**Attainment of Programme Outcome**

**M.SC COMPUTER SCIENCE**

**CO, PO and PSO Mapping**

**Name of the Course: Design and Analysis of Algorithms**

| Blueprint of the question paper | Section | Unit I | Unit II | Unit III | Unit IV | Unit V |
|---|---|---|---|---|---|---|
| | Section A | 2 | 2 | 2 | 2 | 2 |
| | Section B Any FIVE | 2 | 2 | 1 | 1 | 1 |
| | Section C Either OR | 2 | 2 | 2 | 2 | 2 |
| | Section D Any THREE | 1 | 1 | 1 | 1 | 1 |

| SEMESTER –I | | | |
|---|---|---|---|
| **CORE I** | **DESIGN AND ANALYSIS OF ALGORITHMS** | | |
| **Course Code:21PCSC11** | **Hrs/week:5** | **Hrs/Semester:75** | **Credits:4** |

**Objectives:**

- To be technologically adept, innovative and be able to develop new algorithms.
- To understand the course of the algorithm, its features and complexity
- To compare different algorithms for the same problem.

**UNIT- I: Introduction**

Introduction – Performance Analysis - Divide and conquer Method: Binary Search, Finding Maximum and Minimum, Merge Sort and Quick Sort.

**UNIT - II: Greedy Methods**

Greedy Methods: Knapsack Problem, Minimum Cost Spanning Trees, Optimal Storage on Tapes and Single Source Shortest Path Problem-**Net Exam Related Problems**.

**UNIT - III : Dynamic Programming & Basic Traversal and Search Techniques**

Dynamic Programming: Multistage Graphs, 0/1 knapsack and Traveling Salesman Problem. Basic Traversal and Search Techniques: Techniques for Binary Tree,
Techniques for Graphs: Depth First Search and Breadth First Search - Connected Components and Spanning Tree-**Net Exam Related Problems**

**UNIT - IV : Backtracking**

Backtracking: 8 Queens Problems, Sum of Subsets, Graph Colouring, Hamiltonian Cycle and Knapsack Problem.

**UNIT - V: Branch- and- Bound**

Branch and Bound: Least Cost Search. Bounding: FIFO Branch and Bound and LC Branch and Bound.0/1 Knapsack Problem, Travelling Salesman Problem.

**Text Book**

1. E.Horowitz, S.Sahni and Sanguthevarrajasekaran. *Fundamentals of Computer Algorithms*, 2nd edition, Universities Press, 2008.

**Reference Books:**

1. S. K. Basu. Design *Methods and Analysis of Algorithms*. PHI, 2005.
2. Goodman and S. T. Hedetniem. *Introduction to the Design and Analysis of Algorithms*. MGH, 1977.
3. A.V. Aho, J.D. Ullman and J.E.Hospcraft. *The Design and Analysis of Computer Algorithms*, Pearson Education.

**Course Outcomes:**

| **CO.No.** | **Upon Completion of this course, students will be able to** | **PSOs Addressed** | **CL** |
|---|---|---|---|
| CO-1 | understand the running time and space complexity of algorithms using asymptotic analysis. | 2 | Un |
| CO-2 | apply divide and conquer to binary search, quick sort, merge sort. | 1 | Ap |
| CO-3 | analyze greedy method to knapsack problem, prims, kruskal algorithms. | 4 | An |
| CO-4 | apply dynamic programming to optimal binary search trees,0/1 knapsack problem and different tree traversals | 5 | Ap |
| CO-5 | perform Backtracking to n-queen problem, sum of subsets problem, graph coloring etc. | 3 | Ap |
| CO-6 | apply branch and bound to Travelling sales person problem, 0/1 knapsack problem. | 6 | Ap |

**21PCSC11- Design and Analysis of Algorithms**

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** |
| **CO-2** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | **2.9** |
| **CO-3** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **CO-4** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **CO-5** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **CO-6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **Average** | **3.0** | **3.0** | **3.0** | **3.0** | **3.0** | **2.0** | **2.0** | **2.0** | | **3.0** | **3.0** | **3.0** | **3.0** | **3.0** | **2.8** | **2.8** | **2.7** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.9** |
| Strength of PO Correlation | | | | Strong | | | | | | Strength of PSO Correlation | | | | | Strong | | | |

