

**AK UNIVERSITY**

**MCA Course**

**2025-26**

## AK UNIVERSITY – MCA Course Structure

| MCA I Year – I Semester |             |          |                                  |            |            |                |          |           |           |
|-------------------------|-------------|----------|----------------------------------|------------|------------|----------------|----------|-----------|-----------|
| S. No.                  | Course Code | Category | Course                           | Max Marks  |            | Hours Per Week |          |           | Credits   |
|                         |             |          |                                  | I          | E          | L              | T        | P         |           |
| 1                       | MCA101      | C        | Data Structures with C++         | 30         | 70         | 3              | 1        | 0         | 4         |
| 2                       | MCA102      | C        | Database Management Systems      | 30         | 70         | 3              | 1        | 0         | 4         |
| 3                       | MCA103      | C        | Operating Systems                | 30         | 70         | 3              | 1        | 0         | 4         |
| 4                       | MCA104      | CF       | Probability and Statistics       | 30         | 70         | 3              | 1        | 0         | 4         |
| 5                       | MCA105.1    | EF       | Computer Organization            | 30         | 70         | 3              | 1        | 0         | 4         |
|                         | MCA105.2    |          | Digital Logic Design             |            |            |                |          |           |           |
|                         | MCA105.3    |          | Discrete Mathematical Structures |            |            |                |          |           |           |
| 6                       | MCA106      | P-I      | Data Structures lab              | 30         | 70         | 0              | 0        | 6         | 2         |
| 7                       | MCA107      | P-II     | Database Management Systems Lab  | 30         | 70         | 0              | 0        | 6         | 2         |
| 8                       | MCA108      | SEC      | Communication Skills             | 50         | -          | 0              | 3        | 0         | 2         |
| <b>TOTAL</b>            |             |          |                                  | <b>260</b> | <b>490</b> | <b>15</b>      | <b>8</b> | <b>12</b> | <b>26</b> |

C – Mandatory Core

CF – Compulsory Foundation

P – Practical

EF – Elective Foundation

SEC – Skill Enhancement Course

| MCA I Year – II Semester |             |          |  |            |            |                |          |           |           |
|--------------------------|-------------|----------|--|------------|------------|----------------|----------|-----------|-----------|
| S. No.                   | Course Code | Category | Course                                       | Max Marks  |            | Hours Per Week |          |           | Credits   |
|                          |             |          |  | I          | E          | L              | T        | P         |           |
| 1                        | MCA201      | C        | Software Engineering                         | 30         | 70         | 3              | 1        | 0         | 4         |
| 2                        | MCA202      | C        | Computer Networks                            | 30         | 70         | 3              | 1        | 0         | 4         |
| 3                        | MCA203      | C        | Web Technologies                             | 30         | 70         | 3              | 1        | 0         | 4         |
| 4                        | MCA204      | CF       | Artificial Intelligence                      | 30         | 70         | 3              | 1        | 0         | 4         |
| 5                        | MCA205.1    | EF       | Programming and Problem-Solving using Python | 30         | 70         | 3              | 1        | 0         | 4         |
|                          | MCA205.2    |          | Introduction to R Programming                |            |            |                |          |           |           |
| 6                        | MCA206      | P-I      | Python Programming / R Programming Lab       | 30         | 70         | 0              | 0        | 6         | 2         |
| 7                        | MCA207      | P-II     | Web Technologies Lab                         | 30         | 70         | 0              | 0        | 6         | 2         |
| 8                        | MCA208      | SEC      | Seminar                                      | 50         | -          | 0              | 3        | 0         | 2         |
| 9                        | MCA209      | MC       | Data Visualization & Business Analytics      | -          | -          | 0              | 0        | 0         | 0         |
| <b>TOTAL</b>             |             |          |  | <b>260</b> | <b>490</b> | <b>15</b>      | <b>8</b> | <b>12</b> | <b>26</b> |

C – Mandatory Core

CF – Compulsory Foundation

P – Practical

EF – Elective Foundation

SEC – Skill Enhancement Course

MC – Mandatory Courses (MOOCs)

