding of social policy in the perspective of national goals as stated in the Constitution, particularly with reference to Fundamental Rights and the Directive Principles of State Policy.

d. Critically understand the concept, content and process of social development.

e. Develop the capacity to identify linkages among social needs, problems, development issues and policies.

f. Locate strategies and skills necessary for social development and reinforce values of social justice, gender justice and equality.

Course Content

UNIT I

Social Policy and Constitution: Concept of social policy, sectoral policies and social services - Relationship between social policy and social development-- Values underlying social policy and planning based on the Constitutional provisions (i.e. the Directive Principles of State Policy and Fundamental Rights) and the Human Rights - Different models of social policy and their applicability to the Indian situation.

UNIT II

Sectoral Social Policies in India: Evolution of social policy in India in a historical perspective- Different sectoral policies and their implementation, e.g. Policies concerning education, health, social welfare, women, children, welfare of backward classes, social security, housing, youth, population and family welfare, environment and ecology, urban and rural development, tribal development and poverty alleviation.

UNIT III

Social Planning: Concept of social planning - Scope of social planning - the popular restricted view as planning for social services and the wider view as inclusive of all sectoral planning to achieve the goals of social development - Indian planning in a historical perspective - The Constitutional position of planning in India. The legal status of the NITI AYOG - Coordination between Centre and State, need for decentralization - Panchayath Raj - people participation.

UNIT IV

Social Development: Concept of social development - Current debates of development - Approaches to development - Development indicators.

Social Development in India: The historical and social context of development in India - Demographic transitions - Rural development: Agrarian and land reforms; Green Revolution - Industrialization and urban development - Labour relations-Gender issues - Environmental issues (land, water, forest) - Education - Health.

REFERENCES

1. Bagchi, A. K. 1982 — Political Economy of Underdevelopment, Cambridge: Cambridge University Press.

2. Bhanti, R. 1993 — Social Policy and Development in Rajasthan, Udaipur: Himanshu Publications.

3. Bulmer, M. et. aI., 1989 — The Goals of Social Policy. London: Unwin Hyman.

4. Chakraborty,S. 1987 — Development Planning - Indian Experience, Oxford: Claredon Press.

5. Dandekar, V. M. 1994 — "Role of Economic Planning in India in the 1990s & Beyond", Economic and Political Weekly, Vol. 29, No. 24, 1457-1464.

6. Desai, V. 1988 — Rural Development (Vol. 1) Mumbai: Himalaya Publishing House

7. Dimitto, D. M. 1991 — Social Welfare: Politics and Public Policy, New Jersey: Prentice-Hall.

8. Fidelma, A. et. al. 1999 — Contemporary Social and Political Theory: An Introduction, Bucking : Open University Press.

9. Ganapathy, R. S. and Others 1985 — Public Policy and Policy Analysis in India, Delhi: Sage Publications.

10. Ghosh, A. 1992 — Planning in India: The Challenge for The Nineties, New Delhi: Sage Publications.

11. Government of India — Five Year Plan Documents (latest), New Delhi.

12. Hebsur, R. K. (Ed.) Social Intervention for Justice, Bombay: TISS.

13. Huttman, E. D. 1981 Introduction to Social Policy, New York: McGraw- Hill.

14. International Labour Office. 1973 Multinational Enterprises and Social Policy, Geneva, ILO.

15. Jones, K. et. al., 1983 Issues in social Policy, London: Routledge & Kegan Paul.

16. Kahn, A. E. 1973 Social Policy and Social Services, New York: Random House.

17. Kulkarni, P. D. 1979 Social Policy and Social Development in India, Madras: Association of Schools of Social Work in India.

18. Kulkarni, P. D. 1952 Social Policy in India, New York: McGraw-Hill Book Company.

19. Kulkarni, P. D. 1975 Social Policy in India, Bombay, Tata Institute of Social Sciences.

20. Leonard, P. 1997 Postmodern Welfare: Reconstructuring Emancipatory Project, London: Sage

21. Lindblom, C. E. 1980 The Policy-making Process, New Jersey: Prentice-Hall.

22. Livingstane, A. 1969 Social Policy in Developing Countries, London: Routledge & Kegan Paul.

23. Madison, B. Q .1980 The Meaning of Social Policy, London: Croom Helm.

24. Macpherson, S. 1980 Social Policy in the Third World, London: Wheatspeat Brooks.

25. Macpherson, S. 1982 Social Policy in the Third World, New York: John Wiley and Sons.

26. Mathur, K. Bjorkman — Top Policy Makers in India, New Delhi: Concept Publishing Co.

27. Meadows, D. H. 1972 — The Limits to Growth, New York: University Books.

28. Mishra, R. 1977 — Society and Social Policy, London: Macmillan Ltd.

29. Mukherjee, N. 1993 — Participatory Rural Appraisal: Methodology and Applications, New Delhi: Concept Publishers.

30. Mundle, S. 1993 — „Policies, Paradigms and Development Debate at the Close of Twentieth Century", Economic and Political Weekly, Vol. 28, No. 26, September 4, 1993.

31. Mullard, M. and Spieker. 1998 — Social Policy in a Changing Society, London: Routledge.

32. Phillips,D. R. and Verhasselt Yola (Eds.) 1994 — Health and Development, London: Routledge and Kegan Paul

33. Rao, V. 1994. — "Social Policy: The Means and Ends Question" Indian Journal of Public Administration, Vol. 50, No.1, Jan.-March, 1994.

