SBRR Mahajana First Grade College (Autonomous), PG Wing Pooja Bhagavat Memorial Mahajana Education Centre KRS Road, Metagalli, Mysuru-570016

## M.Sc. (Computer Science) <br> Programme Structure <br> w.e.f. 2019-20

## I Semester

| Sl. No | Course Title | Type | Credits |  |  | Subject Code |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | L | T | P |  |
| 1 | Discrete Mathematical Structures | HC | 3 | 1 | 0 | 19J1H1 |
| 2 | Advanced Data Structures | HC | 3 | 1 | 0 | 19J1H2 |
| 3 | Data Communication | HC | 4 | 0 | 0 | 19J1H3 |
| Soft Core Courses (Choose at most 2 Courses) |  |  |  |  |  |  |
| 1 | Java Programming | SC | 3 | 0 | 1 | 19J1S1 |
| 2 | Operating Systems | SC | 3 | 1 | 0 | 19J1S2 |
| 3 | Principles of Programming and Problem Solving | SC | 3 | 0 | 1 | 19J1S3 |
| 4 | Communication Skills | SC | 4 | 0 | 0 | 19J1S4 |
| 5 | Computer Architecture | SC | 4 | 0 | 0 | 19J1S5 |
| 6 | Numerical Algorithms | SC | 4 | 0 | 0 | 19J1S6 |

## II Semester

| Sl. No | Course Title | Type | Credits |  |  | Subject <br> Code |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | L | T | P |  |
| 1 | Design and Analysis of Algorithms | HC | 2 | 1 | 1 | 19J2H1 |
| 2 | Computer Networks | HC | 3 | 1 | 0 | 19J2H2 |
| 3 | Data Base Management Systems | HC | 3 | 0 | 1 | 19J2H3 |
| Soft Core Courses (Choose at most 2 Courses) |  |  |  |  |  |  |
| 1 | System Software | SC | 3 | 0 | 1 | 19J2S1 |
| 2 | Computer Graphics | SC | 2 | 1 | 1 | 19J2S2 |
| 3 | Professional Ethics and Values | SC | 3 | 1 | 0 | 19J2S3 |
| 4 | Pattern Recognition | SC | 3 | 1 | 0 | 19J2S4 |
| 5 | Web Technologies | SC | 3 | 0 | 1 | 19J2S5 |
|  | World Wide Web | OE | 2 | 2 | 0 | 19J2O1 |


| Sl. No | Course Title | Type | Credits |  |  | Subject <br> Code |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | L | T | P |  |
| 1 | Theory of Languages | HC | 3 | 1 | 0 | 19J3H1 |
| 2 | Python Programming | HC | 3 | 0 | 1 | 19J3H2 |
| 3 | Software Engineering | HC | 3 | 1 | 0 | 19J3H3 |
| Soft Core Courses (Choose at most 2 Courses) |  |  |  |  |  |  |
| 1 | Artificial Intelligence | SC | 3 | 1 | 0 | 19J3S1 |
| 2 | Digital Image Processing | SC | 3 | 0 | 1 | 19J3S2 |
| 3 | C\# Programming | SC | 3 | 0 | 1 | 19J3S3 |
| 4 | Android Programming | SC | 3 | 1 | 0 | 19J3S4 |
| 5 | Big Data Analytics | SC | 3 | 1 | 0 | 19J3S5 |
|  | E-Commerce | OE | 3 | 1 | 0 | 19J3O2 |

## IV Semester

| Sl. No | Course Title | Type | Credits |  |  | Subject Code |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | L | T | P |  |
| 1 | Dissertation | HC | 0 | 2 | 10 | 19J4H1 |
| Soft Core Courses (Choose at most 2 Courses) |  |  |  |  |  |  |
| 1 | Compiler Construction | SC | 3 | 1 | 0 | 19J4S 1 |
| 2 | Advanced Data Base Management System | SC | 2 | 1 | 1 | 19J4S2 |
| 3 | Data Mining | SC | 3 | 1 | 0 | 19J4S3 |
|  | Office Automation | OE | 2 | 2 | 0 | 19J4O3 |

## I Semester M.Sc.(CS)

## HC DISCRETE MATHEMATICAL STRUCTURES

## Course 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.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | 3 | 1 | 2 | 1 | 1 | 1 |
| CO 1 | 3 | 3 | 1 | 2 | 1 | 1 |
| CO 2 | 3 | 2 | 2 | 1 | 1 | 2 |
| CO 3 | 3 | 2 | 2 | 1 | 1 | 1 |
| CO 4 | 3 | 1.5 | 2 | 1 | 1 | 1.25 |
| Weighted <br> Average | 3 | 1.5 | 1 | 1 |  |  |

