Bachelor of Science (Food Processing and Quality Management)

(Choice Based Credit System)

SYLLABUS

SEMESTER - I

DSC1A - FOOD PROCESSING – I (3 + 0 +2)

TOTAL CREDITS: 3
TOTAL HOURS: 45 hrs

Objectives:

1. To know the sources of food, its constituents & method of primary and secondary processing for different foods.
2. To know the Objectives and functions of food packaging &Sensory evaluation of food.

Learning outcomes:

1. The student should able to understand the primary processing & secondary processing
2. The student should able to understand the constituents of food and sources of food spoilage.
3. The student should be able to understand the unit operation techniques & properties of packaging .

Module 1: (03 hrs)

History and Introduction to Food Science: Historical development, Definition and scope of food science and technology, various branches of Food Science and Technology, Sources of food, classification of foods (perishable, non perishable, semi perishable food), causes of food spoilage.

Module 2: (12 hrs)

Food Constituents: Nutrients and Non-Nutrients – Overview of carbohydrates, lipids, proteins, Other essential nutrients: Vitamins, minerals, water their nutritional properties and functions, Dietary fibres, Phyto Chemicals and their importance.

Module 3: (12 hrs)

Primary processing and secondary processing of food:

Primary Processing: Introduction, classification of food processing, method of cleaning, sorting, grading, cutting, seeding, chilling and freezing.

Secondary Processing: Introduction, classification and brief account of secondary processing, cooking, frying, roasting, toasting, grilling, blanching, slicing, pulping, paste, milling and drying.

Module 4: **(12 hrs)**

Food Processing Operations and Food Packaging: Food processing in unit operations and its applications to the food industry.

Techniques used in Unit Operation: Cleaning, dry cleaning methods, wet cleaning methods, peeling, grading and sorting.

Food Packaging: Brief account on food packaging, requirements for effective food packaging, types and general properties of packaging materials.

Module 5: **(06 hrs)**

Sensory Evaluation of Food: Objectives, type of food panels, characteristics of panel member, layout of sensory evaluation laboratory.

Books and References:

1. Analysis of Food Constituents, Bruce A. Watkins, J.-L. Multon, William J. Stadelman.
2. Food Processing Technology Principles and Practice, Second Edition,Parts 1-4 by P.J. Fellows.
3. Food Science by B. Srilakshmi, publishing, New Age International (P) ltd. publications.
4. Introduction to food engineering. Academic press. (Unit I, II, III&IV).by Singh RP and Heldman DR, 1993, 2003, 2009, 2nd, 3rd and 4th Ed.
5. Sensory Evaluation of Food ,Principles and Practices By Harry T. Lawless, Hildegarde Heymann .
6. https://naitc-api.usu.edu , http://www.pitt.edu

DSC1B - PRACTICAL

TOTAL CREDITS: 02

TOTAL HOURS: 24hrs

(12X2hrs)

1. Basic laboratory rules.
2. Demonstration of different instruments, machineries with their working principles & write down the construction, operation and utility of food processing laboratory equipments.
3. Demonstrate the operation of oven. Determination of moisture content by Oven dry method.
4. Determination of moisture content by thermo gravimetric method.
5. Estimation of Vitamin C by 2,6 dicholorophenol indophenol dye method .
6. Determination of acidity & alkalinity of water by phenolphthalein method.

Books and References:

1. Essentials of food process engineering. B S publications (Unit I,II, III&IV) by Rao CG.
2. Food Packaging – Principles and Practice, CRC Press Taylor and Francis (Unit IV) Robertson GL.

3. Food Science , CBS Publisher, New Delhi by Potter,N. N , Hotchkiss,J.H.
4. Foods-Facts and Principles ,New Age International Publisher, New Delhi By Manay N.S, Shadaksharaswamy, M.
5. Principles of Food Science: Part-I Food Chemistry. Marcel Dekker, New York by Fennema, O.R

DSC2A - DAIRY SCIENCE - I
(3 + 0 +1)

TOTAL CREDITS: 3
TOTAL HOURS: 45 hrs

Objectives:

1. To ensure viability and growth of Milk Producers by converting surplus milk into other dairy products and ensure their marketing.
2. To carry out activities for promoting production, procurement processing and marketing of milk and milk products for the economic development of the farming community**.**

Learning outcomes:

1. The student should able to understand milk processing industry in India.
2. The student should able to understand composition of milk.
3. The student should be able to understand the products made of milk.