## Attainment of Course Outcomes of the MSc Computer Science Programme

| Course Code | Name of the Course | Course Outcomes | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Programme Outcomes (PO) | | | | | | | | Programme Specific Outcomes (PSO) | | | | | | | |
| | | PO-1 | PO-2 | PO-3 | PO-4 | PO-5 | PO-6 | PO-7 | PO-8 | PSO-1 | PSO-2 | PSO-3 | PSO-4 | PSO-5 | PSO-6 | PSO-7 | PSO-8 |
| 21PCSC11 | Design and Analysis of Algorithms | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.8 | 2.8 | 2.7 |
| 21PCSC12 | Digital Image processing using MATLAB | 3.0 | 3.0 | 2.7 | 2.7 | 3.0 | 2.7 | 2.3 | 2.2 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.8 | 2.7 | 2.5 |
| 21PCSC13 | Mathematical Foundations for Computer Science | 3.0 | 2.8 | 2.7 | 2.8 | 3.0 | 2.5 | 2.3 | 2.0 | 3.0 | 3.0 | 2.8 | 2.8 | 2.8 | 3.0 | 2.8 | 2.7 |
| 21PCSC14 | Compiler Design | 3.0 | 3.0 | 2.7 | 2.7 | 3.0 | 2.7 | 2.3 | 2.2 | 3.0 | 3.0 | 2.8 | 2.8 | 3.0 | 2.8 | 2.7 | 2.5 |
| 21PCSE11 | Advanced computer Architecture | 3.0 | 2.8 | 2.7 | 2.7 | 2.7 | 2.7 | 2.3 | 2.4 | 3.0 | 2.8 | 2.8 | 2.8 | 3.0 | 2.8 | 2.7 | 2.3 |
| 21PCSE12 | Cryptography & Network Security | 3.0 | 2.8 | 2.7 | 2.7 | 3.0 | 2.7 | 2.5 | 2.3 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.7 | 2.7 | 2.5 |
| 21PCSC21 | J2EE | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| 21PCSC22 | Data Mining & R Programming | 2.7 | 2.7 | 2.7 | 2.7 | 2.3 | 2.7 | 2.5 | 2.5 | 2.7 | 2.7 | 2.5 | 2.7 | 2.7 | 2.5 | 2.7 | 2.5 |
| 21PCSC23 | DDBMS | 2.7 | 2.7 | 2.7 | 2.7 | 2.3 | 2.7 | 2.5 | 2.5 | 2.7 | 2.7 | 2.5 | 2.7 | 2.7 | 2.5 | 2.7 | 2.5 |
| 21PCSC24 | Single Board Computers and IoT | 3 | 3 | 3 | 3 | 3 | 2.7 | 2.5 | 2.5 | 2.2 | 2.8 | 3 | 3 | 2.7 | 2.6 | 2.6 | 2.5 |
| 21PCSE21 | Advanced Computer Networks | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| 21PCSE22 | Soft Computing | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 2 |
| 21PCSC31 | Software Testing | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2.2 | 2.2 | 3 |
| 21PCSC32 | Cloud Computing & Big Data | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 2.5 | 2 | 2.3 | 2.3 | 2.5 |
| 21PCSC33 | Data Science using Python | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21PCSC34 | Research Methodology | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2.2 | 3 | 3 | 3 | 3 | 3 | 2.2 | 2.2 | 2.5 |
| 21PCSE31 | Organizational Behaviour | 3 | 3 | 3 | 3 | 3 | 2 | 2.2 | 2 | 3 | 3 | 3 | 3 | 3 | 2.2 | 2.2 | 2.6 |
| 21PCSE32 | Object Oriented Software Engineering | 3 | 3 | 3 | 2.6 | 3 | 2 | 2 | 2 | 3 | 3 | 2.6 | 3 | 3 | 2.2 | 2.2 | 2 |
| 21PCSSS1 | Course for Competitive Exams | 2.5 | 2.5 | 2.7 | 2.7 | 2.7 | 2.2 | 2.2 | 2.7 | 2.5 | 2.7 | 2.7 | 2.7 | 2.2 | 2.2 | 2.2 | 2.7 |
| **Average Correlation** | | **2.9** | **2.8** | **2.7** | **2.8** | **2.8** | **2.4** | **2.3** | **2.3** | **2.8** | **2.9** | **2.7** | **2.8** | **2.8** | **2.5** | **2.5** | **2.5** |
| **Mean Overall Score** | | **2.7** | **The POs and PSOs are strongly correlated with the COs of the programme** | | | | | | | | | | | | | | |

**Courses of the MSc Computer Science Programme**

| SEMESTER I | | | |
|---|---|---|---|
| **CORE II** | **DIGITAL IMAGE PROCESSING USING MATLAB** | | |
| **Course Code: 21PCSC12** | **Hrs/Week: 5** | **Hrs/Sem: 75** | **Credits: 4** |

**Objectives:**

- To interpret images mathematically and process them for the extraction of data using MATLAB.
- To familiarize students with image enhancement and restoration techniques.
- To introduce the concepts of image processing and basic analytical methods to be used in image processing.

**Course Outcomes:**

| CO. No. | Upon Completion of this course, students will be able to | PSOs Addressed | CL |
|---|---|---|---|
| CO-1 | develop programming skills and techniques to solve mathematical problem. | 1 | Ap |
| CO-2 | learn graphic features of MATLAB and they are able to use this feature effectively in the various applications | 5 | Ap |
| CO-3 | learn different techniques employed for the enhancement of images. | 2 | Un |
| CO-4 | interpret Image compression, segmentation and representation standards | 3 | An |
| CO-5 | choose image filtering in various applications | 4 | Ap |
| CO-6 | analyze different causes for image degradation and overview of image restoration techniques. | 6 | An |