### MCA II Year – III Semester

| S. No.       | Course Code | Category | Course                                | Max Marks  |            | Hours Per Week |          |           | Credits   |
|--------------|-------------|----------|---------------------------------------|------------|------------|----------------|----------|-----------|-----------|
|              |             |          |                                       | I          | E          | L              | T        | P         |           |
| 1            | MCA301      | C        | Data Mining and Big Data              | 30         | 70         | 3              | 1        | 0         | 4         |
| 2            | MCA302      | C        | Cloud Computing                       | 30         | 70         | 3              | 1        | 0         | 4         |
| 3            | MCA303      | C        | Machine Learning                      | 30         | 70         | 3              | 1        | 0         | 4         |
| 4            | MCA304.1    | E-I      | Cryptography & Network Security       | 30         | 70         | 3              | 1        | 0         | 4         |
|              | MCA304.2    |          | Cyber Security                        |            |            |                |          |           |           |
| 5            | MCA305.1    | E-II     | Mobile Computing with Android         | 30         | 70         | 3              | 1        | 0         | 4         |
|              | MCA305.2    |          | Block Chain Technology                |            |            |                |          |           |           |
|              | MCA305.3    |          | Microsoft Dynamics                    |            |            |                |          |           |           |
| 6            | MCA306      | P-I      | Data Mining and Big Data Lab          | 30         | 70         | 0              | 0        | 6         | 2         |
| 7            | MCA307      | P-II     | Cryptography & Network Security lab   | 30         | 70         | 0              | 0        | 6         | 2         |
| 8            | MCA308      | SEC      | Technical Report Writing              | 50         | -          | 0              | 3        | 0         | 2         |
| 9            | MCA309      | MC       | Cloud Computing & DevOps Fundamentals | -          | -          | 0              | 0        | 0         | 0         |
| <b>TOTAL</b> |             |          |                                       | <b>260</b> | <b>490</b> | <b>15</b>      | <b>8</b> | <b>12</b> | <b>26</b> |

C – Mandatory Core

CF – Compulsory Foundation

P – Practical

E – Elective

SEC – Skill Enhancement Course

MC – Mandatory Courses (MOOCs)

### MCA II Year – IV Semester

| S. No.       | Course Code | Category | Course       | Max Marks |            | Hours Per Week |          |           | Credits   |
|--------------|-------------|----------|--------------|-----------|------------|----------------|----------|-----------|-----------|
|              |             |          |              | I         | E          | L              | T        | P         |           |
| 1            | MCA401      | SEC      | Project Work | -         | 150        | 0              | 0        | 24        | 18        |
| <b>TOTAL</b> |             |          |              | <b>0</b>  | <b>150</b> | <b>0</b>       | <b>0</b> | <b>24</b> | <b>18</b> |

SEC – Skill Enhancement Course

# SEMESTER I

**ANDHRA KESARI UNIVERSITY**  
**DEPARTMENT OF COMPUTER SCIENCE**  
**MASTER OF COMPUTER APPLICATIONS**  
**SEMESTER-I**

| SEMESTER |  | L | T | P | C |
|----------|--|---|---|---|---|
| I        | <b><u>MCA 101 (24): DATA STRUCTURES with C++</u></b> | 2 | 1 | 1 | 5 |

**LEARNING OBJECTIVES (LO):**

The course is designed to meet the objectives of:

|            |   |
|------------|---|
| <b>LO1</b> | To explain the concepts of object-oriented programming  |
| <b>LO2</b> | Understand how to apply the object-oriented concepts like data abstraction, encapsulation and inheritance |
| <b>LO3</b> | Implement the concepts of pointers, constructors and destructors  |
| <b>LO4</b> | Elucidate the implementation of the six data structures using C++   |

**COURSE OUTCOMES (CO):**

Students successfully completing this course will be able to:

|            |   |
|------------|---|
| <b>CO1</b> | Illustrate the implementation of linked lists and Recursion |
| <b>CO2</b> | Analyse search algorithms and hashing technique             |
| <b>CO3</b> | Apply Stacks and Queues for real world tasks                |
| <b>CO4</b> | Make use of trees and graphs in solving complex problems    |

**CORRELATION BETWEEN OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S) AND PROGRAM SPECIFIC OUTCOMES (PSO'S):**

| CO         | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
|------------|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
|            | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| <b>CO1</b> | 3  | 2 | 2 |   |   |   |   |   |   | 2  |    |    | 2   |   | 1 |
| <b>CO2</b> | 3  | 2 | 2 |   |   |   |   |   |   | 2  |    |    | 1   |   | 2 |
| <b>CO3</b> | 3  | 2 | 3 |   |   |   |   |   |   | 3  |    |    | 3   |   | 3 |
| <b>CO4</b> | 2  | 3 | 2 |   |   |   |   |   |   | 3  |    |    | 3   |   | 3 |

## MCA 101 (24): DATA STRUCTURES WITH C++

### UNIT-I

**Software Engineering Principles and C++ Classes:** Classes: Variable - Accessing Class members – Operators – Functions and Classes – Reference parameters and Class Objects – Implementation of member function – Constructors – Destructors; Data Abstraction, Classes and ADT – Information Hiding.

**Pointers and Array based Lists:** Pointer Data types and Pointer variables: Declaring Pointer Variables – Address of Operator – Dereferencing Operator - Classes, Structures and Pointer Variables – Initializing Pointer Variables – Dynamic Variables – Operators on Pointer Variables.

### UNIT-II

**Linked Lists:** Linked List – Properties – Item Insertion and Deletion – Building a Linked List – Linked List as an ADT – Ordered Linked Lists – Doubly Linked Lists – Linked Lists with header and trailer nodes – Circular Linked Lists.

**Recursion:** Recursive Definitions – Problem solving using recursion – Recursion or iteration - Recursion and Backtracking: n- Queens Puzzle.