Module 1: (10 hrs)

Introduction of Dairy Science: Development of milk processing industry in India, present status and scope, layout of milk processing plant and its management, dairy design & sanitation layout, dairy equipments & sanitation, Buying, receiving, collection, Platform testing, Transportation of milk, storage & distribution of milk.

Module 2: (08 hrs)

Overview of Milk: Definition of milk & colostrums, composition of milk, types of market milk and milk products, organic milk food products , Factors affecting composition of milk, Physico – chemical properties of milk, adulteration in milk, Lactose its forms and Significances of lactose in dairy industry.

Module 3: (07hrs)

Processing of Milk: Condensed, Fermented milk & Cream

Condensed / Concentrated milks: Types, processing of sweetened condensed milk & bulk concentrated milk and product defects its composition, production, and defects.

Fermented milks: definition, types- Curd, lassi, yoghurt, buttermilk, acidophilus milk & cheddar cheese, production of Bulgarian milk.

Cream: Definition & Composition, Different types of creams marketed, bulk separation & storage of cream and their production method and defects.

Module 4: (10 hrs)

Milk fat: Composition and structure, factors affecting melting point, boiling point, solubility and Refractive Index, fat constants (saponification value, iodine value, RM value, Polenske

value, peroxide value), Chemical reactions of fat (hydrolysis, auto-oxidation), condition favouring , auto oxidation, prevention, measurement of auto-oxidation.

Module 5: (12 hrs)

Milk Proteins, Enzymes, Vitamins and Minerals: General structure, amphoteric nature, difference between casein and serum protein, different types of casein (acid and rennet), uses of casein, whey protein fractionation of protein. Catalase, alkaline phosphatase, lipases and proteases, Minerals & Vitamins present in Milk, effects of processing and storage.

Books and References:

1. Dairy Processing – Improving Quality, by Smit G CRC-Woodhead Publ.
2. Fundamentals of dairy chemistry by Webb & Johnson.
3. Milk & Milk Products By Mahindru.
4. Milk and Milk Products in Human Nutrition By Stanisław Kazimierz Kon.
5. Outline of Dairy technology by Sukumar De.
6. http://www.auburn.wednet.edu , https://www.uen.org/ct

DSC2B - PRACTICAL

TOTAL CREDITS: 01
TOTAL HOURS: 12 hrs

(06X2hrs)

1. Conduction of platform tests in milk. (Acidity and COB, MBRT).
2. Estimating the quality of milk using Lactometer & efficiency of sterilization of milk by Turbidity test.
3. Estimation of milk fat by Gerber & SNF method.
4. Analysis of specific gravity of milk.
5. Preparation of casein and calculation of its yield.
6. Preparation of fermented products: Curd, Lassi and Buttermilk.
   Field activity: Visit to a milk industry.

Books and References:

1. Aneja RP, Mathur BN, Chandhan RC& Banerjee AK.
2. Dairy Technology – Principles of Milk Properties and Processes. Marcel Dekker.
3. Outlines of Dairy Technology. Oxford Univ. Press Publ., New Delhi.
4. Technology of Indian Milk Products. Dairy India Publ., Delhi. De S.
5. Walstra P, Geurts TJ, Noomen A, Jellema A & Van Boekel MAJS.

DSC3A: BAKERY AND CONFECTIONERY – I (3 + 0 + 1)

TOTAL CREDITS: 03

TOTAL HOURS: 45 hrs

Objectives:

1. To develop skill in various baking procedures; know various kinds of ingredients & prepare different kind of baking & confectionary products .
2. To gain knowledge of equipments needed for bakery and confectionary industry.

Learning outcomes:

1. The student should be able to understand Bakery and Confectionery industry.
2. The student should be able to understand Rheological testing of dough with units & measurements used in bakery industry.
3. The student should be able to start up a bakery.

Module 1: **(06hrs)**

Bakery and Confectionery Industry: Raw materials, role of yeast in bakery and quality parameters, dough development, dough chemistry. Overview on bakery and bakery products, scope, present status and future perspective, Bakery terms, Organization chart of Bakery, Cleaning and maintenance of work area and machineries.