34. Rastogi, P. N. 1992 — Policy Analysis and Problem-solving for Social Systems, New Delhi: Sage Publications

35. Roychaudhury, T. 1982 — The Cambridge Economic History of India, Vol. I & II, New Delhi: Cambridge University.

36. Singh, R. R. (Ed.) 1995 — Whither Social Development? New Delhi: ASSWI.

37. Singh, Y. 1972 — Modernization of Indian Tradition, Delhi: Thomas Press.

38. Spicker, Paul. 1998 — Principles of Social Welfare: An Introduction to Thinking About the Welfare State, London: Routledge.

39. The Probe Team. 1999 in Association with Centre for Economics. — Public Report on Basic Education in India, New Delhi: Oxford for Development University Press.

40. Upadhyay, S. B. 1992 — Urban Planning, Jaipur: Printwell

41. UNDP — Human Development Reports, Oxford University Press.

42. Weimer. D. L. and Vining, A. R. 1994 — Policy Analysis : Concepts and Practice, New Jersey: Prentice-Hall.

43. World Bank — World Development Reports (Annual), Oxford University Press.

44. Yadav, C. S. (Ed.) 1986 — Urban Planning and Policies - Part A, New Delhi: Concept Publishing Co.

Recommended Journals / Periodicals

Alternatives; Development and Change; Economic and Political Weekly.

Odd Semester

Paper Title: LEGAL SYSTEM IN INDIA

Credit pattern: L:T:P::2:0:0 **Total Credits: 2**

INTRODUCTION

The course is to help learners understand the legal system and procedures in India. It supports understanding the processes in public interest litigation and develops skills for the same.

OBJECTIVES

a. Acquire information on the legal rights of people.

b. Develop an understanding of the legal system and get acquainted with the process of the legal system with emphasis on functioning in India.

c. Understand the role of the police, prosecution, judiciary and correction.

d. Gain insight into the problems faced by the people belonging to different strata of society, in interacting with this system.

5. Develop an understanding of the processes and problems of public interest litigation and legal aid to marginalized.

Course Content

UNIT I

Social Justice: Meaning and Concept; Social legislation: Meaning, definitions and concept. Social justice as an essential basis of social legislations; Social legislations in a welfare state with special reference to India.

Rights: Concept and definitions of Rights; types of Rights; Rights of women and children; Rights of Scheduled Castes and Scheduled Tribes; Rights of accused and offender under Constitution of India, Indian Penal Code and Criminal Procedure Code.

UNIT II

Division of Law: Substantive Law and Procedural Law.

Legislations pertaining to Social Institutions: Marriage, divorce, maintenance of spouse, adoption.

Legislations for prevention of Crime and Deviance: Indian Penal Code (relevant chapters like of Offences against Public Tranquility, of Offences affecting the Public Health, Safety, Convenience, of Decency and Morals, of Offences relating to Religion, of Offences affecting the

Human Body, of Offences relating to Marriage, of Cruelty by Husband or Relatives of Husband)

Legislations pertaining to women.

UNIT III

Criminal Justice System in India:

Police: Structure, powers and functions and their role in maintaining peace and order in the society.

Prosecution: Meaning, structure, its role in criminal justice, trial participation.

Judiciary: Supreme Court, High Court - Constitution of Supreme Court and High Court: Powers and functions.

Sub-ordinate Courts - District Sessions Court, Magistrate Courts, and other subordinate courts.

UNIT IV

Correction and Correctional Laws: Corrective measures as per Criminal Procedure Code, Probation of Offenders Act, Juvenile Justice (Care and Protection of Children) Act.

Legal Aid: Concept of legal-aid, history of legal-aid, persons needing legal-aid, legal-aid schemes.

Public Interest Litigation: Meaning, Concept, Process and Problems.

Right to Information Act- Provisions and implementation.

Role of Social Worker: Social Work intervention, need, methods.

REFERENCES

1. Aranha, T.	Social Advocacy - Perspective of Social Work, Bombay: College of Social Work.
2. Buxi, U. 1982	Alternatives in Development: Law the Crisis of the Indian Legal System, New Delhi: ,Vikas Publishing House.
3. Curry, J. C. 1977	The Indian Police, New Delhi: Manu Publications.
4. Desai, A. E. (Ed.) 1986	Violation of Democratic Rights in India, Vol. 1.
5. Fleming, M. 1978	Of Crimes and Rights, New York: W.W. Norton and Company.
6. Gandhi B.M. 2006.	Indian Penal Code, Lucknow, Eastern Book

Company.

