

**M.C.A. – (Master of Computer Applications )**  
**FROM THE ACADEMIC YEAR 2023 – 2024**

**Programme Outcomes (POs)**

P.O.1. Train the students with Deep Core subject knowledge (including the fundamental concepts, computational models, advanced core techniques, appropriate Domain expertise). Apply the knowledge of deep core concepts to conceptualize the computational models. Accredited or validated against national or international standards.

P.O.2. Skilled with strategic thinking, problem solving, making better use of intuition, learning to evaluate better, and recognizing the essence of things. Analyze the complex problems and to evaluate and assess information in a practical and technical way and ends up with the specialized computational models to provide valid decisions.

P.O.3. Investigating the real world problems to design and develop the computational framework to cope with real world expectations; to fit that model to the complex real-time data and to apply appropriate research methods to synthesis the information to make appropriate decisions

P.O.4. Trained to apply effective management skills to produce specific project outcomes

P.O.5. Capable to learn and apply recent domain specific knowledge in the computer science and applications industry

P.O.6. Skilled to work effectively as a member and also as a leader in multi-disciplinary teams.

P.O.7. Trained to communicate the technical aspects with computing professionals and with society at large. Such ability includes listening reading, speaking and writing, and the ability to comprehend and effective technical report writing and document preparation.

P.O.8. Trained to think and act professionally to adapt themselves in their work places and society to show case their talents and skills smartly for their self up liftmen. Aware about the cyber regulations and professional ethics, responsibilities and norms of professional computing practice.

P.O.9. Trained to update themselves periodically with the current/modern technologies and enrich their knowledge through various online MOOC Courses to cope with the current industrial requirements.

P.O.10. To inculcate the passion for continuum learning for a successful Professional career

P.O.11. Adapt at operating in other cultures, comfortable with different Nationalities and social contexts, able to determine and contribute to desirable social outcomes. Avoiding unethical behavior such as Fabrication, falsification of Data, committing plagiarism

P.O.12. Identify the timely opportunity and using innovation to pursue that opportunity to create value and wealth for the better men to the individual and the society at large.

### **Programme Specific Outcomes (PSOs)**

P.S.O.1. To develop the abilities to acquire deep knowledge of fundamental and core theoretical and programming concepts for holistic development

P.S.O.2. Design, develop and test the software systems for real-time socio-economic problems

P.S.O.3. Analyze and recommend appropriate IT Solutions

## SEMESTER - I

### Core - Discrete Mathematics

#### Course Outcomes

On the successful completion of the course, students will be able

|      |  |       |    |
|------|--|-------|----|
| CO1: | To understand the concepts of relations and functions distinguish among normal forms | K2    | IO |
| CO2: | To analyze and evaluate the recurrence relations                                     | K4,K5 | HO |
| CO3: | To distinguish among various normal forms and predicate calculus                     | K5    | HO |
| CO4: | To solve and know various types of matrices  | K1    | LO |
| CO5: | To evaluate and solve various types of graphs  | K5    | HO |

**K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create**

### Core - Linux and Shell Programming

#### Course Outcomes

On the successful completion of the course, students will be able

|      |  |       |
|------|--|-------|
| CO1: | To understand, apply and analyze the concepts and methodology of Linux shell programming   | K1-K6 |
| CO2: | To comprehend, impart and apply fundamentals of control structure and script controls  | K1-K6 |
| CO3: | To understand, analyses and evaluate the functions, graphical desktop interface and editors  | K1-K6 |
| CO4: | To collaborate, apply and review the concepts and methodology of regular expression and advanced gawk                                    | K1-K6 |
| CO5: | To comprehend, use and illustrate the advance concepts such as alternate shell script, data connectivity and bash scripting using python | K1-K6 |

**K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create**

#### Mapping with Programme Outcomes

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | S   | S   | S   | -   | S   | L   | -   | M   | M   | M    | M    | S    |
| CO2 | S   | S   | M   | -   | S   | L   | -   | M   | M   | M    | M    | S    |
| CO3 | S   | S   | M   | -   | S   | L   | -   | M   | M   | S    | S    | S    |
| CO4 | S   | S   | M   | -   | S   | L   | -   | M   | M   | M    | M    | S    |
| CO5 | S   | S   | M   | -   | S   | L   | -   | M   | M   | M    | M    | S    |