1: Low, 2: Moderate, 3: High

## HC

## ADVANCED DATA STRUCTURES

## Course 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.

Course articulation matrix:

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | 3 | 1 | 2 | 1 | 1 | 1 |
| CO 1 | 1 | 2 | 2 | 1 | 2 | 1 |
| CO 2 | 3 | 2 | 2 | 1 | 1 | 2 |
| CO 3 | 2 | 2 | 1 | 1 | 1 | 1 |
| CO 4 | 2.25 | 1.75 | 1.75 | 1 | 1.25 | 1.25 |
| Weighted <br> Average |  |  | 1 | 1 |  |  |

1: Low, 2: Moderate, 3: High

## HC

DATA COMMUNICATION

## Course 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.

Course articulation matrix:

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | 1 | 1 | 1 | 1 | 3 | 2 |
| CO 1 | 3 | 3 | 2 | 1 | 2 | 2 |
| CO 2 | 2 | 2 | 1 | 1 | 3 | 2 |
| CO 3 | 3 | 2 | 1 | 1 | 2 | 2 |
| CO 4 | 2.25 | 2 | 1.25 | 1 | 2.5 | 2 |
| Weighted <br> Average |  |  |  |  |  |  |

1: Low, 2: Moderate, 3: High

## JAVA PROGRAMMING

## Course outcomes:

- Understand different aspects of object oriented paradigm and programming fundamentals.
- Build programs using programming basics, class fundamentals and reusable code using inheritance and polymorphism.
- Model solutions using files and interfaces.
- Develop efficient and error free applications using packages and exceptions.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | PO 1 | 1 | 3 | 2 | 1 | 2 |
| CO 2 | 1 | 3 | 2 | 1 | 2 | 3 |
| CO 3 | 1 | 3 | 3 | 1 | 2 | 3 |
| CO 4 | 1 | 3 | 3 | 1 | 2 | 3 |
| Weighted <br> Average | 1 | 3 | 2.5 | 1 | 2 | 3 |

1: Low, 2: Moderate, 3: High

## Course 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.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO |  |  |  |  |  |  |
| CO 1 | 1 | 3 | 1 | 1 | 1 | 1 |
| CO 2 | 1 | 3 | 1 | 1 | 1 | 1 |
| CO 3 | 1 | 3 | 1 | 1 | 1 | 1 |
| CO 4 | 1 | 3 | 1 | 1 | 1 | 1 |
| Weighted Average | 1 | 3 | 1 | 1 | 1 | 1 |

1: Low, 2: Moderate, 3: High

## SC PRINCIPLES OF PROGRAMMING AND PROBLEM SOLVING [ 3:0:1]

## Outcomes:

- Learn and implement the steps involved in problem solving and the stages involved in translation of Programming Language.
- Learn and implement the elementary data types and structured data types.
- Comprehend the need of sequence control and subprogram control.
- Implement the concepts in distributed Computing and Network Programming.

Course articulation matrix:

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{C O}$ | 1 | 3 | 2 | 1 | 1 | 3 |
| CO 1 | 1 | 1 | 2 | 1 | 1 | 3 |
| CO 2 | 1 | 1 | 2 | 1 | 1 | 3 |
| CO 3 | 1 | 1 | 2 | 1 | 1 | 3 |
| CO 4 4 <br> average | 1 | 1.5 | 2 | 1 | 1 | 3 |

1: Low, 2: Moderate, 3: High

## Course Outcomes:

- Understand and apply knowledge of human communication and language processes as they occur across various contexts from multiple perspectives.
- Understand and evaluate key theoretical approaches used in the interdisciplinary field of communication.
- Find, use, and evaluate primary academic writing associated with the communication discipline.
- Communicate effectively orally and in writing.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | PO 1 | 1 | 1 | 2 | 3 | 1 |
| CO 2 | 1 | 1 | 3 | 1 | 2 | 2 |
| CO 3 | 1 | 3 | 3 | 3 | 1 | 1 |
| CO 4 | 1 | 2 | 3 | 3 | 2 | 3 |
| Weighted <br> average | 1 | 1.75 | 2.75 | 2.5 | 1.5 | 1.75 |