7. Iyer, V. R. K 1980. Some Half Hidden Aspects of Indian Social Justice, Lucknow: Eastern Book Company.

8. Iyer, V. R. K 1984. Justice in Words and Justice in Deed for Depressed Classes, New Delhi: Indian Social Institute.

9. Iyer, V. R. K 1981. Law Versus Justice: Problems and Solutions, New Delhi: Deep and Deep.

10. Iyer, V. R. K 1980. Justice and Beyond, New Delhi: Deep and Deep.

11. Kelkar R. V. 2006. Lectures on Criminal Procedure, Lucknow, Eastern Book Company.

12. Khanna, H. R. 1980 The Judicial System, New Delhi: II P A.

13. Mathew, P. D. II P.A Legal Aid Series, Delhi: Indian Social Institute

14. McDonald. W. F. (Ed.) 1979 The Presentator, California: Berkeley: Hill

15. Newman, G. 1999 Global Report on Crime and Justice, New York: Oxford University Press.

16. Nirmal Anjali. 1992 Role and Functioning of Central Police Organisations, New Delhi: Uppal.

17. Peak, K. J. 1998 Justice Administration - Police, Courts and Correction, New Jersey: Prentice-Hall.

18. Ratanlal and Dhirajlal, 2006 . Indian Penal Code, Lexis and Lexis, Nagpur

19. Singh. L. M. (Ed.) 1973 Law and Poverty: Cases and Materials, Bombay: Tripathi.

20. Western, P. B. 1976 The Criminal Justice System: An Introduction and Guidelines, California: Good Year Publishers.

21. Government of India, 1973 Report of the Legal Aid Committee.

Open Elective

Paper Title: GERONTOLOGICAL SOCIAL WORK

Credit pattern: L:T:P::3:1:0 **Total Credits: 4**

INTRODUCTION

Changing demographic profile in India has led to rise in the number of elderly as never before. Along with the enhanced longevity, a number of issues related to care and management of elderly have come into focus. Social work as a profession concerned with providing professional service to the needy, has recognized the need to address the concerns of the senior citizens. The paper envisages training the learners in professional social work practice with the elderly.

The paper focuses on senior citizens as target client group for social work intervention; the paper deals with the issues, concerns, problems and social work methods in facilitating healthy adaptation of the client group in the current Indian context.

OBJECTIVES:

a. To get an overview of the perspectives on aging and scope for practice.

b. To understand the various challenges related to aging, healthy aging and problems of the elderly in difficult situations.

c. To identify agencies working with elderly, the different care settings and issues in working with elderly in different settings. To gain an insight into process of working with elderly.

d. To train the learners in applying specific social work intervention measures in working with senior citizens, care givers and to have an understanding of

e. National Policy on Older Persons, and the role of International and NGOs in improving the quality of life of the elderly.

Course Content

UNIT I

Gerontology – Definition and scope. Understanding the elderly – demographic, developmental, psychological, socio cultural, economic, and health perspectives. The issues pertaining to elderly- health, occupation, income, retirement planning, family support, gender issues, property Rights and any other

UNIT II

Developmental tasks in elderly: Issues in health care, changes in family structure, coping with aging process, challenges due to changing physiological, economic, safety, status in the family and other issues, Healthy aging, quality of life, coping with demise of the life partner, bereavement, resolving one's own death, and any other.

UNIT III

Care settings for elderly: General hospitals, geriatric wards/ hospitals, home-based care, homes for the aged, nursing homes, day-care-centers, hobby centers, and facilities for homeless elderly, elder helpline, and senior citizen forum.

Tools for assessment of the problems of elderly, intervention and follow up services and evaluation.

UNIT IV

Social work intervention measures for senior citizens through methods of social work: Case work, group work, community organisation, welfare administration, social work research, social action

Care giver issues - Needs, burden, coping and training; training for caregivers of institutions for the elderly.

National Policy on Older Persons, Legal and governmental welfare benefits for senior citizens, Role of HelpAge India and other prominent Organisations working for elderly.

International scenario

REFERENCES

1. Bali . P. Arun, 2001	Care of the Elderly in India. Shimla, Indian Institute of Advanced Studies.
2. Chatterjee, S.C., Patna, and K.P., Charian, V. 2008.,	Discourses on aging and Dying. New Delhi, Sage Publications
3. Dandekar, Kumudini. 1996	The Elderly In India, New Delhi, Sage Publications.
4. Desai, Murli and Raju, Siva (Ed.) 2000.	Gerontological Social Work in India - Some issues and Perspectives. Delhi, BR Publishing House,.

5. Dey, A. B (Ed.) 2003 Ageing in India: Situation Analysis and Planning for the Future. New Delhi / WHO and AIIMS.

6. Emmatty, Leena. M. 2008 An insight into Dementia Care in India. New Delhi, Sage Publications,.

7. Hurlock, Elizabeth. 1981 Developmental Psychology. 5th Edition. New Delhi, Tata McGraw Hill Publications.

8. Khan M.Z. 1989 Voluntary Welfare Services for the Aged, Dept. of Social Work, New Delhi, Jamia Milia Islamia.

9. Kumar, Vinod (Ed.) 1996 Aging - Indian Perspective and Global Scenario, New Delhi, AIIMS.

10. Rajan, Irudaya.S., Mishra,U. S., and Sharma, S.P. 1999. India's Elderly, New Delhi, Sage Publications.

11. Ramamurti P,V and Jamuna D (Ed) 2004. Handbook of Indian Gerontology. New Delhi, Serial Publishers.

12. Vineeta B Pai 2000 Coping with Retirement, UNESCO CLUB, Naganur, Belgaum

JOURNALS.

1. Indian Journal of Gerontology, C-207, Manu Marg, Tilak Nagar, Jaipur 302 004

2. R & D Journal of Helpage India . C-14, Qutab Institutional Area, New Delhi, 110016.

Open Elective

Paper Title: MANAGEMENT OF NON-GOVERNMENTAL ORGANIZATIONS

Credit pattern: L:T:P::3:1:0 **Total Credits: 4**

INTRODUCTION

This course aims at introducing to students the concepts and principles involved in managing non-profits, particularly NGOs.

OBJECTIVES

a. Develop an understanding about the role of NGOs in societal development.

b. Develop knowledge about management of NGOs.

c. Develop the ability to identify collaborative strategies between NGOs and Government institutions.