Module 2: **(10hrs)**

Rheological test of dough: Wheat and Flour: Different types of flours available, Constituents of flours , testing of wheat grain quality, moisture tests, grain hardness testing, pH Value of flour, Water absorption power of flour, Gluten, Diastatic capacity of flour, Grading of flour.

Module 3: **(05hrs)**

Units and measurements used in Bakery industry: Temperature/ Weight conversions (F/ °C /gms / lb) serving, viscograph, amylograph, farinograph Mixograph, Extensograph, Rapid Visco Analyzer, Falling number, Hosney's dough stickiness tester.

Module 4: **(12 hrs)**

Equipment in Bakery and Confectionary Industry: Detailed description of unit operations for the manufacturing of bread, biscuits, cakes and the effect of variations in formulation. Construction and working of various equipments used in bakery industry: Dough mixer, divider, rounder, proofing, moulding, baking machine, slicing machine sheeter, baking ovens, cooling chamber, sealing and packaging machines, rolling and cutting machines.

Module 5: **(12 hrs)**

Confectionary Products: Principle, Classification and Types of confectionary products, Characteristics and processing of raw material, Technology of manufacturing of toffee, hard

boiled candies, bars, chewing gums, bubble gums. Characteristics of finished products. Defects in confectionary: Sugar bloom, Fat bloom. Preservation of Bakery and confectionary products, Spoilage and microbial analysis, Packaging of Bakery and Confectionery products.

Books and References:

1. "Association of Operative Millers Cereal Millers Hand Book", Burgess Publishing company, USA.
2. A professional Text to bakery and confectionary by John Kingslee.
3. Bakery 1 student handbook and practical manual published by CBSE.
4. Bread: A baker's book of techniques and recipes by Jeffrey Hamelman.
5. "Bakery Technology and Engineering", Chapman & Hall, 3rd Edition by Samuel A. Matz.
6. http://losasm.site , https://www.lkstevens.wednet.edu

DSC3B - PRACTICAL

TOTAL CREDITS: 01

TOTAL HOURS: 12hrs

(06X2hrs)

1. Determination of moisture content of different raw ingredients, finished goods and packaging material.
2. Determination of pH value of wheat flour.
3. Preparation of hard boiled candies and bars.
4. Preparation of Chewing gums & Bubble gums.
5. Evaluation of Gluten content of flour.
6. Study of microbial growth on bakery products. (Physical & Microscopic observation)

Field Activity: Visit to bakery and confectionery industries.

Books and References:

1. Dubey SC. 2002. Basic Baking. The Society of Indian Bakers, New Delhi.

2. Francis FJ. 2000. Wiley Encyclopedia of Food Science & Technology.

3. John Wiley & Sons. Manley D. 2000. Technology of Biscuits, Crackers & Cookies ,2nd Ed. CRC Press.

ENGLISH - I

Total Credits: 3 + 0 + 0=3
Total Hours: 45hrs

Semiosis – I

Poetry (1 Lecture hour per week):

1. The Oxford Clerk – Geoffrey Chaucer
2. Shall I Compare Thee – William Shakespeare
3. Sparkles from the Wheel – Walt Whitman
4. Where the Mind is without Fear – Rabindranath Tagore
5. The Tiger and the Deer – Sri Aurobindo

Prose (1 Lecture hour per week):

1. Toba Tek Singh – Saadat Hasan Manto
2. The Clay Mother-in-law: A South Indian Folktale (Collected by A. K. Ramanujan)
3. On the Way to Goregaon – B. R. Ambedkar

Language Component and **Literary Activity** (2 Tutorial hours per week):

1. Homophones (Words often confused)
2. Articles
3. Verbs in relation to tense, person and number of the subject
4. Prepositions (of place, time, position)
5. Reading Comprehension (of an unseen passage)

HINDI - I

Title of the Paper – Hindi Gadya aur Anuvaad

Total Credits (LTP): 3+ 0 + 0 = 3

Total Hours: 45hrs

Unit- 1 & 2: Hindi Gadya - Gadya Pratibha, Edited by Dr. Basavaraj K.Baraker, Javahar Pustakalaya, Sadar Bazar, Mathura, (UP) 281001 (Omitted 2.4.6.8.10.12..14, 16, 18, 20, 22)

Unit – 3 & 4: Anuvaad

- Anuvaad ki Paribhasha
- Anuvaad kala hai ya vigyan
- Anuvaad ke prakar- Shabdanuvaad, Bhavanuvaad, Vaijyanik
- Anuvaad, Takniki Anuvaad
- Vanijya Anuvaad- Prashasanik Aur Kanuni Anuvaad
- Paribhashik Shabdavali.