**S- Strong; M-Medium; L-Low**

## Core - Python Programming

On the successful completion of the course, students will be able to

|            |   |               |
|------------|---|---------------|
| <b>C01</b> | Comprehend the programming skills in python and develop applications using conditional branches and loop                                | <b>K1- K6</b> |
| <b>C02</b> | Create python applications with strings and functions   |               |
| <b>C03</b> | Understand and implement the Object Oriented Programming paradigm with the concept of objects and classes, Inheritance and polymorphism |               |
| <b>C04</b> | Evaluate the use of Python packages to perform numerical computations and data vizualization  |               |
| <b>C05</b> | Design interactive web applications using Django  |               |

**K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create**

### Mapping with Programme Outcomes

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| C01 | S   | S   | M   | S   | M   | S   | S   | S   | S   | M    | S    | S    |
| C02 | S   | S   | S   | M   | S   | S   | S   | S   | S   | S    | M    | S    |
| C03 | S   | M   | S   | S   | M   | S   | M   | S   | S   | M    | S    | S    |
| C04 | S   | S   | S   | S   | S   | S   | S   | M   | S   | S    | M    | S    |
| C05 | S   | S   | S   | S   | S   | S   | S   | S   | S   | M    | M    | S    |

**S- Strong; M-Medium; L-Low**

## Linux and Shell Programming – Lab

### Course Outcomes

On the successful completion of the course, students will be able to

|             |  |       |
|-------------|--|-------|
| <b>C01:</b> | To understand, apply and analyze the concepts and methodology of Linux shell programming                                   | K1-K6 |
| <b>C02:</b> | To comprehend, impart and apply fundamentals of control structure and script controls                                      | K1-K6 |
| <b>C03:</b> | To understand, analyses and evaluate the functions, graphical desktop interface and editors                                | K1-K6 |
| <b>C04:</b> | To collaborate, apply and review the concepts and methodology of regular expression and advanced gawk                      | K1-K6 |
| <b>C05:</b> | To comprehend, use and analyze the advance concepts such as alternate shell script, dy and bash scripting using PostgreSQL | K1-K6 |

**K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create**

### Mapping with Programme Outcomes

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | S   | S   | S   | -   | S   | -   | -   | -   | M   | -    | -    | -    |
| CO2 | S   | S   | S   | -   | S   | -   | -   | -   | M   | -    | -    | -    |
| CO3 | S   | S   | S   | -   | S   | -   | -   | -   | M   | S    | S    | S    |
| CO4 | S   | S   | S   | -   | S   | -   | -   | -   | M   | -    | -    | -    |
| CO5 | S   | S   | S   | -   | S   | -   | -   | -   | M   | S    | S    | S    |

**S- Strong; M-Medium; L-Low**

## Python Programming Lab

### Course Outcomes

**On the successful completion of the course, students will be able to**

|            |  |               |
|------------|--|---------------|
| <b>CO1</b> | Comprehend the programming skills in python and write scripts  | <b>K1- K6</b> |
| <b>CO2</b> | Create python applications with elementary data items, lists, dictionaries and tuples                                    |               |
| <b>CO3</b> | Implement the Object Oriented Programming programming concepts such as objects and classes, Inheritance and polymorphism |               |
| <b>CO4</b> | Assess the use of Python packages to perform numerical computations and perform data vizualization                       |               |
| <b>CO5</b> | Create interactive web applications using Django   |               |

**K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create**

### Mapping with Programme Outcomes

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | S   | S   | M   | S   | S   | S   | S   | S   | S   | M    | S    | S    |
| CO2 | S   | S   | S   | S   | S   | S   | S   | S   | S   | S    | M    | S    |
| CO3 | S   | S   | S   | S   | S   | S   | M   | S   | S   | M    | L    | S    |
| CO4 | S   | S   | S   | S   | S   | S   | S   | M   | S   | S    | S    | S    |
| CO5 | S   | S   | S   | S   | L   | S   | M   | S   | S   | M    | M    | S    |