Course Content

UNIT I

Non Profits as Organisational Entities: Non-profits as modern organizational forms- NGOs as non profit organizations involved in development work - common denominators and overlaps in business, public and non- profit managements - legal – rational structure of non-profits - trusts, societies and companies special reference to Trust Act, Societies Registration Act and Companies Act

UNIT II

Organisational Design: Vision, Mission and Goals of NGOs - matching intervention paradigms with mission and vision – translating vision and mission into action – Role of Strategic Planning - Operational goals, Programmes and Projects - Division of responsibility, authority and power relations – Decision-making - Participation, empowerment, teamwork and ownership Voluntarism, Individual Autonomy and Organisational accountability, Transparency and Stakeholder Accountability - Knowledge generation and management - Leadership styles suited for NGOs.

UNIT III

NGO Environment: Interfacing with community and community based organizations - NGO-State relationship - Critical collaboration and autonomy - Managing and maintaining donor constituency – Other NGOs and CBO - Networking, Partnering, Collaborating, etc. – Relating to

market and business-NGI- Corporate relationship.

NGO Capacity Building - Building the competencies in NGOs - Identification and procurement of right competencies, Training and development and performance appraisal – Organisational – techno - managerial capacity, Capacity for independence and autonomy and capacity for learning and change.

UNIT IV

Resource Management for Non- Profits:

Resource Mobilisation for NGO - Non-financial resource, natural resources, physical resources in the form of common property - Human capital resources and social capital financial resource – Institutional and non-institutional sources of funding - National and international Fund-raising strategies - Foreign contributions - Statutory obligations.

Accounting for Non- Profit Organisations: Basic accounting principles and concepts- Preparation and analysis of financial statements- Ratio analysis, cash flow and fund flow analysis - Responsibility accounting, performance budgeting and zero base budgeting; Financial Management: Investment, Financing – Management of working capital.

REFERENCES

1. Chowdhary, D. P 1981. Role of Voluntary Action in Social Welfare Development, New Delhi, Sidhartha Publications.

2. Drucker, Peter, 1983 Managing the Non-Profit Organisation, New Delhi, Macmillan

3. Gangrada, K.D, 1988 Social Welfare and Social Development, New Delhi, Northern Book Centre

4. Garain S, 1998 Organizational Effectiveness of NGO's, Jaipur University Book House.

5. Jackson, J 1989 Evaluation for Voluntary Organizations, Delhi, Information and News Network

6. Kapoor, K.K, 1986 — Directory of Funding Organisations, Delhi, Information and News Network.

7. PRIA, 1989 — NGO – Government Relations, Delhi, PRIA

8. PRIA, 1991 — NGOs in India: A Critical Study, Delhi, PRIA

9. Sachdeva, D.R, 1998 — Social Welfare Administration in India, Allahabad, Kitab Mahal.

10. Weiner, M, 1982 — Human Service Management, Illinois, The Dorsey Press.

Master's level even semester (IV Semester)

Even Semester

Paper Title: EMPLOYEE RELATIONS AND LEGISLATIONS

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

The purpose is to provide an in-depth knowledge about the relationship between employer, employee and the state, to bring out the importance of cordial employee relations for organizational productivity and gain an understanding of the mechanism of inter-personal relations, collective bargaining and productivity improvement functions in the organisation through involvement of all groups.

OBJECTIVES

a. Develop the skills of interpersonal relationship as per organizational requirement.

b. Understand the trends and dynamics between the partners in the organisation.

c. Enhance the knowledge on organisational performance, role and responsibility.

d. Develop the knowledge on various statutory / legal aspects influencing the organizations.

e. To stimulate thinking on rationale behind the Laws and their enforcement.

Course Content

UNIT I

Employee relations, History of industria1ization in India - Issues related to employees in organized and unorganized sector.

Concept, Definition, Philosophy and Principles of employee relations. Employee relations with special reference to Occupation - Safety - Health and Environment (OSHE) Education.

Analysis of the terms 'industry' and 'industrial dispute', industrial discipline – misconduct, disciplinary proceedings.

Domestic Enquiry: Contents and Process, Principles of Natural Justice, Tribunal; Discharge/Dismissal.

UNIT II

Trade Unions: Trade Unionism in India, emergence, history and growth, Trade Union as an organization – Various Trade Unions in India, Trade Union policies, Role of Trade Unions in India, Employers'' Associations – Objectives, structure and activities. Contemporary issues in employee relations.

UNIT III

Employee Legislations: - The Payment of Bonus Act, 1965, Employees Provident Fund (and Misc. Previsions) Act 1952, Workmen's Compensation Act 1923, Employees State Insurance Act 1948, Payment of Gratuity Act, 1972,Child Labour (Prohibition and Regulation) Act, 1986.

Fundamentals of Labour laws, The Constitution of India: Preamble, Fundamental Rights including writs, Directive Principles of State Policy, The Factories Act 1948, The Contract Labour (Regulation and Abolition) Act 1970,The Minimum Wages Act 1948 and The Payment of Wages Act 1936; The Apprentices Act, 1961,The Maternity Benefit Act 1961.

UNIT IV

The Trade Union Act 1926, The Industrial Employment (Standing Orders) Act 1946, The Industrial Dispute Act 1947, The Employment Exchanges (Compulsory Notification of Vacancies) Act 1958. Introduction to Right to Information Act, Intellectual Property Rights, Patent Law, Copyrights, Trademark Law.

Collective Bargaining: Definitions, characteristics, critical issues in collective bargaining, theories of collective bargaining, Hick's Analysis of Wages settlement.

under collective bargaining, conflict-choice model of negotiation, Behavioral Theory of Labor Negotiation, Collective Bargaining in India, Collective bargaining in practice, levels of bargaining, coverage and duration of agreements, administration of agreements, negotiating a contract, the negotiation process, effective negotiation, negotiation and collective bargaining, post negotiation – Administration of the agreement.