**21PCSC12- Digital Image Processing using Matlab**

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | **2.4** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** |
| **CO-2** | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | **2.4** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | **2.8** |
| **CO-3** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | **2.9** |
| **CO-4** | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **CO-5** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | **2.7** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **CO-6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | **2.8** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **Average** | **3.0** | **3.0** | **2.7** | **2.7** | **3.0** | **2.7** | **2.3** | **2.2** | | **3.0** | **3.0** | **3.0** | **3.0** | **3.0** | **2.8** | **2.7** | **2.5** | |
| PO Mean | | | | | | | | | **2.7** | PSO Mean | | | | | | | | **2.9** |
| Strength of PO Correlation | | | | Strong | | | | | | Strength of PSO Correlation | | | | | Strong | | | |

| SEMESTER – I | | | |
|---|---|---|---|
| **CORE III MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE** | | | |
| **Course Code : 21PCSC13** | **Hrs / Week : 4** | **Hrs / Sem : 60** | **Credits : 4** |

**Objectives:**

- To understand and apply the class of functions which transform a finite set into another finite set which relates to input output functions in computer science.
- Apply the concept of two dimensional random variables to correlation, regression and Central limit theorem
- Analyze whether given graphs are isomorphic and apply different algorithms to find the shortest path.

**Course Outcomes:**

| CO. No. | Upon Completion of this course, students will be able to | PSOs Addressed | CL |
|---|---|---|---|
| CO-1 | test the complementary relationship of skewness with measures of central tendency and dispersion in describing a set of data. | 3 | An |
| CO-2 | apply 'moments' as a convenient and unifying method for summarizing several descriptive statistical measures. | 5 | Ap |
| CO-3 | analyze the strength and direction of a linear relationship between two variables using Correlation. | 2 | An |
| CO-4 | demonstrate how much a dependent variable changes based on adjustments to an independent variable using regression. | 6 | Ap |
| CO-5 | discover the logical operations and predicate calculus needed for computing skill. | 4 | An |
| CO-6 | understand the application of various type of graphs in real life problem. | 1 | Un |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | **2.5** | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | **2.5** |
| **CO-2** | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | **2.5** | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | **2.6** |
| **CO-3** | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | **2.5** | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | **2.8** |
| **CO-4** | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | **2.9** |
| **CO-5** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | **2.7** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **CO-6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | **2.9** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **Average** | **3.0** | **2.8** | **2.7** | **2.8** | **3.0** | **2.5** | **2.3** | **2.0** | | **3.0** | **2.8** | **2.8** | **2.8** | **3.0** | **2.8** | **2.7** | **2.3** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.8** |
| Strength of PO Correlation | | | | Strong | | | | | | Strength of PSO Correlation | | | | Strong | | | | |

| SEMESTER –I | | | |
|---|---|---|---|
| **CORE IV** | **COMPILER DESIGN** | | |
| **Course Code:21PCSC14** | **Hrs/week:4** | **Hrs/Semester:60** | **Credits:4** |

**Objectives:**

- To learn the process of translating a modern high-level language to executable code.
- To identify the methods and strategies of parsing techniques.
- To generate intermediate code, and to design syntax directed translation scheme and apply code optimization techniques.

**Course Outcomes:**

| CO. No | Upon Completion of this course, students will be able to | PSO addressed | CL |
|---|---|---|---|
| CO-1 | understand the basic principles of compiler in high level programming language | 2 | Un |
| CO-2 | represent language tokens using regular expressions, finite automata | 4 | An |
| CO-3 | apply parsing techniques and able to write Context Free Grammars for various languages | 6 | Ap |
| CO-4 | apply the knowledge of intermediate code generation to build efficient systems | 1 | Ap |
| CO-5 | understand the need of intermediate representation for the generation of target code by applying code optimization techniques | 3 | Ap |
| CO-6 | apply machine independent optimization technique to intermediate code and generate machine code for high level programming language. | 5 | Ap |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | **2.4** | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | **2.5** |
| **CO-2** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | **2.6** |
| **CO-3** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | **2.8** |
| **CO-4** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | **2.7** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **CO-5** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | **2.8** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **CO-6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **Average** | **3.0** | **3.0** | **2.7** | **2.7** | **3.0** | **2.7** | **2.3** | **2.2** | | **3.0** | **3.0** | **2.8** | **2.8** | **3.0** | **2.8** | **2.7** | **2.5** | |
| PO Mean | | | | | | | | | **2.7** | PSO Mean | | | | | | | | **2.8** |
| Strength of PO Correlation | | | | Strong | | | | | | Strength of PSO Correlation | | | | | Strong | | | |

| SEMESTER – I | | | |
|---|---|---|---|
| **ELECTIVE I A- ADVANCED COMPUTER ARCHITECTURE** | | | |
| **Course Code : 21PCSE11** | **Hrs / Week : 4** | **Hrs / Sem : 60** | **Credits : 4** |

**Objectives:**

- To give the students a deep insight on the hardware organisation of a computer system.
- To understand various addressing modes, data storage and memory organisation.
- Learn the computer arithmetic principles and super scalar techniques.