Recommended Books

- Anuvaad Vigyan- Bholanatha Tiwari, Shabdkar, Delhi,110092
- Anuvaad kala-Kuch vichar- by Anand Prakash Khemani, S.Chand & Co., New Delhi.
- Anuvaad Siddhant aur samsyayen: R.N.Srivastav and K.K. Goswami, Alok Prakashan, Delhi.
- Anuvaad-Patrika ke Ank,Pub. Anuvaad Sahitya Parishass,New Delhi
- Anuvaad- Siddhant Evam Swarup by Manohar Saraph and Dr. Shivkanth Goswamy.

ENVIRONMENT STUDIES

Total Credits: 3 + 0 + 0=3
Total Hours: 45Hours

Unit 1: Introduction to Environmental Studies 5hrs

- Multidisciplinary nature of environmental studies; Components of environment: Atmosphere, hydrosphere, lithosphere, biosphere. Scope and importance; Concept of sustainability and sustainable development.

Unit 2: Ecosystems 5hrs

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.
- Case studies of the following ecosystems:

  a) Forest ecosystem

  b) Grass land ecosystem

  c) Desert ecosystem

  d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3: Natural Resources: Renewable and Non-renewable Resources 5hrs

•Land resources and land use change; Land degradation, soil erosion and desertification.

•Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal Populations.

•Water: Use and over- exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter- state).

•Energy resources: Renewable and non renewable energy sources, Use of alternate energy sources, growing energy needs case studies.

Unit 4: Biodiversity and Conservation 5hrs

•Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots

•India as a mega-biodiversity nation; Endangered and endemic species of India

•Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

•Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit 5: Environmental Pollution **5hrs**

•Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution

•Nuclear hazards and human health risks

•Solid waste management: Control measures of urban and industrial waste.

•Pollution case studies.

Unit 6: Environmental Policies & Practices **8hrs**

•Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture

•Environment Laws: Environment Protection Act; Air (Prevention &Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols, UNFCCC (The United Nations Frame work Convention on Climate Change, CBD (Convention on Biological Diversity) and IUCN (International Union for Conservation of Nature).

•Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Unit 7: Human Communities and the Environment **5 hrs**

•Human population growth: Impacts on environment, human health and welfare.

•Resettlement and rehabilitation of project affected persons; case studies.

•Disaster management: floods, earthquake, cyclones and landslides.

•Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.

•Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.

•Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Unit 8: Field work **7hrs**

•Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.

•Visit to a local polluted site-Urban/Rural/Industrial/Agricultural

•Visit to Industries for study on Occupational health and safety.

•Study of Biodiversity and protected areas.

• Study of Solid waste management/drinking/waste-water treatment plant etc.

Suggested Readings:

1. Carson, R. 2002. *Silent Spring.* Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R.1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.

3. Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.

4. Gleick, P.H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.

5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland:Sinauer Associates, 2006.

6. Grumbine, R. Edward, and Pandit, M. K. 2013.Threats from India's Himalaya dams. *Science,*339:36---37.

7. McCully, P. 1996. *Rivers no more: the environmental effects of dams* (pp.29---64). Zed Books.

8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

9. Odum, E. P., Odum, H. T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.

10. Pepper, I. L., Gerba, C. P. & Brusseau, M. L. 2011. Environmental and Pollution Science. Academic Press.

11. Rao, M. N. & Datta, A. K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.

12. Raven, P. H., Hassenzahl, D. M . & Berg, L. R. 2012. *Environment*. 8th edition. John Wiley & Sons.

13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India*. *Tripathi 1992.*

14. Sengupta, R. 2003. *Ecology and economics*: Anapproach to sustainable development. OUP.

15. Singh, J. S., Singh, S. P. and Gupta, S. R. 2014. *Ecology, Environmental Science and Conservation* .S. Chand Publishing, New Delhi.