Employee relations in knowledge based industry - Concepts of self-managed teams (SMT) - Changing employee/ employer and trade union relationship. Current rules of Taxation of Salaries.

Labor Welfare Officer - Duties and functions; Social Work in Industry.

REFERENCES

1. Achar, M. R. 1976 — Labour Rules in Karnataka, Bangalore, Shree Vidya Printers.

2. Arora, M, 2005 — Industrial Relations, New Delhi, Excell Books.

3. Dasgupta, S. K. — Industrial Law, Sterling Publishers Pvt. Ltd.

18. Saiyed I A, 2009 — Labour Law, Mumbai, Himalaya Publishing House Pvt., Ltd.

19. Singh BD, 2005 — Industrial Relations: Emerging Paradigms, New Delhi, Excell Books.

20. Sinha, G. P. and Sinha, P. R. 1977 — Industrial Relations and Labour Legislation in India, New Delhi, Oxford IBH Publishing Co.

21. Somani, Anjan and Mishra, Shivani, 2009-10 — Employment Laws, Jaipur, Ramesh Book Depot

22. Srivastava S C, 2009 — Industrial Relations and Labour Law. New Delhi, Vikas Publishing House Pvt Ltd.

23. Subramanian, H. N. 1967 — Labour Management Relations in India, Bombay, Asia Publishing House.

24. Tripati, P. C. 1989 — Personnel Management and Industrial Relations, New Delhi, S. Chand and Sons,.

25. Tyagi, B. P. 1976 — Labour Economics and Social Welfare, Meerut, Jai Prakash Nath & Co.

26. Vaid, K. N. 1970 — Labour Welfare in India, New Delhi, Sri Ram Centre for Industrial Relations.

27. Yoder, D. 1972 — Personnel Management an Industrial Relations, New York, Prentice-Hall India.

Even Semester

Paper Title: **MENTAL HEALTH AND PSYCHIATRIC SOCIAL WORK**

Credit pattern: L:T:P::2:1:0 **Total Credits: 3**

INTRODUCTION

This course is to provide awareness about mental health and mental health problems and also application of social work in mental health settings.

OBJECTIVES

a. Understand the concepts 'mental health' and 'mental illness'.

b. Understand the signs and symptoms, etiology, diagnosis and treatment of mental health problems.

c. Understand different services for the care of mentally ill.

d. Understand historical background of psychiatric social work in India and abroad. Understand the nature of psychiatric social work services and relevance of team work.

e. Understand the nature of collaboration with voluntary organisations for the welfare of mentally ill.

f. Identify the issues related to psychiatric social work department in hospitals and community mental health settings.

Course Content

UNIT I

Concept of mental health and mental illness - Mental health as a part of general health - Misconceptions about mental illnesses. General approaches to the mentally ill - International Classification of Mental Disorders.

Signs, symptoms, etiology, diagnosis, prognosis and management of the following:

- Neuroses
- Psychoses
- Psycho physiologic disorders
- Personality disorders
- Psychiatric disturbances in children and adolescents
- Organic psychotic conditions

- Mental retardation.

UNIT II

Introduction to Psychiatric Social Work: Meaning and Scope - Historical background of psychiatric social work in India and abroad - Reasons for its development as a specialty. Application of social work methods and other related techniques used in the field - Multi-disciplinary approach and team work in mental health care - Problems of hospitalization - Impact of mental illness on the patient, family and community.

Practice of Social Work: Importance of home visit and visit to the place of work - Role of family in the treatment of mentally ill - Preparing the family and community for the return of the affected individual, follow-up.

UNIT III

Care of mentally ill: Day-care centre, night-care centre, half-way-home, sheltered workshop, Occupational therapy units - Role of social worker and role of voluntary organisations.

Role of voluntary organisations, governmental-agencies and paraprofessionals in the welfare of mentally ill.

Role of social worker in mental health centers, departments of psychiatry in general hospitals, child guidance clinics, community mental health units, correctional institutions, industries, and family welfare centres.

Role of social worker with head injured, paraplegics and epileptics.

Role of social worker in the management of substance abuse – Educational avenues in psychiatric social work - Research avenue in the field of mental health for social workers.

UNIT IV

Organisation of psychiatric social work department - Functions; and collaboration with other departments.

Community mental health and social work, NMHP, Innovations like Satellite clinics, district mental health programme etc.

Rehabilitation and Acts: Occupational therapy - Principles and practice - Psychosocial rehabilitation.

Mental Health Act, 1987.

The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995.

REFERENCES

1. Ahuja, Niraj 1995 — A Short Textbook of Psychiatry, Third Edition, New Delhi, Jaypee Brothers.

2. Anderson, David. 1982 — Social Work with. Mental Handicap, London, Macmillan Press Ltd.

3. Banerjee, G. R. 1968 In. — Psychiatric Social Work, Chapter 26, Wadia, A. R. (Ed.): History and Philosophy of Social Work in India, Bombay: Allied Publishers.

4. Brody, Elaine M. and care Contributors 1974 — A Social Work Guide for Long-term Facilities, U. S. Department of Health, Education and Welfare, Public Health Service, Maryland: National Institute of Mental Health.

5. Coleman, J. C. 1976 Life, — Abnormal Psychology and Modern Bombay, D. B. Taraporevala and Sons.

6. Dickerson, Martha Ufford. 1981 — Social Work Practice with the Mentally Retarded, New York: Free Press.

7. Freedman, A. M. and Kaplan, H. I. (Eds.) 1967 — Comprehensive Textbook of Psychiatry, Baltimore, Williams and Wilkins Company.