1: Low, 2: Moderate, 3: High

## 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.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | PO 1 | 1 | 2 | 1 | 1 | 1 |
| CO 2 | 1 | 2 | 1 | 1 | 1 | 1 |
| CO 3 | 1 | 2 | 1 | 1 | 1 | 1 |
| CO 4 | 1 | 2 | 1 | 1 | 1 | 1 |
| Weighted <br> Average | 1 | 2 | 1 | 1 | 1 | 1 |

1: Low, 2: Moderate, 3: High

## 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.

Course articulation matrix:

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO |  |  |  |  |  |  |
| CO 1 | 3 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 3 | 1 | 1 | 1 | 1 | 1 |
| CO 3 | 3 | 1 | 1 | 1 | 1 | 1 |
| CO 4 | 3 | 1 | 1 | 1 | 1 | 1 |
| Weighted Average | 3 | 1 | 1 | 1 | 1 | 1 |

1: Low, 2: Moderate, 3: High

## II Semester M.Sc.(CS)

## HC DESIGN AND ANALYSIS OF ALGORITHM [2:1:1]

## Course outcomes:

- Compare between different data structures. Pick an appropriate data structure for a design situation. Analyze Performance of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-andconquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- Describe the greedy paradigm and dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
- Describe the backtracking paradigm and branch and bound paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.


## Course articulation matrix

| PO |  |  |  |  |  |  |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: |
| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| CO 1 | 3 | 1 | 1 | 1 | 1 | 1 |
| CO 2 | 3 | 1 | 1 | 1 | 2 | 1 |
| CO 3 | 3 | 1 | 1 | 1 | 2 | 1 |
| CO 4 | 3 | 1 | 1 | 1 | 2 | 1 |
| Weighted | 3 | 1 | 1 | 1 | 1.75 | 1 |
| Average | 3 | 1 |  |  |  |  |

1: Low, 2: Moderate, 3: High

## HC

COMPUTER NETWORKS

## Course Outcomes:

- To comprehend the functionalities needed for network communication into layers
- Choose the required functionality at each layer for given application.
- Comprehend different algorithms used in different layers.
- Understand the working principles of various application protocols.

Course articulation matrix

| $\begin{aligned} & \mathrm{PO} \\ & \hline \mathrm{CO} \end{aligned}$ | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO1 | 1 | 1 | 1 | 1 | 2 | 1 |
| CO2 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 2 | 2 | 3 | 1 | 1 | 3 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 |
| Weighted <br> Average | 1.25 | 1.25 | 1.5 | 1 | 1.25 | 1.5 |

1: Low, 2: Moderate, 3: High

## HC

## DATABASE MANAGEMENT SYSTEMS

## Course 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.


## Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | CO 1 | 1 | 2 | 2 | 1 | 1 |
| CO 2 | 2 | 3 | 3 | 1 | 2 | 2 |
| CO 3 | 1 | 2 | 1 | 1 | 1 | 1 |
| CO 4 | 1 | 2 | 1 | 1 | 1 | 1 |
| Weighted <br> Average | 1.25 | 2.25 | 1.75 | 1 | 1.25 | 1.25 |

1: Low, 2: Moderate, 3: High

## Course 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.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | 1 | 2 | 2 | 1 | 1 | 3 |
| CO 1 | 1 | 2 | 2 | 1 | 1 | 3 |
| CO 2 | 1 | 3 | 2 | 1 | 1 | 3 |
| CO 3 | 1 | 3 | 2 | 1 | 1 | 3 |
| CO 4 | 3 | 2.5 | 2 | 1 | 1 | 3 |
| Weighted <br> Average | 1.5 | 2.5 |  |  |  |  |

1: Low, 2: Moderate, 3: High

## Course Outcomes:

- Able to identify and use various graphics hardware, basic coordinate representations, functions and scan conversion algorithms.
- Able to implement various filled area primitives, 2D transformations and viewing.
- Able to implement 2D clipping algorithms 3D geometric transformations.
- Able to implement 3D viewing, spline curves and visible surface detection.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | ---: | ---: | ---: | ---: | ---: |
| CO | CO 1 | 3 | 3 | 1 | 1 | 1 |
| CO 2 | 3 | 3 | 1 | 1 | 1 | 1 |
| CO 3 | 3 | 3 | 1 | 1 | 1 | 1 |
| CO 4 | 3 | 3 | 1 | 1 | 1 | 1 |
| Weighted <br> Average | 3 | 3 | 1 | 1 | 1 | 1 |