16. Sodhi, N. S., Gibson, L. & Raven, P. H. (eds). 2013. *Conservation Biology*: *Voices from the Tropics*. John Wiley & Sons.

17. Thapar, V. 998. *Land of the Tiger*: *ANatural History of the Indian Subcontinent*.

18. Warren, C. E. 1971. *Biology and Water Pollution Control*. WB Saunders.

19. Wilson, E. O. 2006. *The Creation: appeal to save life on earth*. New York: Norton.

20. World Commission on Environment and Development. 1987. *Our Common Future*. Oxford University Press.

21. www.nacwc.nic.in

22. www.opcw.org

SEMESTER - II

DSC4 A - FOOD PROCESSING – II (3 + 0 + 2)

TOTAL CREDITS: 03
TOTAL HOURS: 45HRS

Objectives:

1. To understand the principles behind the various methods of food preservation.
2. To study the method of action of different preservatives.

Learning outcomes:

1. The student should be able to understand food processing machineries and their working principles.
2. The student should gain the knowledge of Food additives.
3. The student should be acquainted with Safety and quality evaluation of food additives and contaminants.

Module 1: (06 hrs)

Food Processing Machineries: Working principles and designs of the machineries: Millers, ovens, boilers, freezers, mixers and kneaders, size reduction machineries, pasteurizer, packaging equipments.

Module 2: (12 hrs)

Food Processing and Preservation Principles: Pasteurization, Sterilization, Ultra High temperature, blanching. Low temperature preservation techniques: Cooling, Evaporation, membrane filtration technique, refrigeration and freezing. Recent methods in preservation: Pulsed electric field processing, high pressure processing, processing using ultrasound, dielectric, Ohmic radiation and infrared heating methods. Importance of water activity in food preservation.

Module 3: (10hrs)

Food Preservatives: Principles, chemicals, antioxidants, mould inhibitors, antibiotics, acidulants sequestrants their chemistry, types and functions, preservation by salt, sugar and fermentation - advantages, disadvantages and effect on food quality,.

Module 4: (12hrs)

Food additives in food processing: Classification and their functions, ADI, GRAS and naturally occurring compounds, Nutritional and non nutritional food additives, Direct food additives -Types and properties, Natural food colors : Heme pigments, chlorophylls, carotenoids, anthocynains and flavonoid, tannins, caramel and other artificial food colors, Permitted and Non-permitted Colors.

Module 5: **(05hrs)**

Safety and Quality Evaluation of Food Additives: Regulatory aspects, Safety and quality evaluation of food additives and contaminants, International numbering system for food additives.

Books and References:

1. Advanced Textbook on Food and Nutrition by Dr. M. Swaminathan Vol: I & II, The Bangalore Printing and Publishing Co. Ltd.
2. Food Facts and Principles Many N. S. & Shadakshasawamy M. New Age International Publishers.
3. Food Preservatives By Grahame W. Gould
4. Food Science by Norman N Potter and Joseph H. Hotchkiss, CBS Publishers and Distributors.
5. Handbook of food additives. Vol I and Vol II (Unit I,II, III&IV) .
6. https://www.chemicalsafetyfacts.org/preservatives/ , https://www.academia.edu/

DSC4 B - FOOD PROCESSING – II (Practical)

TOTAL CREDITS: 02
TOTAL HOURS: 24 hrs

(12 X 2 hrs)

1. Preparation of standard solutions- normality, molarity.
2. Preparation of standard solutions: ppm, ppb and percentage calculation.
3. Demonstrate membrane filtration technique.
4. Extraction & Quantification of carotenoids from carrot.
5. Prepare Jam with different concentration of sugar (5 %, 15% & 30%) and confer the preservation efficiency-Demonstration.
6. Prepare Pickle with different concentration of salt (5 %, 15% & 30%) and confer the preservation efficiency – Demonstration.
7. Prepare Tomato Ketchup – Fruits & Vegetables with different concentration of chemical (5 %, 15% & 30%) and confer the preservation efficiency - Demonstration.
8. Preserve Pineapple using different concentration of Vinegar (5 %, 15% & 30%) and confer the preservation efficiency – Demonstration.
9. Determination of total chlorophyll A & B by Spectrophotometric method.
10. List the additives (according to GRAS) used in bakery, fruits, vegetables, milk and meat products.
11. Qualitative determination of preservative (Benzoic acid) in the food sample by ferric chloride test