**S- Strong; M-Medium; L-Low**

**Effective communication in English**  
**Ability Enhancement Course 1 (AEC)**

**Course Objectives:**

CO1. L T P 2 EFFECTIVE COMMUNICATION IN ENGLISH

CO2. To help the students develop communication skills and self confidence

CO3. To motivate the students to acquire employability skills

CO4. To introduce various interview techniques to the students

CO5. To motivate the students to becomes good public speakers

CO6. To develop leadership qualities in the students

CO7. To guide the students how to tackle interviews

CO8. To help the students to enhance their writing skills

CO9. To teach the students how to write a good CV

CO10. To introduce various articles in writing to the students

**Basics of Web Design**  
**Skill Enhancement Course (SEC 2)**

**Course Outcomes(Cos)**

- Understand the Basic Structure of HTML5
- Develops the skill to write CSS and HTML Code to design webpages.
- Develops the skill to write Server client pages using JavaScript codes

## SEMESTER II

### Core - Data Structures and Algorithms

**Course Outcome:**

On the successful completion of the course, students will be able to,

|     |  |       |
|-----|--|-------|
| C01 | Understand various ADT concepts  | K1-K6 |
| C02 | Familiar with implementation of ADT models with Python language and understand how to develop ADT for the various real-time problems |       |
| C03 | Apply with proper ADT models with problem understanding  |       |
| C04 | Apply and Analyze right models based on the problem domain   |       |
| C05 | Evaluate modern data structures with Python language   |       |

K1- Remember, K2 - Understand, K3 - Apply , K4 - Analyze, K5 - Evaluate, K6 - Create

**Mapping with Programme Outcomes:**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| C01 | S   | M   | L   | L   | L   | L   | S   | S   | S   | L    | M    | M    |
| C02 | S   | M   | S   | M   | M   | L   | L   | L   | L   | L    | M    | M    |
| C03 | S   | S   | S   | L   | L   | L   | M   | M   | M   | M    | M    | L    |
| C04 | S   | S   | S   | L   | L   | L   | M   | M   | M   | L    | L    | L    |
| C05 | S   | S   | S   | L   | M   | M   | S   | S   | S   | S    | M    | L    |

**L - Low, M- Medium, S - Strong**

### Core - Advanced Software Engineering

| <b>Expected Course Outcomes:</b>  |  |       |
|---|--|-------|
| On the successful completion of the course ,student will be able to:        |  |       |
| 1   | Understand about Software Engineering process  | K1,K2 |
| 2   | Understand about Software project management skills, design and qualitymanagement      | K2,K3 |
| 3   | Analyze on Software Requirements and Specification                                     | K3,K4 |
| 4   | Analyze on Software Testing, Maintenance and Software Re-Engineering                   | K4,K5 |
| 5   | Design and conduct various types and levels of software quality for a software project | K5,K6 |
| <b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create</b> |  |       |

| Mapping with Programming Outcomes |     |     |     |     |     |     |     |     |     |      |
|-----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Cos                               | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1                               | S   | S   | M   | S   | S   | S   | M   | M   | M   | M    |
| CO2                               | S   | S   | S   | S   | S   | S   | S   | M   | S   | S    |
| CO3                               | S   | S   | S   | S   | S   | S   | S   | M   | S   | S    |
| CO4                               | S   | S   | S   | S   | S   | S   | S   | M   | S   | S    |
| CO5                               | S   | S   | S   | S   | S   | S   | S   | M   | S   | S    |

\*S-Strong; M-Medium; L-Low

### Core - Advanced JAVA Programming

| Expected Course Outcomes:  |   |       |
|--|---|-------|
| On the successful completion of the course, student will be able to:         |   |       |
| 1  | Understand the advanced concepts of Java Programming                                      | K1,K2 |
| 2  | Understand JDBC and RMI concepts  | K2,K3 |
| 3  | Apply and analyze Java in Database  | K3,K4 |
| 4  | Handle different event in java using the delegation event model, event listener and class | K5    |
| 5  | Design interactive applications using Java Servlet, JSP and JDBC                          | K5,K6 |
| <b>K1-Remember;K2-Understand;K3-Apply; K4-Analyze;K5-Evaluate; K6-Create</b> |   |       |

| Mapping with Programming Outcomes |     |     |     |     |     |     |     |     |     |      |
|-----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Cos                               | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1                               | S   | S   | S   | S   | S   | S   | M   | M   | M   | S    |
| CO2                               | S   | S   | S   | S   | S   | S   | S   | M   | S   | S    |
| CO3                               | S   | S   | S   | S   | S   | S   | S   | M   | S   | S    |
| CO4                               | S   | S   | S   | S   | S   | S   | S   | M   | S   | S    |
| CO5                               | S   | S   | S   | S   | S   | S   | S   | M   | S   | S    |