8. French, Lois Meredity. 1940 — Psychiatric Social Work, New York; The Commonwealth Fund.

9. Friedlander, W. A. 1967 — Introduction to Social Welfare, (Chapter 12: Social Work in Medical and Psychiatric Settings), New Delhi: Prentice-Hall of India.

10. Feldman Robert S 1997 — Understanding Psychology, 4th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi

11. Golan, Naomi. 1978 — Treatment in Crisis Situations, New York: Free Press.

12. Henderson, Sir David and Batchelor, I. R. C. 1962 — Textbook of Psychiatry, New York Oxford University Press.

13. Hudson, Barbara L. 1982 — Social Work with Psychiatric Patients, London: Macmillan.

14. Humble, Stephen and Unell, Judith (Ed.) 1989 — Self Help in Health and Social Welfare, London: Routledge.

15. Jones, Kathleen. 1972 — A History of the Mental Health Services, London: Routledge and Kegan Paul.

16. Jordan, William. 1972 — The Social Worker in Family Situations, London: Routledge and Kegan Paul.

17. Maller, Joshua-o. 1971 — The Therapeutic Community with Chronic Mental Patients, S. Karger.

18. Mishne, Judith (Ed.) 1980 — Psychotherapy and Training in Clinical Social Work, New York: Gardner Press.

19. Page, J. D. 1983 — Abnormal Psychology, New York, McGraw-Hill.

20. Robbins, Arthur J. 1957 — Mental Hospitals in India and Social Work Service, Delhi School of Social Work.

21. Strean, Herbert S. 1979 — Psychoanalytic Theory and Social Work Practice, New York: Free Press.

22. Stroup, H. H. 1960 — Social Work - An Introduction to the Field, (Chapter 9: Psychiatric Social

23. Todd,F.Joan.1967 — Social Work with the Mentally Subnormal, New York: Routledge and Kegan Paul.

24. Towle, Charlotte. 1941 — Social Case Records from Psychiatric Clinics with Discuss Notes, Chicago; Illinois: University of Chicago Press.

25. Yelloly, Margaret. 1980 — Social Work Theory and Psychoanalysis, New York: Van Nostrand Reinhold Company.

26. National Mental Health Programme for India

Even Semester

Title: **MAJOR PROJECT**

Credit pattern: L:T:P::0:0:4 **Total Credits: 4**

Students are given broader guidelines for undertaking empirical evidence-based project in the fourth semester, either independently or by forming a small team comprising of three to four students. In case of group project work, the group will be formed by the college or the university department by adopting random method of selection. The project shall comprise of selection of the topic, methodological details, analysis, interpretation and deductions made. The respective college / the department of the university will prepare the set of guidelines for presenting the report.

Evaluation of the Project will be done along with the viva-voce examination by the viva-voce committee constituted for the assessment of social work practicum or similar committee may be constituted, if required.

Even semester

Title : **SOCIAL WORK PRACTICUM – V**

Credit pattern: L:T:P::0:0:3 **Total Credits: 3**

Concurrent practice learning of two-days a week - on going learning of practice is an opportunity to develop intervention skills in reality situations. This entails learning social work practice for two, or two and a half days or its equivalent, each week of the semester. The learners may be placed in agencies or in communities to initiate and participate in direct service delivery.

Practice learning is a vital component of the educational opportunity to be provided to the learner. The teaching-learning process must be designed to help the learner to move on the mastering strategies, skills and techniques to practice social work.

Even semester:

Title: **SOCIAL WORK PRACTICUM – VI**: (BLOCK PLACEMENT)

Credit pattern: L:T:P::0:0:3 **Total Credits: 3**

Block Placement - enables learners to integrate learning and generate newer learning by participating in the intervention process over a period of 6 weeks continuously, in a specific agency. Usually, block field work is provided at the end of the two-year programme. There shall be a professionally qualified worker in the setting willing to plan orientation and provide consultation, when needed.

Even semester:

Paper Title: **HUMAN RESOURCE DEVELOPMENT AND EMPLOYEE WELLNESS**

Credit pattern: L:T:P::2:0:0 **Total Credits: 2**

INTRODUCTION

The purpose of this course is to provide practical exposure and knowledge in behavioural science to develop skills not only to understand and analyse problems but also to develop a problem-solving approach to issues.

OBJECTIVES

a. To develop multi facets of the personality and to build self confidence.
b. To develop a spirit of continuous learning and innovation.
c. To strengthen the competency base of individuals, teams and organization and also familiar with the organizational culture.
d. Understand and further the organization culture.
e. To appreciate the importance of bottom-line focus to the Human Resource function and trend toward HR Accountability.
f. To understand the various approaches to and techniques of measuring HR issues.
g. To create awareness of different types of information systems in an organization so as to enable the use of computer resources efficiently, for effective decision- making.

Course Content

UNIT I

Human Resource Development (HRD): Concept, origin and needs for HRD; Overview of HRD as a Total system; Approaches to HRD; human capital approach; social psychology approach and poverty alleviation approach; HRD and its dimensions, Competency Mapping.

UNIT II

HRD Interventions: Performance Measurement Systems – Fundamental issues. Feedback sessions. Organizational goal setting process, Key Result Area (KRA) and Key Performance Indicator (KPI),Coaching, Mentoring, career planning, career development, reward system, quality of work life. HRIS: - Computers and computer based Information Systems. Measuring HR : Changing role of HR, HR as a strategic partner, the need for measuring HR. Approaches to measuring HR: - Competitive Benchmarking, HR Accounting, HR Auditing, HR Effectiveness Index, HR Key Indicators, HR MBO (Management by Objectives).