**Search Algorithms:** Search Algorithms: Sequential – Binary search – Performance of binary search – insertion into ordered list; Hashing: Hash functions – Collision Resolution – Hashing: Implementation using Quadratic Probing – Collision Resolution: Chaining.

### UNIT-III

**Stacks:** Stack operations – Implementation of stacks as arrays – Linked implementation of stacks – Application of stacks.

**Queues:** Queues: Queue operations – Implementation of Queues as arrays; Linked implementation of Queues; Priority Queue; Application of Queues.

**Sorting Algorithms:** Selection Sort – Insertion Sort – Quick Sort – Merge Sort – Heap Sort.

### UNIT-IV

**Trees:** Binary Trees – Binary Tree Traversal – Binary Search Tree – Non recursive Binary Tree Traversal Algorithms – AVL Trees.

**Graphs:** Graph Definitions and Notations – Graph Representation – Operations on graphs – Graph as ADT – Graph Traversals – shortest path

Algorithm – Minimal Spanning Tree.

### **PRESCRIBED BOOK:**

D.S.Malik, "Data Structures using C++", Cengage Learning India Edition (2008).

### **REFERENCE BOOKS:**

- 1) Mark Allen Weiss, "Data structures and Algorithm Analysis in C++", Third Edition, Pearson Education (2008).
- 2) Adam Drozdek, "Data Structures and Algorithms in C++", Cengage Learning, India Edition .

|          |   |                       |          |          |          |
|----------|---|-----------------------|----------|----------|----------|
| SEMESTER | <b><u>MCA 102 (24): DATABASE MANAGEMENT</u></b> | L                     | T        | P        | C        |
| <b>I</b> |   | <b>2</b>              | <b>1</b> | <b>1</b> | <b>5</b> |
|          |   | <b><u>SYSTEMS</u></b> |          |          |          |

### LEARNING OBJECTIVES (LO):

The course is designed to meet the objectives of:

|            |   |
|------------|---|
| <b>LO1</b> | The purpose of a database management system (DBMS)                                    |
| <b>LO2</b> | The role of the database administrator  |
| <b>LO3</b> | Data consistency, data integrity, data redundancy and data independence               |
| <b>LO4</b> | The concept of entity relationships and data normalization                            |
| <b>LO5</b> | The concept of a client/server database   |
| <b>LO6</b> | The relevant advantages of a client/server database over a non-client/server database |

### COURSE OUTCOMES (CO):

Students successfully completing this module will be able to:

|            |  |
|------------|--|
| <b>CO1</b> | Explain about database, different operations, queries performed for management system problems |
| <b>CO2</b> | Demonstrate the significance of ER-diagram in DBMS   |
| <b>CO3</b> | Make use of different normalizations for database size reduction and removal of redundancy     |
| <b>CO4</b> | Apply PL/SQL, SQL injection, procedures etc  |

### CORRELATION BETWEEN OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S) AND PROGRAM SPECIFIC OUTCOMES (PSO'S):

| CO         | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
|------------|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
|            | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| <b>CO1</b> | 2  |   | 2 |   |   |   |   |   |   | 1  |    |    | 2   |   | 1 |
| <b>CO2</b> | 2  |   | 3 |   |   |   |   |   |   | 2  |    |    |     |   | 2 |
| <b>CO3</b> | 2  |   | 2 |   |   |   |   |   |   | 2  |    |    | 2   |   | 2 |
| <b>CO4</b> | 2  |   | 3 |   |   |   |   |   |   | 3  |    |    | 2   |   | 3 |

## MCA 102 (24): DATABASE MANAGEMENT SYSTEMS

### Unit-I

**Databases and Database Users:** Introduction, Characteristics of the Database Approach, Actors on the Scene, Workers behind the scene, Advantages of the using the DBMS Approach.

**Database System Concepts and Architecture:** Data Models, Schemas and Instances, Three Schema architecture and Data Independence, Database Languages and Interfaces, Centralized and Client/Server Architecture for DBMS, Classification of Database Management Systems.

**Disk Storage, Basic File Structures and Hashing:** Introduction, Secondary Storage Devices, Buffering of Blocks, Placing file Records on Disk, Operations on Files, Files of Unordered Records, Files of Ordered Records, Hashing Techniques, Other Primary File Organizations, Parallelizing Disk Access using RAID Technology.

**Indexing Structures for Files:** Types of Single-Level Ordered Indexes, Multilevel Indexes and Dynamic Multilevel Indexes Using B-Trees and B<sup>+</sup> Trees, Indexes on Multiple Keys, Other Types of Indexes.

**Data Modeling Using the ER Model:** Conceptual Data models, Entity Types, Entity Sets, Attributes and Keys, Relationship types, Relationship sets, roles and structural Constraints, Weak Entity types, Relationship Types of Degree Higher than Two, Refining the ER Design for the COMPANY Database.