**Course Outcomes:**

| CO. No | Upon Completion of this course, students will be able to | PSOs Addressed | CL |
|---|---|---|---|
| CO-1 | understand the fundamental of computer structure. | 3 | Un |
| CO-2 | perform computer arithmetic operations. | 6 | Ap |
| CO-3 | apply the concept of cache mapping techniques. | 2 | Ap |
| CO-4 | correlate the performance of I/O device. | 5 | An |
| CO-5 | conceptualize instruction level parallelism and analyze different types of pipeline hazard. | 1 | An |
| CO-6 | analyze performance issues in processor and memory design of a digital computer. | 4 | An |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | **2.4** | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | **2.5** |
| **CO-2** | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | **2.5** | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | **2.6** |
| **CO-3** | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | **2.6** | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | **2.8** |
| **CO-4** | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | **2.7** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | **2.9** |
| **CO-5** | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | **2.8** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **CO-6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **Average** | **3.0** | **2.8** | **2.7** | **2.7** | **2.7** | **2.7** | **2.3** | **2.4** | | **3.0** | **2.8** | **2.8** | **2.8** | **3.0** | **2.8** | **2.7** | **2.3** | |
| PO Mean | | | | | | | | | **2.7** | PSO Mean | | | | | | | | **2.8** |
| Strength of PO Correlation | | | | Strong | | | | | | Strength of PSO Correlation | | | | | Strong | | | |

| SEMESTER- I | | | |
|---|---|---|---|
| **ELECTIVE I B- CRYPTOGRAPHY AND NETWORK SECURITY** | | | |
| **Course Code: 21PCSE12** | **Hrs / week :4** | **Hrs / Sem: 60** | **Credits :4** |

**Objectives:**

- To make the students to learn the fundamental concepts of cryptography and network security and utilize these techniques in computing system.
- To understand cryptography and network security concepts
- To develop the knowledge in cryptography theories, algorithms and systems

**Course Outcomes:**

| CO. No | Upon Completion of this course, students will be able to | PSOs Addressed | CL |
|---|---|---|---|
| CO-1 | understand the fundamental concepts of various encryption techniques. | 4 | Un |
| CO-2 | demonstrate the process to maintain the Confidentiality, Integrity and Availability of data. | 2 | Ap |
| CO-3 | distinguish between various algorithms for network security to protect against the threats in the networks. | 6 | An |
| CO-4 | apply the concept of Public key cryptography and analyze solutions for effective key management and distribution. | 1 | Ap |
| CO-5 | apply and manage to secure a message over insecure channel by various means. | 3 | Ap |
| CO-6 | identify and apply the functional IP network security to protect against the threats in the networks and to protect system security. | 5 | Ap |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 1 | **2.3** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** |
| **CO-2** | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | **2.5** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | **2.8** |
| **CO-3** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | **2.8** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | **2.9** |
| **CO-4** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **CO-5** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **CO-6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **Average** | **3.0** | **2.8** | **2.7** | **2.7** | **3.0** | **2.7** | **2.5** | **2.3** | | **3.0** | **3.0** | **3.0** | **3.0** | **3.0** | **2.7** | **2.7** | **2.5** | |
| PO Mean | | | | | | | | | **2.7** | PSO Mean | | | | | | | | **2.9** |
| Strength of PO Correlation | | | | Moderate to Strong | | | | | | Strength of PSO Correlation | | | | Strong | | | | |

| SEMESTER – II | | | |
|---|---|---|---|
| **CORE V** | **J2EE** | | |
| **Course Code : 21PCSC21** | **Hrs / Week : 5** | **Hrs / Sem : 75** | **Credits : 4** |

**Objectives:**

- To acquire knowledge on the usage of recent platforms in developing web applications.
- Enhancing the student's skills to design and develop interactive, client-side, server-side executable web applications.
- Able to apply the skill learnt for projects.

**Course Outcomes:**

| CO. No. | Upon Completion of this course, students will be able to | PSOs Addressed | CL |
|---|---|---|---|
| CO-1 | make use of a high-level overview of the J2EE architecture | 1 | Ap |
| CO-2 | identify the services and components which comprise the J2EE specification | 5 | Un |
| CO-3 | explain how J2EE technology applications are packaged | 5 | Un |
| CO-4 | acquire the knowledge of EJB and its types and Differentiate Servlet and JSP | 7 | An |
| CO-5 | build server side java application called Servlet to catch form data sent from client and store it on database | 8 | Cr |
| CO-6 | build server side java application called JSP to catch form data sent from client, process it and store it on database. | 8 | Cr |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.5** |
| **CO-2** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.5** |
| **CO-3** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.5** |
| **CO-4** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.8** |
| **CO-5** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.8** |
| **CO-6** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.7** |
| **Average** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | |
| PO Mean | | | | | | | | | **2.5** | PSO Mean | | | | | | | | **2.5** |
| Strength of PO Correlation | | | | | Strong | | | | | Strength of PSO Correlation | | | | | | | Strong | |

| SEMESTER- II | | | |
|---|---|---|---|
| **CORE VI** | **DATA MINING & R PROGRAMMING** | | |
| **Course Code: 21PCSC22** | **Hrs / week :5** | **Hrs / Semester: 75** | **Credits :4** |

**Objectives:**

- Extract patterns of usable data using appropriate algorithms
- To study the basic and advanced concepts in Data Mining Techniques.
- To understand the various algorithms involved in data mining and its applications.