## Practical III - Data Structures and Algorithms Lab

### Course Outcome:

On the successful completion of the course, students will be able to,

|     |   |       |
|-----|---|-------|
| CO1 | Strong understanding in various ADT concepts                | K1-K6 |
| CO2 | To become a familiar with implementation of ADT models      |       |
| CO3 | Apply sort and tree search algorithms                       |       |
| CO4 | Evaluate the different data structure models                |       |
| CO5 | Learn how to develop ADT for the various real-time problems |       |

K1- Remember, K2 - Understand, K3 - Apply , K4 - Analyze, K5 - Evaluate, K6 - Create

### Mapping with Programme Outcomes:

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | S   | M   | L   | L   | L   | L   | S   | S   | M   | M    | S    | S    |
| CO2 | S   | M   | S   | M   | M   | L   | S   | M   | S   | L    | M    | M    |
| CO3 | S   | S   | S   | L   | L   | L   | M   | M   | M   | M    | S    | L    |
| CO4 | S   | S   | S   | M   | M   | S   | M   | M   | S   | S    | S    | L    |
| CO5 | S   | S   | S   | S   | L   | M   | S   | M   | M   | M    | M    | L    |

**L - Low, M- Medium, S - Strong**

## Practical IV - Advanced JAVA Lab

| <b>Expected Course Outcomes:</b>  |  |       |
|---|--|-------|
| On the successful completion of the course, student will be able to:        |  |       |
| 1   | Understand to the implement concepts of Java using HTML forms ,JSP & JAR | K1,K2 |
| 2   | Must be capable of implementing JDBC and RMI concepts                    | K3,K4 |
| 3   | Able to write Applets with Event handling mechanism                      | K4,K5 |
| 4   | To Create interactive web based applications using servlets and jsp      | K5,K6 |
| <b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create</b> |  |       |

| <b>Mapping with Programming Outcomes</b> |      |      |     |     |      |     |     |      |     |       |
|--|------|------|-----|-----|------|-----|-----|------|-----|-------|
| COs                                      | PO 1 | PO 2 | PO3 | PO4 | PO 5 | PO6 | PO7 | PO 8 | PO9 | PO1 0 |
| <b>CO1</b>                               | S    | S    | M   | S   | S    | S   | M   | M    | S   | M     |
| <b>CO2</b>                               | S    | S    | S   | S   | S    | S   | S   | M    | S   | S     |
| <b>CO3</b>                               | S    | S    | S   | S   | S    | S   | S   | S    | S   | S     |
| <b>CO4</b>                               | S    | S    | S   | S   | S    | S   | S   | S    | S   | S     |

\*S-Strong; M-Medium; L-Low

## **ENGLISH FOR COMPETITIVE EXAMS**

(Ability Enhancement Course: AEC 2)

### **Course Outcomes(Cos)**

- CO1 - Helps the students to prepare for competitive exams
- CO2 - Enables the students to learn the techniques to ace the tests
- CO3 - Enables the students to learn English grammar
- CO4 - Enhances the student's reading skills
- CO5 - students learn answer the comprehension questions
- CO6 - Introduces various components of vocabulary
- CO7 - Introduces a variety of reading passages to the students
- CO8 - guide the students about IELTS exams

### **Web Development using PHP**

Skill Enhancement Course (SEC 2)

- CO1 - Introduces HTML, PHP and databases like MySQL
- CO2 - Enables to learn the techniques to write server side and client-side coding
- CO3 – Guides the students how to connect databases
- CO4 - Enhances the student's reading skills