***Field Activity*:** Visit to Food Industry / R & D Lab

Books and References:

1. “Food processing and preservation” by Subalakshmi, G and Udipi, S.A.
2. Food Processing: Principles and Applications by Ramaswamy H. & Marcotte M. Taylor & Francis.
3. Food Science by Norman N Potter and Joseph H. Hotchkiss, CBS Publishers and Distributors.
4. New Methods of food preservation”, Springer Science & Business Media by Gould, G. W.
5. Novel Food Processing Technologies by Barbosa-Canovas, Tapia & Cano CRC Press.

DSC5A: DAIRY SCIENCE - II (3 + 0 + 1)

TOTAL CREDITS: 03
TOTAL HOURS: 45hrs

Objectives:

1. Impart knowledge and technical proficiency in clean milk production and handling-Processing of milk.
2. Facilitate Good Manufacturing Practices in the processing sector.

Learning outcomes:

1. The student will be able to inculcate the knowledge regarding various dairy products and its processing techniques.
2. The student will be able to understand the processing and storage of dairy products.
3. The student will gain knowledge about the standards of dairy industry.

Module 1: (05hrs)

Dairy Development in India : Dairy Cooperatives – NDRI, NDDB, TCMPF, Operation Flood – Milk and Milk Products Order '92 , Nutritive value of milk – Milk production in India with reference to Global milk production – Per capita availability of milk in India , Role of milk and milk products in human nutrition, Dairy husbandry.

Module 2: (10 hrs)

Diary Processing: Processing of milk, filtration, clarification, cream separation & sterilization, chilling standardization, pasteurization, homogenization, bactofugation, Principles of dehydration of milk, Boiler & its efficiency, Energy consumption in different milk processing operations, Refrigeration requirements in different dairy processing operations, Time/Temperature schedule for CIP of Tanker, Pipelines and Pasteurizers, Energy Conservation measures.

Module 3: (12hrs)

Processing of Milk: Preparation of butter, paneer, chenna (soft cheese), ghee, khoa, flavoured milk and dairy by-products, Dried milk products – Whole Milk Powder, Skimmed Milk Powder, Buttermilk powder, Whey Powder, Infant milk food. By-products Utilization: Judging & grading of milk and its products, Manufacturing process, storage, packaging and labeling, defects and their prevention, hygiene and sanitation in milk plant.

Module 4: (06 hrs)

Frozen Dairy Products: Principles and methods of ice cream manufacturing, definition & composition, role of ingredients. Grading and prevention of defects in ice creams, preparation of ice cream mix powder, Kulfi, Softy.

Module 5: (12hrs)

Dairy Plant Management & Standards: Food safety and Quality assurance strategies – Implementation of HACCP / ISO certification, Definition of Milk and Milk Products under the PFA Rules, 1955/Food Safety Act 2006, Classes of Milk – Legal / Statutory standards of milk and milk products ,bacteriological standards for milk and milk products – BIS, PFA standards Maximum Permissible limits of Aflatoxin, Pesticides, Antibiotic residues and Heavy metals in Milk and Milk Products.

Books and References:

1. "Milk and Milk Products: Technology, chemistry and microbiology", Springer Science & Business Media Publishers by Alan H. Varnam, .
2. "Modern Dairy Technology: Volume 2 Advances in Milk Products", Springer Science & Business Media Publishers by Robinson, R. K.
3. PFA Act 1954 & Rules 1955 as amended to date.
4. Technology of Indian Milk Products by Aneja et al. A Dairy India Publication.
5. Warner J. M, 1976, Principles of Dairy Processing.
6. http://www.auburn.wednet.edu , https://www.uen.org

DSC5B: DAIRY PRODUCTS (Practical)

TOTAL CREDITS: 01

TOTAL HOURS: 10 hrs

(05X2 = 10 hrs)

1. Pasteurization of milk, Determination of efficiency of pasteurization
2. Preparation of milk products like Khoa, Paneer, Chhena,
3. Preparation of milk based beverages - flavoured milk and various flavoured ingredients.
4. Preparation of frozen dairy products : ice-cream, Kulfi & Softy
5. Microbiological quality evaluation of milk and milk products.