**The Enhanced Entity-Relationship Model:** Sub classes, Super classes and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization Hierarchies, Modeling of Union Types using Categories, An Example University ERR Schema, Design Choices and Formal Definitions.

### Unit-II

**The Relational Data Model and Relational Database Constraints:** Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations.

**The Relational Algebra and Relational Calculus:** Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples, The Tuple Calculus and Domain Calculus.

**SQL-99: Schema Definition, Constraints, Queries and Views:** SQL Data Definitions and Data Types, Specifying Constraints in SQL, Schema Change Statements on SQL, Basic Queries in SQL, More Complex SQL Queries, INSERT, DELETE and UPDATE statements in SQL, Triggers and Views.

### Unit-III

**Functional Dependencies and Normalization for Relational Databases:** Informal Design Guidelines for Relation Schemas, Functional dependencies, Normal Forms Based in Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form.

**Relational Database Design Algorithms and Further Dependencies:** Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Inclusion Dependencies, Other Dependencies and Normal Forms.

#### Unit-IV

**Introduction to Transaction Processing Concepts and Theory:** Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing schedules Based on Serializability.

**Concurrency Control Techniques:** Two Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multiversion Concurrency control techniques, Validation concurrency control Techniques, Granularity of Data Items and multiple Granularity Locking.

**Distributed Databases and Client Server Architectures:** Distributed Database Concepts, Data Fragmentation, Replication, and allocation Techniques for Distributed Database Design, Types of Distributed Database Systems, An Overview of 3 Tier Client Server Architecture.

#### **PRESCRIBED TEXT:**

RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education (2007)

#### **REFERENCE BOOKS:**

- 1) Peter Rob, Carlos Coronel, "Database Systems" – Design, Implementation and Management, Eighth Edition, Thomson (2008).
- 2) C.J. Date, A.Kannan, S. Swamynathan, "An Introduction to Database Systems", VII Edition Pearson Education (2006).
- 3) Raman A Mata – Toledo, Panline K. Cushman, "Database Management Systems", Schaum's Outlines, TMH (2007).
- 4) Steven Feuerstein, "Oracle PL/SQL – Programming", 10<sup>th</sup> Anniversary Edition, OREILLY (2008).

|                 |   |          |          |          |          |
|-----------------|---|----------|----------|----------|----------|
| <b>SEMESTER</b> | <b><u>MCA 103 (24): OPERATING SYSTEMS</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>I</b>        |   | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**LEARNING OBJECTIVES (LO):**

The course is designed to meet the objectives of:

|            |   |
|------------|---|
| <b>LO1</b> | Appreciating the role of an operating system  |
| <b>LO2</b> | Making aware of the issues in management of resources like processor, memory and input-output                         |
| <b>LO3</b> | Selection of appropriate productivity enhancing tools or utilities for specific needs like filters or version control |
| <b>LO4</b> | Obtaining some insight into the design of an operating system.  |

**COURSE OUTCOMES (CO):**

Students successfully completing this module will be able to:

|            |   |
|------------|---|
| <b>CO1</b> | Explain what is an operating system and the role it plays   |
| <b>CO2</b> | Infer high level understanding of the structure of operating systems, applications, and the relationship between them |
| <b>CO3</b> | How to gather knowledge of the services provided by operating systems   |
| <b>CO4</b> | Compare the exposure to some details of major OS concepts.  |

**CORRELATION BETWEEN OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S) AND PROGRAM SPECIFIC OUTCOMES (PSO'S):**

| <b>CO</b>  | <b>PO</b> |          |          |          |          |          |          |          |          |           |           |           | <b>PSO</b> |          |          |
|------------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|------------|----------|----------|
|            | <b>1</b>  | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> | <b>11</b> | <b>12</b> | <b>1</b>   | <b>2</b> | <b>3</b> |
| <b>CO1</b> | 1         |          |          | 2        |          |          |          |          |          |           |           |           | 2          |          | 2        |
| <b>CO2</b> | 3         |          |          | 2        |          |          |          |          |          |           |           |           | 2          |          | 2        |
| <b>CO3</b> | 2         |          |          | 2        |          |          |          |          |          |           |           |           | 2          |          | 2        |
| <b>CO4</b> | 2         |          |          | 2        |          |          |          |          |          |           |           |           | 2          |          | 3        |

## MCA 103 (24): OPERATING SYSTEMS

### UNIT-I:

**Introduction:** What Operating Systems Do – Computer System Organization – Computer system Architecture – Operating System Structure – Operating System Operations – Process Management – Memory Management – Storage Management – Protection and Security – Distributed Systems – Special purpose Systems – Computing Environments.

**System Structure:** Operating System Services – User Operating System Interface – System Calls – Types of System Calls – System Programs – Operating System Design and Implementation – Operating System Structure – Virtual Machine – Operating System Generation – System Boot.

**Process Concept:** Overview – Process Scheduling – Operations on Processes – Inter process Communication – Examples of IPC Systems – Communication in Client Server Systems.