**Course outcomes:**

| CO. No. | Upon Completion of this course, students will be able to | PSOs Addressed | CL |
|---|---|---|---|
| **CO-1** | classify different data mining tasks and the algorithms most appropriate for addressing them. | 4,5 | An |
| **CO-2** | discover Strengths & Limitations of Data Mining Methods | 5 | An |
| **CO-3** | display interesting patterns from large data, to extract and analyse, make predictions and solve problems | 4,5 | An |
| **CO-4** | evaluate models/algorithms with respect to their accuracy | 4 | Ev |
| **CO-5** | demonstrate capacity to perform a self-directed piece of practical work that requires the application of data mining techniques. | 1,5 | Ev |
| **CO-6** | develop hypotheses based on the analysis of the results obtained and test them. | 2.8 | Ev |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | **2.5** |
| **CO-2** | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | **2.6** |
| **CO-3** | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | **2.6** |
| **CO-4** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | **2.7** |
| **CO-5** | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.7** |
| **CO-6** | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** |
| **Average** | **2.7** | **2.7** | **2.7** | **2.7** | **2.3** | **2.7** | **2.5** | **2.5** | | **2.7** | **2.7** | **2.5** | **2.7** | **2.7** | **2.5** | **2.7** | **2.5** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.6** |
| Strength of PO Correlation | | | | | Strong | | | | | Strength of PSO Correlation | | | | Strong | | | | |

| SEMESTER – II | | | |
|---|---|---|---|
| **CORE VII** | **DISTRIBUTED DATABASE MANAGEMENT SYSTEM** | | |
| **Course Code : 21PCSC23** | **Hrs / Week : 4** | **Hrs / Sem : 60** | **Credits : 4** |

**Objectives:**

- Identify the introductory distributed database concepts and its structures.
- Describe terms related to distributed object database design and management.
- Produce the transaction management and query processing techniques in DDBMS.

**Course Outcomes:**

| CO. No. | Upon Completion of this course, students will be able to | PSOs Addressed | CL |
|---|---|---|---|
| CO-1 | understand the concept of Distributed DBMS | 4 | Un |
| CO-2 | apply various architectures of DDBMS and fragmentation techniques in a given problem | 5 | Ap |
| CO-3 | visualize the steps of query processing | 5 | Ap |
| CO-4 | compare various Query Optimization Algorithms | 2 | An |
| CO-5 | organise the approaches to concurrency control in Distributed database | 2 | An |
| CO-6 | apply various algorithms and techniques for deadlock and recovery in Distributed database | 5 | Ap |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | **2.6** | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | **2.5** |
| **CO-2** | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | **2.6** |
| **CO-3** | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | **2.6** |
| **CO-4** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | **2.7** |
| **CO-5** | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | **2.6** | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.7** |
| **CO-6** | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** |
| **Average** | **2.7** | **2.7** | **2.7** | **2.7** | **2.3** | **2.7** | **2.5** | **2.5** | | **2.7** | **2.7** | **2.5** | **2.7** | **2.7** | **2.5** | **2.7** | **2.5** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.7** |
| Strength of PO Correlation | | | | | Strong | | | | | Strength of PSO Correlation | | | | Strong | | | | |

| SEMESTER- II | | | |
|---|---|---|---|
| **CORE VIII** | **SINGLE BOARD COMPUTERS AND IOT** | | |
| **Course Code: 21PCSC24** | **Hrs / week :4** | **Hrs / Sem: 60** | **Credits :4** |

**Objectives:**

- To deliver a deep knowledge of Internet of Things and Single Board Computers.
- To understand the architecture of Single Board Computers and ability on setup Raspberry Pi .
- To recognize the concepts of Internet of Things and its security measures.

**Course Outcomes:**

| **CO.No** | **Upon Completion of this course, students will be able to** | **PSO addressed** | **CL** |
|---|---|---|---|
| CO-1 | code program and develop applications using single board computers and to create a good working setup of Raspberry Pi | 1,5 | Cr |
| CO-2 | understand the concepts of Internet of Things and identifying different IoT technologies | 7 | Un |
| CO-3 | inculcate knowledge on communication middleware and Information security in IoT | 4,5 | Un |
| CO-4 | analyze basic protocols in wireless sensor networks | 4 | An |
| CO-5 | implement State of the Art - IoT Architecture | 1,5 | Ap |
| CO-6 | examine the security and privacy issues in IoT | 8 | An |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | **2.8** | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | **2.8** |
| **CO-2** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | **2.6** |
| **CO-3** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | **2.6** |
| **CO-4** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | **2.6** |
| **CO-5** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | **2.6** |
| **CO-6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | **2.6** |
| **Average** | **3** | **3** | **3** | **3** | **3** | **2** | **2** | **2** | | **3** | **3** | **2** | **3** | **3** | **2** | **2.2** | **3** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.7** |
| Strength of PO Correlation | | | | | Strong | | | | | Strength of PSO Correlation | | | | | Strong | | | |

| SEMESTER- II | | | |
|---|---|---|---|
| **ELECTIVE II** | **A – ADVANCED COMPUTER NETWORKS** | | |
| **Course Code: 21PCSE21** | **Hrs / week :4** | **Hrs / Semester: 60** | **Credits :4** |

**Objectives:**

- To understand modern computer networks
- To familiarize routing algorithms
- To detect the technical problems in networking