## LIST OF ELECTIVES

### ADVANCED OPERATING SYSTEMS

| <b>Expected Course Outcomes:</b>  |   |       |
|---|---|-------|
| On the successful completion of the course student will be able to:         |   |       |
| 1   | Understand the design issues associated with operating systems  | K1,K2 |
| 2   | Master various process management concepts including scheduling, deadlocks and distributed file systems | K3,K4 |
| 3   | Prepare Real Time Task Scheduling   | K4,K5 |
| 4   | Analyze Operating Systems for Handheld Systems  | K5    |
| 5   | Analyze Operating Systems like LINUX and IOS  | K5,K6 |
| <b>K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create</b> |   |       |

| <b>Mapping with Programming Outcomes</b> |      |      |     |     |      |     |     |      |     |      |
|--|------|------|-----|-----|------|-----|-----|------|-----|------|
| Cos                                      | PO 1 | PO 2 | PO3 | PO4 | PO 5 | PO6 | PO7 | PO 8 | PO9 | PO10 |
| <b>CO1</b>                               | S    | M    | S   | S   | S    | S   | M   | M    | M   | M    |
| <b>CO2</b>                               | S    | M    | S   | S   | S    | S   | S   | M    | S   | M    |
| <b>CO3</b>                               | S    | M    | S   | S   | S    | S   | S   | M    | S   | M    |
| <b>CO4</b>                               | S    | M    | S   | S   | S    | S   | S   | M    | S   | M    |
| <b>CO5</b>                               | S    | M    | S   | S   | S    | S   | S   | M    | S   | M    |

\*S-Strong; M-Medium; L-Low

### ADVANCED COMPUTER NETWORKS

| <b>Expected Course Outcomes:</b>  |   |          |
|---|---|----------|
| On the successful completion of the course, student will be able to:            |   |          |
| 1   | Understand fundamental underlying principles of computer networking                   | K1,K2    |
| 2   | Understand details and functionality of layered network architecture.                 | K2,K3    |
| 3   | Apply mathematical foundations to solve computational problems in computer Networking | K3,K4    |
| 4   | Analyze and evaluate performance of various communication protocols.                  | K4,K5,K6 |
| 5   | Compare and create new routing algorithms.  | K6       |
| <b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b> |   |          |

| Mapping with Programming Outcomes |      |      |     |     |      |     |     |      |     |       |
|-----------------------------------|------|------|-----|-----|------|-----|-----|------|-----|-------|
| Cos                               | PO 1 | PO 2 | PO3 | PO4 | PO 5 | PO6 | PO7 | PO 8 | PO9 | PO1 0 |
| <b>CO1</b>                        | S    | M    | M   | M   | M    | M   | S   | L    | M   | L     |
| <b>CO2</b>                        | S    | M    | M   | S   | M    | M   | S   | L    | M   | L     |
| <b>CO3</b>                        | S    | S    | M   | S   | S    | M   | S   | M    | M   | M     |
| <b>CO4</b>                        | S    | S    | S   | S   | S    | M   | S   | M    | M   | M     |
| <b>CO5</b>                        | S    | S    | S   | S   | S    | S   | S   | M    | M   | M     |

## ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

| Expected Course Outcomes:  |   |       |
|--|---|-------|
| On the successful completion of the course, student will be able to:   |   |       |
| 1  | Demonstrate AI problems and techniques  | K1,K2 |
| 2  | Understand machine learning concepts  | K2,K3 |
| 3  | Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning | K3,K4 |
| 4  | Analyze the impact of machine learning on applications  | K4,K5 |
| 5  | Analyze and design are all world problem for implementation and understand the dynamic behavior of a system                           | K5,K6 |
| <b>K1</b> -Remember; <b>K2</b> -Understand; <b>K3</b> -Apply; <b>K4</b> -Analyze; <b>K5</b> -Evaluate; <b>K6</b> -Create |   |       |

| Mapping with Programming Outcomes |      |      |     |     |      |     |     |      |     |       |
|-----------------------------------|------|------|-----|-----|------|-----|-----|------|-----|-------|
| COs                               | PO 1 | PO 2 | PO3 | PO4 | PO 5 | PO6 | PO7 | PO 8 | PO9 | PO1 0 |
| <b>CO1</b>                        | S    | S    | S   | S   | S    | S   | S   | M    | M   | S     |
| <b>CO2</b>                        | S    | S    | S   | S   | S    | S   | S   | M    | S   | S     |
| <b>CO3</b>                        | S    | S    | S   | S   | S    | S   | S   | M    | S   | S     |
| <b>CO4</b>                        | S    | S    | S   | S   | S    | S   | S   | M    | S   | S     |
| <b>CO5</b>                        | S    | S    | S   | S   | S    | S   | S   | M    | S   | S     |