### UNIT-II:

**Multithreaded Programming:** Overview – Multithreading Models – Thread Libraries – Threading Issues – Operating System Examples.

**Process Scheduling:** Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple Processor Scheduling – Thread Scheduling.

**Synchronization:** Background – The Critical Section Problem – Peterson's solution – Synchronization Hardware – Semaphores – Classic Problem of Synchronization – Monitors – Synchronization Examples – Atomic Transaction.

### UNIT-III:

**Deadlocks:** System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

**Memory Management Strategies:** Background – Swapping – Contiguous Memory Allocation – Paging – Structure of the Page Table – Segmentation – Example: The Intel Pentium.

**Virtual Memory Management:** Background – Demand Paging – Copy on Write – Page Replacement – Allocation of Frames – Thrashing.

### UNIT-IV:

**File System:** File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection.

**Implementing File Systems:** File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free Space Management – Efficiency and Performance – Recovery – Log structured File Systems.

**Secondary Storage Structure:** Overview of Mass – Storage Structure – Disk Structure – Disk Attachment – Disk Scheduling – Disk Management – Swap Space Management – RAID structure.

**I/O Systems: Overview – I/O Hardware – Application I/O Interface – Kernel I/O Interface – Transforming I/O requests to Hardware Operations – Streams – Performance.**

**PRESCRIBED BOOK:**

Abraham Silberschatz, Peter Baer Galvin, Greg Gagne. "Operating System Principles", Seventh Edition, Wiley.

**REFERENCE BOOKS:**

- 1) William Stallings, "Operating Systems – Internals and Design Principles", Fifth Edition, Pearson Education (2007)
- 2) Achyut S Godbole, "Operating Systems", Second Edition, TMH (2007).
- 3) Flynn/McHoes, "Operating Systems", Cengage Learning (2008).
- 4) Deitel&Deitel, "Operating Systems", Third Edition, Pearson Education (2008)



## MCA 104 (24): PROBABILITY AND STATISTICS

### Unit I:

**Some probability laws:** Axioms of Probability, Conditional Probability, Independence of the Multiplication Rule, Bayes' theorem

**Discrete Distributions:** Random Variables, Discrete Probability Densities, Expectation and distribution parameters, Binomial distribution, Poisson distribution, simulating a Discrete distribution.

**Continuous distributions:** continuous Densities, Expectation and distribution parameters, exponential distribution, Normal distribution, Weibull distribution and Reliability.

### UNIT II:

**Estimation:** Point estimation, interval estimation and central limit theorem.

**Inferences on the mean and the Variance of a distribution:** Hypothesis Testing, significance testing, Hypothesis and significance test on the mean, Hypothesis tests on the Variance

**Inferences on proportions:** estimating proportions, testing hypothesis on a proportion, Comparing two proportions: estimation, comparing two proportions: hypothesis testing.

### UNIT III:

**Comparing two means and two variances:** point estimation: independent samples, Comparing variances: the F-distribution,

**Comparing means:** variances equal,

**Analysis of Variance:** One-way classification fixed effects model, comparing variances, pair wise comparisons, randomized complete block design

### UNIT IV:

**Simple linear regression and correlation:** model and parameter estimation, inferences about slope, inferences about intercept, Co-efficient of determination

**Multiple linear regression models:** least square procedures for model fitting, a matrix approach to least squares, interval estimation.

### **PRESCRIBED BOOK:**

- 1) J Susan Milton and Jesse C. Arnold: "Introduction to Probability and Statistics", Fourth edition, TMH, (2007).

### **REFERENCE BOOK:**

- 1) William Mendenhall, Robert J Beaver, Barbara M Beaver: Introduction to Probability and Statistics, Twelfth edition, Thomson.

|                 |   |          |          |          |          |
|-----------------|---|----------|----------|----------|----------|
| <b>SEMESTER</b> | <b><u>MCA 105.1 (24): COMPUTER ORGANIZATION</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>I</b>        |   | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

### LEARNING OBJECTIVES (LO):

The course is designed to meet the objectives of:

|            |   |
|------------|---|
| <b>LO1</b> | Help the students to develop an understand the nature and characteristics of the organisation and design of the modern computer systems |
| <b>LO2</b> | Explain the students about the basic computer organization  |
| <b>LO3</b> | Focus on the organisation & operation of the CPU  |

### COURSE OUTCOMES (CO):

Students successfully completing this module will be able to:

|            |  |
|------------|--|
| <b>CO1</b> | Explain the key concepts that are likely to be included in the design of any modern computer system                                      |
| <b>CO2</b> | Make use of the basic metrics by which new and existing computer systems may be evaluated  |
| <b>CO3</b> | Outline the impact that languages, their compilers and underlying operating systems have on the design of computer systems               |
| <b>CO4</b> | How to evaluate the impact that peripherals, their interconnection and underlying data operations have on the design of computer systems |
| <b>CO5</b> | Demonstrate the techniques needed to conduct the design of a computer  |