Instructional Technology: Learning and HRD; Building Learning Organization: measuring learning – the intellectual capital, architecting a learning organization, Organizational Learning, models and curriculum; factors and principles of learning; group and individual learning; HRD trends; behavioural sciences; transactional analysis; Concepts of continuous learning, behavior modeling and self-directed learning; evaluating the HRD effort; data gathering; analysis and feedback; HRD experience in Indian organizations; future of HRD - Organization culture and development.

UNIT III

Talent Development: Concept and importance; Training Need Analysis, process of training, designing and evaluating training and development programs. Use of information technology, Types and Methods of Training: Training within industry (TWI), External; on the job and off the job; Training methods; lecture, incident process, role play, structured and unstructured discussion, in-basket exercise, simulation, vestibule, training, management games, case study, programmed instruction, team development, and sensitivity training; review of training programs.

UNIT IV

Employee Wellness: Concept, philosophy, principles and scope; Importance and relevance of wellness programs, Role of Welfare Officer as per the Factories Act 1948. Relevance - with reference to Accidents, Absenteeism, Alcoholism, Domestic Violence: Preventive and remedial measures.

Employee Counseling. Role of Counselor in Organizations. Corporate Social

Responsibility (CSR): CSR as a business strategy.

Environmental management systems ISO 14001, ISO 26000: Social responsibility guidance standard, environmental impact assessment.

REFERENCES

1. Bhattacharyya, Dipak Kumar.1999 Managing People, New Delhi, Excel Books.

2. Business Today Managing People: The Business Today, Experiential Guide to Managing Workforce 2000, January 7-21, 1996.

3. Cowling, Alan and James Philip The Essence of Personnel Management and Industrial Relations, New Delhi, Pentice-Hall of India Pvt., Ltd.

4. Davis, Keith. 1983 Human Behaviour at Work, New Delhi: Tata McGraw-Hill

5. Fisher, Cynthia; Schoenfeldt, Lyle F. and Shaw, James, B. 1997 Human Resource Management, Third Edition, Boston, Houghton Mifflin Company.

6. Jayagopal, R. 1990 Human Resource Development: Conceptual Analysis and Strategies, New Delhi: Sterling Publishers Pvt. Ltd.

7. Moorthy, M. V. 1982 Priciples of Labour Welfare, New Delhi, Oxford & IBH.

8. Moorthy, M. V. 1992 Human Resource Management Psycho-Sociological Social Work

Approach, Bangalore, R & M Associates.

9. Norman, M. 1960 — Psychology in Industry, London, Harrap & Company.

10. Prasad, L. M. 1996 — Organisational Behaviour, New Delhi, S. Chand & Co.

11. Rao, T. V. 1990 & — HRD Missionary, New Delhi. Oxford IBH.

12. Rao, T. V. 1991 — Reading in Human Resource Development, New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd

13. Rudrabasavaraj, M. N. 1984 — Human Factors in Administration, Bombay: Himalaya Publishing House.

14. Sahni, P. and Sharma, K. K. 1988 — Organisational Behaviour, New Delhi: Deep and Deep Publications.

15. Singh M. K. and Bhattacharya (Eds.) 1990 — Personnel Management, New Delhi : Discovery Publishing House.

16. Vroom, V. H. and Grant, L. 1969 — Organisational Behaviour and Human Performance, New York. Wiley.

Even Semester

Even

Title: CASE STUDIES

Credit pattern: L:T:P::0:0:2 Total Credits: 2

Every Candidate is expected to take up five cases, study them in depth and present the intervention, if any. Case refers to a unit of study – an individual, an institution, a community or an incident. The candidate has to work under the guidance of faculty member and submit the report on or before the date prescribed.

The university or the college concerned can develop guidelines for undertaking case studies. However, the students are encouraged to start his/her work on case studies from the beginning of the course.

Evaluation of the case study will be done along with the viva-voce examination by the viva-voce committee constituted for the assessment of social work practicum or similar committee may be constituted, if required.

Open Elective

Paper Tile: **DISASTER MANAGEMENT**

Credit pattern: L:T:P::3:1:0 Total Credits: 4

INTRODUCTION

The course aims at introducing students to acquire the required knowledge and skills in disaster management.

OBJECTIVES

a. Understand key concepts, theories and approaches of disaster management with specific reference to Indian context
b. Develop skills to analyse factors contributing to disaster
c. Develop an understanding of the process of disaster management
d. Develop an understanding of the social worker's role in the team for disaster management.

Course Content

UNIT I

Disasters: Concept, types and impact - Famine, floods, cyclones, hurricanes, warfare, earthquake, volcanoes; traditional and modern disaster threats and care factor, classification of disasters; Disaster management - Definition and concept; approaches to

disaster management, importance and relevance of disaster management in the present environmental scenario, cases studies of disaster management.

UNIT II

Disaster and Social Work Intervention: Scope of disaster related intervention, intervention during disaster impact stage, trauma counseling and crisis intervention, post disaster management, damage assessment and long term rehabilitation and reconstruction, networking and co-ordination between government, NGOs, donor agencies, local bodies, police, military etc.

UNIT III

Disaster Prevention and Preparedness: Vulnerability analysis, hazard mapping, community based disaster preparedness programmes, training for CBDP, preparedness for post-disaster emergency response and long term rehabilitation, organization and planning, logistics; resource utilization, specialized skills and training needs; public awareness and education; first-aid training, civil defense training.