1: Low, 2: Moderate, 3: High

## PROFESSIONAL ETHICS AND VALUES

## Course 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.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO |  | 1 | 1 | 1 | 2 | 3 |
| CO 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| CO 2 | 1 | 1 | 2 | 2 | 3 | 1 |
| CO 3 | 1 | 1 | 1 | 2 | 3 | 1 |
| CO 4 | 1 | 1 | 1 | 1.25 | 2 | 3 |
| Weighted <br> Average | 1 | 1 | 1 |  |  |  |

1: Low, 2: Moderate, 3: High

PATTERN RECOGNITION

## Outcomes:

- Understand Machine perception and Bayesian Decision Theory.
- Apply maximum likelihood and Bayesian parametric estimation
- Apply nonparametric techniques for pattern recognition
- Apply unsupervised learning techniques for pattern recognition.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO |  |  |  |  |  |  |
| CO 1 | 3 | 2 | 1 | 1 | 1 | 1 |
| CO2 | 3 | 2 | 1 | 1 | 1 | 1 |
| CO 3 | 3 | 2 | 1 | 1 | 1 | 1 |
| CO 4 | 3 | 2 | 1 | 1 | 1 | 1 |
| Weighted Average | 3 | 2 | 1 | 1 | 1 | 1 |

1: Low, 2: Moderate, 3: High

## Course Outcomes:

- Implement HTML5 pages using fundamental tags.
- Develop style sheet using CSS for a given problem.
- Extend JavaScript to validate a form with event handler for a given problem.
- Develop a dynamic website with database backend.


## Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: |
| CO |  | 2 | 3 | 3 | 1 | 1 |
| CO 1 | 2 | 3 | 1 | 1 | 1 | 1 |
| CO 2 | 1 | 3 | 2 | 2 | 1 | 1 |
| CO 3 | 1 | 3 | 2 | 3 | 1 | 1 |
| CO 4 | 1 | 3 | 2 | 1.75 | 1 | 1 |
| Weighted <br> Average | 1.5 | 3 |  | 1 | 1 |  |

1: Low, 2: Moderate, 3: High

## OE

## WORLD WIDE WEB

## 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.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | $\mathbf{1}$ | $\mathbf{3}$ | $\mathbf{1}$ | $\mathbf{1}$ | $\mathbf{1}$ | $\mathbf{1}$ |
| CO 1 | 1 | 3 | 1 | 1 | 1 | 1 |
| CO 2 | 1 | 3 | 2 | 1 | 1 | 1 |
| CO 3 | 1 | 3 | 2 | 1 | 1 | 1 |
| CO 4 4 <br> Average | 1 | 3 | 1.5 | 1 | 1 | 1 |

## 1: Low, 2: Moderate, 3: High

## III Semester M.Sc.(CS)

HC
THEORY OF LANGUAGES
Course 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.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | PO 1 | 3 | 1 | 1 | 1 | 1 |$| 1$

1: Low, 2: Moderate, 3: High

## HC

## Python Programming

## Course 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.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | 1 | 2 | 1 | 1 | 3 | 3 |
| CO 1 | 1 | 2 | 1 | 1 | 3 | 3 |
| CO 2 | 1 | 3 | 1 | 1 | 3 | 3 |
| CO 3 | 2 | 3 | 1 | 1 | 3 | 3 |
| CO 4 | 3 | 3 | 1 | 3 | 3 |  |
| Weighted <br> Average | 1.75 | 2.5 | 1 | 1 | 3 |  |

1: Low, 2: Moderate, 3: High

## HC SOFTWARE ENGINEERING

Course Outcomes:

- Identify the key activities in managing software project and compare different process models.
- Apply the Concepts of requirements engineering and Analysis Modelling.
- Apply systematic procedure for software design and deployment.
- Compare and contrast the various testing and maintenance.