### CORRELATION BETWEEN OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S) AND PROGRAM SPECIFIC OUTCOMES (PSO'S):

| CO  | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
|-----|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
|     | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| CO1 | 2  |   |   | 1 |   |   |   |   |   |    |    |    | 1   |   |   |
| CO2 | 2  |   |   | 2 |   |   |   |   |   |    |    |    | 1   |   |   |
| CO3 | 3  |   |   | 2 |   |   |   |   |   |    |    |    |     |   |   |
| CO4 | 2  |   |   | 2 |   |   |   |   |   |    |    |    | 2   |   |   |

## MCA 105.1 (24): COMPUTER ORGANIZATION

### Unit-I

**Digital Logic Circuits:** Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip-Flops, Sequential Circuits.

**Digital Components:** Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory Unit.

**Data Representation:** Data Types, Complements, Fixed Point Representation, Floating Point Representation, Other Binary Codes, error Detection Codes.

### Unit-II

**Register Transfer and Microoperations:** Register Transfer Languages, Register Transfer, Bus and Memory Transfer, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit

**Basic Computer Organization and Design:** Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-Output and Interrupt.

### Unit-III

**Micro programmed Control:** Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.

**Central Processing Unit:** Introduction, General Register Organization, Stack Organization, Instruction Format, Addressing Modes, Data Transfer and Manipulation, Program Control.

### Unit-IV

**Computer Arithmetic:** Addition, Subtraction, Multiplication, Division Algorithms, Floating Point Arithmetic Operations.

**Input-Output Organization:** Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt.

**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary memory, Associative Memory, Cache Memory.

### **PRESCRIBED BOOK:**

- 1) M.Morris Mano, "Computer System Architecture", 3<sup>rd</sup> Edition, Pearson Education (2008).

### **REFERENCE BOOKS:**

- 1) V. Rajaraman, T. Radha Krishnan, "Computer Organization and Architecture", PHI
- 2) BehroozParhami, "Computer Architecture", Oxford (2007)
- 3) ISRD group, "Computer Organization", ace series, TMH (2007)
- 4) William Stallings, "Computer Organization and Architecture – Designing for Performance", Pearson Education (2005)
- 5) P.Chakraborty, "Computer Architecture and Organization", Jaico Books (2008)

|                 |   |          |          |          |          |
|-----------------|---|----------|----------|----------|----------|
| <b>SEMESTER</b> | <b><u>MCA 105.2 (24):DIGITAL LOGIC DESIGN</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>I</b>        |   | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

#### LEARNING OBJECTIVES (LO):

The course is designed to meet the objectives of:

|            |  |
|------------|--|
| <b>LO1</b> | To understand basic number systems, codes and logical gates.                       |
| <b>LO2</b> | To understand the concepts of Boolean algebra                                      |
| <b>LO3</b> | To understand the use of minimization logic to solve the Boolean logic expressions |
| <b>LO4</b> | To understand the design of combinational and sequential circuits                  |
| <b>LO5</b> | To understand the state reduction methods for Sequential circuits.                 |
| <b>LO6</b> | To understand the basics of various types of memories                              |

#### COURSE OUTCOMES (CO):

Students successfully completing this module will be able to:

|            |   |
|------------|---|
| <b>CO1</b> | Explain number systems and codes.                           |
| <b>CO2</b> | Illustrate Boolean expressions using Minimization methods.  |
| <b>CO3</b> | Demonstrate the sequential and combinational circuits.      |
| <b>CO4</b> | Apply state reduction methods to solve sequential circuits. |

#### CORRELATION BETWEEN OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S) AND PROGRAM SPECIFIC OUTCOMES (PSO'S):

| CO         | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
|------------|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
|            | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| <b>CO1</b> | 2  |   |   |   |   |   |   |   |   |    |    |    | 2   |   | 1 |
| <b>CO2</b> | 2  |   |   |   |   |   |   |   |   |    |    |    |     |   | 2 |
| <b>CO3</b> | 3  |   |   |   |   |   |   |   |   |    |    |    | 3   |   | 3 |
| <b>CO4</b> | 3  | 3 |   |   |   |   |   |   |   |    |    |    | 3   |   | 3 |

## MCA 105.2 (24): DIGITAL LOGIC DESIGN

### UNIT-I

**Binary Systems:** Digital Systems, Binary Numbers, Number base conversions, Octal, Hexadecimal and other base numbers, complements, signed binary numbers, Floating point number representation, binary codes, Error detection and correction, binary storage and registers, binary logic.

**Boolean algebra and logic gates:** Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, Digital Logic Gates.

### UNIT-II

**Gate-Level Minimization:** The K-Map Method, Three-Variable Map, Four-Variable Map, Five-Variable Map, sum of products, product of sums simplification, Don't care conditions, NAND and NOR implementation and other two level implementations, Exclusive-OR function.