UNIT IV

Institutions and Instruments in Disaster Response: international decade for natural disaster reduction and UN resolutions, administration of relief in India - National, state, district and local levels; Disaster related legislations and policies; national and international donor agencies; NGOs, mental health institutions in disaster management and relief.

REFERENCES

1. IFRC, 2005 World Disaster Report

2. Birnabaum, F, Coplon, J and Scharff, T 1973 "Crisis intervention after a Natural Disaster", Social Case Work, Vol. 54,

3. Blaufard H and Levine J 1967 No. 9, 545-551

4. Brahme S and Gole P, 1967 "Crisis intervention in an Earthquake", Social Work, Vol.17, No.4, 16-19

5. Chen, L 1973 Deluge in Poone, Poone: Asia Publishing House

Disaster in Bangladesh: Health Crisis in a Developing Nation, New York,

Oxford University Press.

6. Fritz, C.E 1968 "Disaster", Sills D (Ed.) Internatioanl Encyclopedia of Social Science. Vol 4 USA: The MacMillan Company and the Free Press, 202-208.

7. Gangrade, K.D and Dhadde S, 1973 Challenge and Response, Delhi: Rechna Publication.

8. Grossman, L 1973 "Train Crash: Social Work and Disaster Services" Social Work Vol.18, No.5, 38-44

9. Hoff, A 1978 "People in Crisis", Understanding and Helping, California: Addison Wesley Publishing Company.

10. Joint Assistantance Centre 1980 Natural Disaster, New Delhi: Adhyatma Sadhana Kendra

11. Lindomann, E 1944 "Symptomology and Management of Acute Grief", American Journal of Psychiatry, Vol. 101, pp.141-148

12. Shader, I and Schwartz A 1966 "Management of Reaction of Disaster", Social Work, Vol. 11, No. 2.

13. Siporin, M 1966 "The Experience of Aiding the Victims of Hurricane "Betsy", Social Service Review, Vol. 10

14. Wolfenstein, M 1977 Disaster: A Psychological Essay, New York: Arno Press

Open Elective:

Paper Title: **CORRECTIONAL ADMINISTRATION AND SERVICES**

Credit pattern: L:T:P::3:1:0 **Total Credits: 4**

INTRODUCTION

This course introduces the basics of the administration of correctional institutions and the integrated services provided to persons in conflict with law so as to reintegrate them into the mainstream of society as law abiding citizens.

OBJECTIVES:

a. To acquaint with the correctional institution and non-institutional programmes.

b. To understand the different services for juvenile, young and adults offenders and also to understand the legal provisions and procedures for their assistance.

c. To understand the role of custodial staff in the process of correction and rehabilitation.

d. To understand the structure, function ,treatment and facilities provided by the institutions.

Course content

UNIT I

Institutional systems - Introduction to correctional administration. History of Correctional Administration in India - Concept, objectives and functions of Correctional administration.

Institutional protection for children and young offenders - Juvenile Justice (Care and Protection of Children) Act -2002, 2005.

Observation Home, Juvenile Home for Boys and Girls and their functions. District Shelter for boys and girls and their functions.

UNIT II

Institutional Treatment for Released Offenders and Convicts.

Prison - Historical development of prison system- Indian Prison Act, Prison Manual (Karnataka).

Prison administration, prison labor, prison discipline and prison education Pre-release programmes, prisoners‟ welfare board.

Open-air prison - Historical development of Open-air prison system, organization and administration.

UNIT III

Non-institutional systems.

Probation and Parole - Historical development of probation system, principles and procedure.

Parole - Historical development of parole - functions and powers of Parole Board, Conditions under the Prison Manual. Indian Penal Code, provisions on Parole.

Pre-release preparation of the parolee.

UNIT IV

After care services:

Legal provision for establishing social institution.

Provision for assistance to released prisoners - Role of voluntary organization, corporate bodies and the state in the rehabilitation.

Prevention of Immoral Traffic Act - Its objectives; State Home for Women (Sthrinikethana)

Citizen committees, Police help-line.

Social work intervention and Role of social worker in the prison administration. Social work practice in correctional services.

REFERENCES:

1. Ahuja Ram, 2006 — Criminology: New Delhi, Rawat Publications

2. Afzal Qadri, S.M, and Ahmad Siddiqiue‟s, 2005 — Criminology: Problems & Perspectives, Lucknow, Eastern Book Co.

3. Paranjape N.V, 1998 — Criminology and Penology; Allahabad: Central Law Publications

4. Sethna, M.J, 1964 — Society and the Criminal, Bombay, Kitab Mahal

5. Sirohi, J.P.S, 1983 — Criminology and Correctional Administration, Allahabad, Allahabad Law Agency

6. Srivastava, Surendra Sahai 2007 — Criminology, Criminal Administration; Allahabad, Allahabad Central Law Agency

Appendix I
PATTERN OF QUESTION PAPER
Question Paper Pattern

(The Question paper comprising of 3 parts: A,B and C as follows)

Title of the Paper **Paper Code:**

Duration: 3 hours **Max.Marks:70**

PART – A

There are 6 questions and a candidate has to answer any 4 questions. Each question carries 4 marks. This part covers all units of the syllabus.

Answer any Four 4x4=16

1.
2.
3.
4.
5.
6.

PART – B

There are 6 questions and a candidate has to answer any 4 questions. Each question carries 10 marks. This part covers all units of the syllabus.

Answer any Four 4x10-40

7.
8.
9.
10.
11.
12.

PART – C

There is a single question (with no choice) such as case study (may contain sub questions) covering entire syllabus carrying 14 marks.

Answer the following. 1x14=14

13.