Course articulation matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | 2 | 3 | 2 | 2 | 2 | 2 |
| CO 1 | 2 | 3 | 2 | 3 | 2 | 2 |
| CO 2 | 3 | 3 | 2 | 2 | 3 | 2 |
| CO 3 | 3 | 2 | 2 | 2 | 2 |  |
| CO 4 | 2 | 2 | 2 | 2.25 | 2 | 2.25 |
| Weighted <br> Average | 2.5 | 2.5 | 2.25 |  |  |  |

Low: 1, Moderate: 2, High: 3

ARTIFICIAL INTELLIGENCE

## 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 conventionaltechnology.

Course Articulation Matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | 3 | 3 | 2 | 2 | 2 | 3 |
| CO 1 | 3 | 3 | 3 | 2 | 1 | 3 |
| CO 2 | 3 | 3 | 3 | 2 | 1 | 3 |
| CO 3 | 3 | 3 | 3 | 2 | 1 | 3 |
| CO 4 | 3 | 3 | 2.75 | 2 | 1.25 | 3 |
| Weight <br> ed <br> Averag <br> e | 3 | 3 |  |  |  |  |

1: Low, 2: Moderate, 3: High

## SC

DIGITAL IMAGE PROCESSING

## Outcomes:

- Demonstrate the concepts of digital image processing.
- Learn different techniques employed for the enhancement of images using spatial domain.
- Learn different techniques employed for the enhancement of images using frequency domain.
- Implement the techniques of image segmentation.

Course Articulation Matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | P | 1 | 1 | 1 | 2 | 1 |
| CO 1 | 3 | 1 | 1 | 1 | 3 | 1 |
| CO 2 | 3 | 1 | 1 | 1 | 3 | 1 |
| CO 3 | 3 | 3 | 1 | 1 | 1 | 3 |
| CO 4 | 1 | 1 |  |  |  |  |
| Weighted <br> Average | 3 | 1 | 1 | 1 | 2.75 | 1 |

1: Low, 2: Moderate, 3: High

C\# PROGRAMMING
[3:0:1]

## 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.

Course Articulation Matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | 1 | 3 | 1 | 1 | 1 | 2 |
| CO 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| CO 2 | 1 | 1 | 3 | 2 | 1 | 1 |
| CO 3 | 1 | 1 |  |  |  |  |
| CO 4 | 1 | 3 | 2 | 1 | 1 | 2 |
| Weighted <br> Average | 1 | 2.75 | 1.5 | 1 | 1 | 1.5 |

1: Low, 2: Moderate, 3: High

## ANDROID PROGRAMMING

## Outcomes:

- Build sample android application.
- Develop user interfaces for android applications.
- Develop android applications to share data between different applications.
- Deploy android applications.

Course Articulation Matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | 2 | 3 | 2 | 1 | 1 | 1 |
| CO 1 | 2 | 3 | 2 | 1 | 1 | 2 |
| CO 2 | 3 | 3 | 3 | 2 | 1 | 2 |
| CO 3 | 3 | 3 | 1 | 1 | 2 | 2 |
| CO 4 | 3 | 3 | 3 | 1 | 1.5 | 1.75 |
| Weighte <br> d <br> Average | 2.75 | 3 | 2.25 | 1 |  |  |

1: Low, 2: Moderate, 3: High

## Course Outcomes:

- Understand the concept and challenges of big data and why existing technology is inadequate to analyse the big data.
- Develop an ability to collect, manage, store, query, and analyse various form of big data.
- Understand the significance of No SQL databases over RDBMS.
- Map the impact of big data for business decisions and strategy.

Course articulation matrix:

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | ---: | ---: | ---: | ---: | ---: |
| CO | 1 | 1 | 2 | 2 | 3 | 2 |
| CO 1 | 1 | 3 | 2 | 2 | 2 | 2 |
| CO 2 | 3 | 2 | 2 | 1 | 3 | 2 |
| CO 3 | 2 | 2 | 1 | 1 | 2 | 2 |
| CO 4 | 3 | 2 | 1.75 | 1.5 | 2.5 | 2 |
| Weighted <br> Average | 2.25 | 2 | 2 | 2 |  |  |

Low: 1, Moderate: 2, High: 3.

OE

## Outcomes:

- Study the impact of E-commerce on business models and strategy
- Describe the Internet trading relationships including Business to Consumer, Business-to-Business, Intra-organizational structures.
- Assess electronic payment systems and its securities.
- Recognize, discuss and derive possible solutions to global E-commerce issues.