### UNIT-III

**Combinational Logic:** Combinational Circuits (CC), Analysis procedure, Design Procedure, Combinational circuit for different code converters and other problems, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Demultiplexers.

### UNIT-IV

**Synchronous Sequential Logic:** Synchronous Sequential Circuits, Latches, Flip-flops, analysis of clocked sequential circuits, Registers, Shift registers, Ripple counters, Synchronous counters, other counters.

Asynchronous Sequential Circuits -Introduction, Analysis procedure, Circuits with latches, Design procedure, Reduction of state and follow tables, Race- free state assignment, Hazards.

### UNIT-V

**Memory:** Introduction, Random-Access memory, Memory decoding, ROM, Programmable Logic Array, Programmable Array Logic, Sequential programmable devices.  
**Register Transfer and Micro operations -** Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit.

### TEXT BOOKS:

- 1) Digital Design, M. Morris Mano, M.D.Ciletti, 5th edition, Pearson.(Units I, II, III, IV, Part of Unit V)
- 2) Computer System Architecture, M.Morris Mano, 3rd edition, Pearson.(Part of Unit V)

### REFERENCE BOOKS:

- 1) Switching and Finite Automata Theory, Z. Kohavi, Tata McGraw Hill.
- 2) Fundamentals of Logic Design, C. H. Roth, L. L. Kinney, 7th edition, Cengage Learning.
- 3) Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman, John Wiley.



## **MCA 105.3 (24): DISCRETE MATHEMATICAL STRUCTURES**

### **UNIT-I:**

**The Foundations: Logic and Proofs:** Propositional Logic – Propositional Equivalences – Predicates and Quantifiers – Nested Quantifiers – Rules of Inference – Introduction to Proofs – Proof Methods and Strategy

**Basic Structures: Sets, Functions, Sequences and Sums:** Sets – Set Operations – Functions – Sequences and Summations

**The Fundamentals: Algorithms, The Integers and Matrices:** Algorithms – The Growth of Functions – Complexity of Algorithms – The Integers And Divisions – Primes and Greatest Common Divisors – Integers and Algorithms – Applications of Number Theory – Matrices

**Introduction and Recursion:** Mathematical Induction – Strong Induction and Well-Ordering – Recursive Definitions and Structural Induction – Recursive Algorithms – Program Correctness

### **UNIT-II:**

**Counting:** The Basics of Counting – The Pigeon Hole Principle – Permutations and Combinations – Binomial Coefficients – Generalized Permutations and Combinations – Generating Permutations and Combinations

**Advanced Counting Techniques:** Recurrence Relations – Solving Linear Recurrence Relations – Divide and Conquer Algorithms and Recurrence Relations – Generating Functions – Inclusion – Exclusion – Applications of Inclusion & Exclusion

### **UNIT-III:**

**Relations:** Relations and Their Properties – n-ary Relations and Their Applications – Representing Relations – Closures of Relations – Equivalence Relations – Partial Orderings

**Graphs:** Graphs and Graph Models – Graph Terminology and Special Types of Graphs – Representing Graphs and Graph Isomorphism's – Connectivity – Euler and Hamilton Paths – Shortest Path Problems – Planar Graphs - Graph Coloring

### **UNIT-IV:**

**Trees:** Introduction to Trees – Applications of Trees – Tree Traversal – Spanning Trees – Minimum Spanning Trees

**Boolean Algebra:** Boolean Functions – Representing Boolean Functions – Logic Gates – Minimization of Circuits

### **PRESCRIBED BOOK:**

- 1) Kenneth H Rosen, "Discrete Mathematics & its Applications", 6<sup>th</sup> Edition, McGraw-Hill (2007) **Chapters:** 1 to 10

### **REFERENCE BOOKS:**

- 1) Ralph P. Grimaldi, B.V. Ramana, "Discrete and Combinational Mathematics", 5<sup>th</sup> Edition, Pearson Education (2008).
- 2) Swapan Kumar Sarkar, "A Text Book of Discrete Mathematics", S.Chand (2008).
- 3) D.S.Malik and M.K.Sen, "Discrete Mathematical Structures", Thomson (2006).

| SEMESTER | <b><u>MCA 106 (24): DATA STRUCTURES LAB</u></b> | L | T | P | C |
|----------|---|---|---|---|---|
| <b>I</b> |   | - | - | 6 | 3 |