Field Activity: Visit to Ice cream Industry.

Books and References:

1. Milk & Milk Processing; Herrington BL, McGraw-Hill Book Company.
2. Milk Processing and Technology by A Q Khan, Allahabad Publication.
3. Modern Dairy Products, Lampert LH, Chemical Publishing Company.
4. Outlines of Dairy Chemistry, De S; Oxford.
5. The technology of milk Proceesing–Ananthakrishnan, C.P., Khan, A.Q. and Padmanabhan, P.N. Shri Lakshmi Publications.

DSC6A: BAKERY AND CONFECTIONERY – II (3 + 0 + 1)

TOTAL CREDITS: 03

TOTAL HOURS: 45hrs

Objectives:

1. To gain indepth knowledge about the raw materials used in production of bakery products.

2. To be familiar with the procedures in the production of Bakery and confectionery products

Learning outcomes:

1. The student will understand the process and how their ingredients play a role in preparation of breads, cakes, biscuits, chocolates, implementing and maintaining product quality systems.
2. The course has been designed in such a way that the students aspiring to be entrepreneurs field of bakery and confectionery.

Module1: (08hrs)

Raw materials used in Bakery: Role of flour, water, salt, yeast, sugar, milk, fats etc, Yeast - an elementary knowledge of baker's yeast, role played in fermentation of dough and conditions influencing its working. Effect of over and under fermentation and under proofing of dough, Mixing methods used for baking, Baking ingredients required for production and plan production sequence.

Module 2: (10hrs)

Processes involved in Baking: Process of mixing and kneading to make dough, Oven and baking - knowledge and working of various types of oven. Biscuits and Cookies - types of biscuit dough, developed dough, short dough, semi sweet dough, batters, importance of the consistency of dough, factors affecting the quality of biscuits and cookies.

Module 3: (12hrs)

Preparation of Cakes and Breads:

Cakes: Cake making ingredients -flour, sugar, shortening and egg, fats and oils, leavening agents, cake making method, sugar batter process, flour batter process, correct temperature for baking different types of cakes.

Bread: straight dough fermentation, bread improvers, improving physical quality , Methods of bread making-straight dough method, No time dough method ,Sponge and dough method, External characteristic-volume, symmetry of shape, Internal characteristics - color, texture, aroma - Bread faults and remedies.

Module 4: (10hrs)

Preparation of Confectionary Products:

Chocolate Processing: Ingredients used in chocolate, Cocoa butter substitutes, chocolate refining, conching and molding, enrobing, panning.

Sugar Confectionary: Types of sugars - production , storage , alternative bulk sweeteners, corn syrup and glucose syrup, sorbitol, xylitol, maltitol, isomalt, lactitol, mannitol, polydextrose - fondant, fudge, caramel, toffee, nut brittles .

Gelatin Sweets - Fruit chews, jellies, gum.

Module 5: **(05hrs)**

Preparation of Pastries and Icing: Pastry making, principles & derivatives, Stages of Sugar Cookery - identification & description, Caramelized Sugar preparations, Sugar for desserts and presentations, Types of Icing and its characteristics.

Books and References:

1. Bakery Technology & Engineering; Matz SA, AVI Pub.
2. Emmanueal Obene : Chocolate science and Technology.
3. Extrusion of Food, Vol 2; Harper JM, CRC Press.
4. Modern Cereal Chemistry; Kent-Jones DW & Amos AJ, Food Trade Press Ltd.
5. W.P. Edwards : Science of Bakery Products.
6. http://www.norwichcsd.org , https://www.sfu.ca

DSC6B: BAKERY AND CONFECTIONERY – II

TOTAL CREDITS: 01

TOTAL HOURS: 15 hrs

(06X2.5hrs)

1. Preparation of bread and assessment of its quality.
2. Preparation of butter cake, sponge cake and assessment of its quality
3. Preparation of cake using instant cake mix and assessment of its quality.
4. Preparation of biscuits and cookies and assessment of quality.
5. Preparation and quality evaluation of chocolate, fondant, fudge and brittles.
6. Preparation of pastries.