**Course Outcomes:**

| CO. No. | Upon Completion of this course, students will be able to | PSOs Addressed | CL |
|---|---|---|---|
| CO-1 | describe the evolution and History of Wireless technology | 7 | Un |
| CO-2 | analyse the wireless propagation channels. | 4 | An |
| CO-3 | examine the Performance of ARQ Protocols, Ethernet LAN, Token Ring, RIP, TCP and UDP. | 5 | Ap |
| CO-4 | identify the networking technologies and implementation of protocols like TCP, UDP and IP using OPNET and NS-2 | 4,5 | An |
| CO-5 | solve technical problems in ARQ protocols, MAC protocols and Routing Algorithm. | 4,5 | Ap |
| CO-6 | construct the route discovery algorithm to determine the shortest path in an internet represented as a weighted graph. | 4 | Ap |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.5** |
| **CO-2** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.5** |
| **CO-3** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.5** |
| **CO-4** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.8** |
| **CO-5** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.8** |
| **CO-6** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.7** |
| **Average** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.6** |
| Strength of PO Correlation | | | | | Strong | | | | | Strength of PSO Correlation | | | | | Strong | | | |

| SEMESTER- II | | | |
|---|---|---|---|
| **ELECTIVE II** | **B - SOFT COMPUTING** | | |
| **Course Code: 21PCSE22** | **Hrs / week :4** | **Hrs / Sem: 60** | **Credits :4** |

**Objectives:**

- To solve real-world problems by providing approximate results those conventional and analytical models cannot solve.
- To understand the features, advantages and applications of Artificial Intelligence.
- To realize the revolution of artificial intelligence to develop hybrid systems for the industrial problems.

**Course Outcomes:**

| CO. No. | Upon Completion of this course, students will be able to | PSOs Addressed | CL |
|---|---|---|---|
| CO-1 | understand the concepts of Artificial Intelligence and neural networks and categorize different learning algorithms | 1,4 | Un |
| CO-2 | analyze the classification taxonomy of NN and compare different network models | 4 | An |
| CO-3 | comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory. | 5 | Ap |
| CO-4 | implement the concepts of fuzzy sets, knowledge representation using fuzzy rules | 5 | An |
| CO-5 | identify and define approximate reasoning, fuzzy inference systems, and fuzzy logic | 4,5 | An |
| CO-6 | analyze the genetic algorithms and their applications | 2,5 | An |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | **2.5** |
| **CO-2** | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | **2.6** |
| **CO-3** | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | **2.6** |
| **CO-4** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | **2.6** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | **2.7** |
| **CO-5** | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.7** |
| **CO-6** | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | **2.6** | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | **2.6** |
| **Average** | **3** | **3** | **2** | **3** | **2** | **3** | **2** | **3** | | **2** | **3** | **2** | **3** | **3** | **2** | **3** | **2** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.7** |
| Strength of PO Correlation | | | | | Strong | | | | | Strength of PSO Correlation | | | | | Strong | | | |

| Semester III | | | |
|---|---|---|---|
| **CORE IX** | **SOFTWARE TESTING** | | |
| **Course Code: 21PCSC31** | **Hrs / week : 4** | **Hrs / Sem: 60** | **Credits :4** |

**Objectives:**

- To provide basic understanding of the software development life cycle including testing, test planning &design and test team organization.
- To study the various types of test in the life cycle of the software product.
- To build design concepts for system testing and execution

**Course Outcomes:**

| CO. No | Upon Completion of this course, students will be able to | PSO addressed | CL |
|---|---|---|---|
| CO-1 | understand the fundamental concepts and techniques in Software Testing and the categories of the system testing methods | 1,4 | Un |
| CO-2 | identify and apply the functional and system testing methods in commercial environment | 4,5 | Ap |
| CO-3 | design Test Planning | 5 | Ap |
| CO-4 | distinguish between methods of judging test case adequacy and how to design tests that will accomplish the obligations of such methods. | 4 | An |
| CO-5 | demonstrate the process of validation and verification Write code to automate test execution and analysis | 1,5 | Ap |
| CO-6 | implement various test processes for quality improvement | 5 | Ap |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | **2.8** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | **2.5** |
| **CO-2** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | **2.5** |
| **CO-3** | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | **2.5** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | **2.5** |
| **CO-4** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | **2.8** |
| **CO-5** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | **2.8** |
| **CO-6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **Average** | **3** | **3** | **3** | **3** | **3** | **2** | **2** | **2** | | **3** | **3** | **3** | **3** | **3** | **2.2** | **2.2** | **3** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.7** |
| Strength of PO Correlation | | | | | Strong | | | | | Strength of PSO Correlation | | | | | Strong | | | |

| SEMESTER – III | | | |
|---|---|---|---|
| **CORE X** | **CLOUD COMPUTING AND BIG DATA** | | |
| **Course Code : 21PCSC32** | **Hrs / Week : 4** | **Hrs / Sem : 60** | **Credits : 4** |

**Objectives:**

- To explore the fundamental concepts of big data analytics.
- To analyze the big data using intelligent techniques and the concept of Virtualization.
- Learn to design trusted Cloud Computing system architecture and services.