Course Articulation Matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | PO 1 | 1 | 1 | 2 | 2 | 2 |
| CO 2 | 1 | 2 | 3 | 2 | 2 | 1 |
| CO 3 | 1 | 2 | 2 | 1 | 1 | 1 |
| CO 4 | 1 | 1 | 2 | 2 | 1 | 1 |
| Weighted <br> Average | 1 | 1.5 | 2.25 | 1.75 | 1.5 | 1 |

1: Low, 2: Moderate, 3: High

## IV Semester <br> DISSERTATION

## Outcomes:

- Develop basic algorithm steps as a solution to a real-life problem.
- Implement algorithms using latest tools that contribute to the software solution of the projectusing different tools.
- Analyse, interpret, test and validate experimental results.
- Develop research/technical report with enhanced writing/communication skills followingethical practices.

Course Articulation Matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | PO 1 | 3 | 3 | 2 | - | - |
| CO 2 | - | - | 3 | - | 3 | - |
| CO 3 | 1 | 3 | - | - | 2 | - |
| CO 4 | - | - | 3 | 3 | 3 | 3 |
| Weighted <br> Average | 2 | 3 | 2.66 | 3 | 2.66 | 3 |

1: Low, 2: Moderate, 3: High

## SC

## Compiler Construction

[ 3:1:0]

## Outcomes :

- Explain the concepts and different phases of compilation and Interpret language tokens using regular expressions and design lexical analyzer.
- Build top down parsing, bottom up parsing and parse tree representation of the input.
- Perform context sensitive analysis, semantic analysis and type checking
- Experiment the optimization techniques to intermediate code and generate machine code for high level language program.

Course Articulation Matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | PO 1 | 2 | 3 | 1 | 1 | 1 |
| CO 2 | 3 | 3 | 1 | 1 | 1 | 1 |
| CO 3 | 3 | 3 | 1 | 1 | 1 | 1 |
| CO 4 | 2 | 3 | 1 | 1 | 1 | 1 |
| Weighted <br> Average | 2.5 | 3 | 1 | 1 | 1 | 1 |

1: Low, 2: Moderate, 3: High

## SC <br> ADVANCED DATABASE MANAGEMENT SYSTEM [ 2:1:1]

## Outcomes:

- Critically assess new developments in database technology.
- Evaluate the contribution of database theory to practical implementations of databasemanagement systems.
- Implement the various types of database systems.
- Interpret the impact of emerging database standards.

Course Articulation Matrix

| PO | PO | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO |  |  |  |  |  |  |
|  | 3 | 2 | 1 | 1 | 1 | 1 |
| CO 1 |  |  |  |  |  |  |
|  | 3 | 3 | 2 | 1 | 2 | 2 |
| CO 2 |  |  |  |  |  |  |
|  | 3 | 3 | 3 | 1 | 2 | 3 |
| CO 3 |  |  |  |  |  |  |
|  | 3 | 3 | 2 | 1 | 2 | 2 |
| CO 4 |  |  |  |  |  |  |
| Weighted | 3 | 2.75 | 2 | 1 | 1.75 | 2 |

1: Low, 2: Moderate, 3: High

SC
DATA MINING

## Outcomes:

- Identify data mining problems and recognize types of data and preprocessing needed.
- Employ the concepts of Association Analysis
- Identify problems suitable for Classifications and Apply different classification algorithms
- Identify problems appropriate for Clustering and Apply different clustering algorithms.

Course Articulation Matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | 3 | 2 | 1 | 1 | 2 | 1 |
| CO 1 | 3 | 3 | 1 | 1 | 2 | 1 |
| CO 2 | 3 | 3 | 1 | 1 | 2 | 1 |
| CO 3 | 3 | 3 | 3 | 1 | 1 | 2 |
| CO 4 | 3 | 1 |  |  |  |  |
| Weighted <br> Average | 3 | 2.75 | 1 | 1 | 2 | 1 |

1: Low, 2: Moderate, 3: High

OE
OFFICE AUTOMATION

## 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 analyzing for productivity.
- To prepare presentations.

Course Articulation Matrix

| PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO | PO 1 | $\mathbf{2}$ | $\mathbf{2}$ | $\mathbf{1}$ | $\mathbf{1}$ | $\mathbf{1}$ |
| CO 1 |  |  |  |  |  |  |
| CO 2 | 2 | 2 | 1 | 1 | 1 | $\mathbf{1}$ |
| CO 3 | 2 | 2 | 1 | 1 | 1 | 1 |
| CO 4 | 2 | 2 | 1 | 1 | 1 | 1 |
| Weighted <br> Average | 2 | 2 | 1 | 1 | 1 | 1 |

1: Low, 2: Moderate, 3: High