Books and References:

1. John Kingslee: A professional text to bakery and confectionary, New Age International Publication.
2. NIIR Board: The complete technology book on bakery products.
3. Up to-date Bread Making; Fance WJ & Wrogg BH; 1968, Maclasen & Sons Ltd.

ENGLISH - II

Total Credits: 3 + 0 + 0=3
Total Hours: 45hours

Poetry:

1. On His Blindness – John Milton
2. Sower – Victor Hugo (Translated by Toru Dutt)
3. Once upon a Time – Gabriel Okara
4. I am not that Woman – Kishwar Naheed
5. Remembrance – Mamang Dai

Prose:

1. Pepe – Maxim Gorky
2. My Greatest Olympic Prize – Jesse Owens
3. Letters from *The Diary of a Young Girl* – Anne Frank

Language Component and **Literary Activity:**

1. Punctuation (capitalization, comma, period, question mark, exclamation mark, quotation marks and apostrophe)
2. Framing Questions (with wh-words & yes/no questions)
3. Use of Negatives
4. Linkers (Conjunctions)
5. Reading Comprehension (of an unseen passage)

HINDI - II

Title of the Paper – Hindi Kahani Sahitya aur Prayojanmulak Hindi

Total Credits (LTP): 3 + 0 + 0 = 3

Total Hours: 45hours

Unit -1 & 2: Aath Acchi Kahaniyan-Ed. Markandey- Lokbharati Prakashan,Allahabad-

Unit -3 & 4: Prayojan Moolak Hindi

Portion Prescribed

- Patravyavahar ka samanya parichay, Patron ke prakar, Parivarik Patra
- Vyavasayik Patravyavahar- Bank Sambandhee Patra, Beema sambandhee Patra, Poochha- taachha Sambandhee Patra, Aadesh sambandhee Patra, Paripatra- Agency Sambandhee Patra- Naukari Sambandhee Patra.
- Aalekhan- Paribhasha aur Prakar, Tippan- Paribhasha- Karyalay Me Tippan ka Kshetra aur prayog
- Sankshiptikaran- Sankshipt lekhan ke Pradhaan Gun

Recommended Books.

- Vyavasayik Sampreshan- Dr. Anupchand Bhayani, Pub. Rajpal and Sons, Kashmiri Gate, Delhi-6
- Karyalaya Aalekhan aur Tippan- Karnatak Mahila Hindi Seva Samithi, 178, 4th Main Chamraj pet, Bangalore.
- Vanijya Patra Vyavahar Anuvaad Nibandha Tatha Samkshiptikaran. Prof. A.v. Narti, jaanoday Prakashan, Dharwad.
- Prashasanik Hindi-Ed. Ramdarash Mishra and Ramswaroop Shastri
- Vyavaharik Hindi- Dr. Omprakash Simhal, Kitab Ghar, Dariaganj, New Delhi.

CONSTITUTION OF INDIA

Total Credits: 3 + 0 + 0=3
Total Hours: 45 hrs

Module 1:

1. Meaning and importance of Constitution
2. Making of Indian Constitution
3. Salient features and preamble

Module 2:

1. Fundamental Rights
2. Fundamental Duties
3. Directive Principles

Module 3: Union Government

1. Lok Sabha & Rajya Sabha (Composition, Powers and Functions)
2. President & Prime Minister (Powers, Functions, Position)
3. Supreme Court - Powers, Functions, Position

Module 4: Major Functionalities

1. Union Public Service Commission
2. Election Commission
3. Planning Commission

Books for reference-

1. Indian Constitution-Durga Das Basu.

2. Indian Constitution – M.V. Pylee.

3. Indian Government and Politics- J.C. Johri.

4. Indian Government- S.R. Maheshwari.

5. Indian Government and Politics- J.C. Joohri.

6. India's Constitution -- Faida

7. Indian Government and Politics - Dr. S.N. Dubey.

8. Indian Political System- R.C. Agarwal.

10. Indian Constitution --Vidhya Bhushan and Vishnu Bhagawan.

11. Bharathada sarkara matthu Rajakiya- Dr. H.M. Rajshekara

12. Bharathada sarkara matthu Rajakiya- Dr. K.J. Suresha.