**Course Outcomes:**

| CO. No. | Upon completion of this course, students will be able to | PSOs addressed | CL |
|---|---|---|---|
| CO-1 | carrying out the decisions based on data analytics. | 8 | Ap |
| CO-2 | analyze the big data analytic techniques for useful business applications. | 4 | An |
| CO-3 | identifying the data models in relation to Big Data Storage and Analytics. | 5,8 | Re |
| CO-4 | implementing Big Data applications using Pig and Hive and working with big data platform | 5, | Ap |
| CO-5 | identify the architecture, infrastructure and delivery models of cloud | 4 | Re |
| CO-6 | apply suitable virtualization concept and organize the core issues of cloud computing | 1,8 | An |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | **2.8** | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | **2.5** |
| **CO-2** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | **2.5** |
| **CO-3** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | **2.5** |
| **CO-4** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | **2.6** |
| **CO-5** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | **2.6** |
| **CO-6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | **2.7** |
| **Average** | **3** | **3** | **3** | **3** | **3** | **2** | **2** | **2** | | **3** | **3** | **3** | **2.5** | **2** | **2.3** | **2.3** | **2.5** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.6** |
| Strength of PO Correlation | | | | | Strong | | | | | Strength of PSO Correlation | | | | | Strong | | | |

| SEMESTER III | | | |
|---|---|---|---|
| **CORE XI** | **DATA SCIENCE USING PYTHON** | | |
| **Course Code: 21PCSC33** | **Hrs / week :4** | **Hrs / Sem: 60** | **Credits : 4** |

**Objectives:**

- To enable the students to understand the concepts of data science and apply data analysis in various application areas
- To provide comprehensive knowledge of python programming paradigms required for Data Science.
- To perform a wide variety of mathematical operations on arrays using NumPy

**Course Outcomes:**

| CO. No | Upon Completion of this course, students will be able to | PSO Addressed | CL |
|---|---|---|---|
| CO-1 | explore the fundamental concepts of data science | 8 | An |
| CO-2 | explain how data is collected, managed and stored for data science | 4 | Un |
| CO-3 | evaluate the data analysis techniques for applications handling large data and visualize the inference using various tools | 5,8 | Ap |
| CO-4 | implement numerical programming, data handling and visualization through NumPy and Pandas | 1,2 | Ap |
| CO-5 | understand and demonstrate the usage of universal functions and list of Arrays in NumPy | 1 | Ap |
| CO-6 | analyze the significance of python program development environment and apply it to solve real world applications | 1,7 | Un |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.5** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.5** |
| **CO-2** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.5** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.5** |
| **CO-3** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.5** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.5** |
| **CO-4** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.5** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.5** |
| **CO-5** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.5** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | **2.5** |
| **CO-6** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.5** | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | **2.5** |
| **Average** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | |
| PO Mean | | | | | | | | | **2.5** | PSO Mean | | | | | | | | **2.5** |
| Strength of PO Correlation | | | | | Strong | | | | | Strength of PSO Correlation | | | | Strong | | | | |

| SEMESTER – III | | | |
|---|---|---|---|
| **CORE XII** | **RESEARCH METHODOLOGY** | | |
| **Course Code : 21PCSC34** | **Hrs / Week : 4** | **Hrs / Sem : 60** | **Credits : 4** |

**Objectives:**

- To achieve outstanding scientific research in various areas of knowledge.
- To encourage distinguished research work through the creation of an attractive and stimulating environment to achieve goals.
- The learner should be able to get a guidelines on how to write, publish, present and review scientific papers.

**Course Outcomes:**

| CO. No. | Upon completion of this course, students will be able to | PSO addressed | CL |
|---|---|---|---|
| CO-1 | demonstrate knowledge of research processes | 2 | An |
| CO-2 | understand the concepts of defining the research problem and research design and compare between methodologies and methods used in research | 2,5 | Un |
| CO-3 | explain the concepts and procedures of sampling, data collection, analysis and reporting | 4,5 | Ap |
| CO-4 | assess the basic function and working of analytical research tools used in computer science research | 1,5 | Re |
| CO-5 | prepare a research report and examine the plagiarism and its types. | 8,2 | Ap |
| CO-6 | apply the knowledge of teaching methods for its wide applicability. | 7,6 | Ap |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | **2.8** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.5** |
| **CO-2** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.5** |
| **CO-3** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.5** |
| **CO-4** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | **2.8** |
| **CO-5** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | **2.8** |
| **CO-6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **Average** | **3** | **3** | **3** | **3** | **3** | **2** | **2** | **2** | | **3** | **3** | **3** | **3** | **3** | **2.2** | **2.2** | **2.5** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.7** |
| Strength of PO Correlation | | | | | Strong | | | | | Strength of PSO Correlation | | | | | Strong | | | |

| SEMESTER- III | | | |
|---|---|---|---|
| **ELECTIVE I** | **A- ORGANIZATIONAL BEHAVIOUR** | | |
| **Course Code: 21PCSE31** | **Hrs / week :4** | **Hrs / Sem: 60** | **Credits :4** |

**Objectives:**

- To develop a basic understanding of individual behaviour and organisational change.
- To help the students to develop cognizance of the importance of human behaviour.
- To provide the students with the tools to understand and evaluate individual, group and organizational processes.

**Course Outcomes:**

| CO. No | Upon Completion of this course, students will be able to | PSO addressed | CL |
|---|---|---|---|
| CO-1 | analyse the behaviour of individuals and groups in organisations in terms of the key factors that influence organizational behaviour | 1, 6 | An |
| CO-2 | evaluate personality types, perception and learning process on human behavior | 8 | Ap |
| CO-3 | analyze the importance of Attitudes, Values, Job satisfaction, Group formation and Group behaviour | 1,6 | An |
| CO-4 | identify different motivational theories and evaluate motivational strategies used in a variety of organizational settings | 6 | Un |
| CO-5 | analyze about human stress and the consequences of stress in an organization | 6 | An |
| CO-6 | identify the various leadership styles and the role of leaders in a decision making process | 1,6 | Un |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | **2.8** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** |
| **CO-2** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** |
| **CO-3** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** |
| **CO-4** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | **2.8** |
| **CO-5** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | **2.8** |
| **CO-6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **Average** | **3** | **3** | **3** | **3** | **3** | **2** | **2.2** | **2** | | **3** | **3** | **3** | **3** | **3** | **2.2** | **2.2** | **2.6** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.7** |
| Strength of PO Correlation | | | | | | | | | Strong | Strength of PSO Correlation | | | | | | | | Strong |

| SEMESTER – III | | | |
|---|---|---|---|
| **ELECTIVE I B - OBJECT ORIENTED SOFTWARE ENGINEERING** | | | |
| **Course Code : 21PCSE32** | **Hrs / Week : 4** | **Hrs / Sem : 60** | **Credits : 4** |

**Objectives:**

- To be a professional developer of software products
- To understand different conventions in software modelling
- To perform software testing and validation

**Course Outcomes:**

| CO. No | Upon Completion of this course, students will be able to | PSOs Addressed | CL |
|---|---|---|---|
| CO-1 | design and implement a software system to meet desired needs. | 1,5 | Cr |
| CO-2 | use modern software systems and tools. | 1,7 | Ap |
| CO-3 | understand different software life cycle concept. | 3,5 | Un |
| CO-4 | study and design SRS documents for software projects. | 4,5 | An |
| CO-5 | study and model software projects using different modelling techniques. | 5 | An |
| CO-6 | discuss about project organisation and communication | 6,7 | Ev |

| | PO-1 | | | | | | | | | PO-2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO No.** | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| CO-1 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | **2.8** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | **2.5** |
| CO-2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | **2.5** |
| CO-3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | **2.5** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | **2.5** |
| CO-4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | **2.8** |
| CO-5 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | **2.8** |
| CO-6 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.6** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **3.0** |
| **PO Avg** | **3** | **3** | **3** | **3** | **3** | **2** | **2** | **2** | | **3** | **3** | **3** | **3** | **3** | **2.2** | **2.2** | **2** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.7** |
| Strength of PO Correlation | | | | Strong | | | | | | Strength of PSO Correlation | | | | | Strong | | | |

| Semester III | |
|---|---|
| **SELF-STUDY COURSE COURSE FOR COMPETITIVE EXAMS** | |
| **Course Code: 21PCSSS1** | **Credits: 2** |

**Objectives:**

- To provide a platform to the students for building the fundamentals of basic mathematics for competitive examinations preparation strategy
- Establish a framework to help students acquire knowledge and expertise necessary to secure employment opportunities in the government sector

**Course Outcomes:**

| CO. No. | Upon completion of this course, students will be able to | PSO addressed | CL |
|---|---|---|---|
| CO-1 | solve real life problems requiring interpretation and comparison of various representations of ratios. | 4 | Ap |
| CO-2 | distinguish between proportional and non-proportional situations and when appropriate apply proportional reasoning | 4,5 | An |
| CO-3 | solve problems applying probabilistic reasoning to make decisions | 4,5 | Ap |
| CO-4 | evaluate claims based on empirical, theoretical and subjective probabilities | 4,5 | An |
| CO-5 | solve problems using high speed mental calculations | 4 | Ap |
| CO-6 | understand the basic concepts of logical reasoning skills. | 4 | Un |

| | PO | | | | | | | | | PSO | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **Avg** | **PSO-1** | **PSO-2** | **PSO-3** | **PSO-4** | **PSO-5** | **PSO-6** | **PSO-7** | **PSO-8** | **Avg** |
| **CO-1** | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | **2.5** | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | **2.3** |
| **CO-2** | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | **2.4** | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | **2.3** |
| **CO-3** | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | **2.4** | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | **2.4** |
| **CO-4** | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | **2.4** | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | **2.6** |
| **CO-5** | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | **2.4** | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | **2.6** |
| **CO-6** | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | **2.5** | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | **2.9** |
| **Average** | **2.5** | **2.5** | **2.7** | **2.7** | **2.7** | **2.2** | **2.2** | **2.2** | | **2.7** | **2.5** | **2.7** | **2.7** | **2.7** | **2.2** | **2.2** | **2.2** | |
| PO Mean | | | | | | | | | **2.6** | PSO Mean | | | | | | | | **2.7** |
| Strength of PO Correlation | | | | | Strong | | | | | Strength of PSO Correlation | | | | | Strong | | | |