- 1) Write a program for implementing the operations on complex numbers using classes.
- 2) Program for finding the area of circle, rectangle and room using function overloading.
- 3) Program for finding the volume of box using constructor overloading.
- 4) Program for Sorting 'n' elements Using bubble sort technique.
- 5) Sort given elements using Selection Sort.
- 6) Sort given elements using Insertion Sort.
- 7) Sort given elements using Merge Sort.
- 8) Sort given elements using Quick Sort.
- 9) Implement the following operations on single linked list.
  - (i) Creation (ii) Insertion (iii) Deletion (iv) Display
- 10) Implement the following operations on double linked list.
  - (i) Creation (ii) Insertion (iii) Deletion (iv) Display
- 11) Implement the following operations on circular linked list.
  - (i) Creation (ii) Insertion (iii) Deletion (iv) Display
- 12) Program for splitting given linked list.
- 13) Program for traversing the given linked list in reverse order.
- 14) Merge two given linked lists.
- 15) Implement Stack Operations Using Arrays.
- 16) Implement Stack Operations Using Linked List.
- 17) Implement Queue Operations Using Arrays.
- 18) Implement Queue Operations Using Linked List.
- 19) Implement Operations on Circular Queue.
- 20) Construct and implement operations on Priority Queue.
- 21) Implement Operations on double ended Queue.
- 22) Converting infix expression to postfix expression by using stack.
- 23) Write program to evaluate post fix expression.
- 24) Add two polynomials using Linked List.
- 25) Multiply Two polynomials using Linked List.
- 26) Construct BST and implement traversing techniques recursively.
- 27) Implement preorder traversal on BST non recursively.
- 28) Implement inorder traversal on BST non recursively.
- 29) Implement postorder traversal on BST non recursively.
- 30) Implement binary search techniques recursively.

|          |                                      |   |   |   |   |
|----------|--------------------------------------|---|---|---|---|
| SEMESTER | <b><u>MCA 107 (24): DBMS LAB</u></b> | L | T | P | C |
| I        |                                      | - | - | 6 | 3 |

Aim: **Marketing Company** wishes to computerize their operations by using following tables.

Table Name: **Client Master**

Description: This table stores the information about the clients.

| Column Name | Data Type | Size | Attribute   |
|-------------|-----------|------|---|
| Client_no   | Varchar2  | 6    | Primary Key and first letter should starts with 'C' |
| Name        | Varchar2  | 10   | Not null  |
| Address1    | Varchar2  | 10   |   |
| Address2    | Varchar2  | 10   |   |
| City        | Varchar2  | 10   |   |
| State       | Varchar2  | 10   |   |
| Pincode     | Number    | 6    | Not null  |
| Bal due     | Number    | 10,2 |   |

Table Name: **Product master**

Description: This table stores the information about products.

| Column Name    | Data Type | Size | Attribute   |
|----------------|-----------|------|---|
| Product_no     | Varchar2  | 6    | Primary Key and first letter should starts with 'P' |
| Description    | Varchar2  | 10   | Not null  |
| Profit_percent | Number    | 2,2  | Not null  |
| Unit_measure   | Varchar2  | 10   |   |
| Qty_on_hand    | Number    | 8    |   |
| Record_lvl     | Number    | 8    |   |
| Sell_price     | Number    | 8,2  | Not null, can't be 0                                |
| Cost_price     | Number    | 8,2  | Not null, can't be 0                                |

Table Name: salesman\_master

Description: This table stores the salesmen working in the company

| Column Name | Data Type | Size | Attribute   |
|-------------|-----------|------|---|
| Salesman_id | Varchar2  | 6    | Primary Key and first letter should starts with 'S' |
| Name        | Varchar2  | 10   | Not null  |
| Address1    | Varchar2  | 10   |   |
| Address2    | Varchar2  | 10   |   |
| City        | Varchar2  | 10   |   |
| State       | Varchar2  | 10   |   |
| Pincode     | Number    | 6    | Not null  |
| Sal_amt     | Number    | 8,2  | Should not null and zero                            |
| Target_amt  | Number    | 6,2  | Should not null and zero                            |
| Remarks     | Varchar2  | 10   |   |

Table Name: sales\_order

Description: This table stores the information about orders

| Column Name   | Data Type | Size | Attribute  |
|---------------|-----------|------|--|
| S_order_no    | Varchar2  | 6    | Primary Key and first char is 'O'                              |
| S_order_date  | Date      |      |  |
| Client_no     | Varchar2  | 6    | Foreign key  |
| Delve_address | Varchar2  | 20   |  |
| Salesman_no   | Varchar2  | 6    | Foreign key  |
| Delve_type    | Varchar2  | 1    | Delivery: part(P)/Full(F) and default 'F'                      |
| Billed_yn     | Char      | 1    |  |
| Delve_date    | Date      |      | Can't be less than the s_order_date                            |
| Order_status  | Varchar2  | 10   | Values in 'IN PROCESS', 'FULFILLED', 'BACK ORDER', 'CANCELLED' |

Table Name: sales\_order\_details

Description: This table stores the information about products ordered

| Column Name  | Data Type | Size | Attribute  |
|--------------|-----------|------|--|
| S_order_no   | Varchar2  | 6    | Primary key, foreign key references sales_order table    |
| Product_no   | Varchar2  | 6    | Primary key, foreign key references product_master table |
| Qty_ordered  | Number    | 8    |  |
| Qty_disp     | Number    | 8    |  |
| Product_rate | Number    | 10,2 |  |

Table Name: challan\_master

Description: This table stores the information about challans made for orders.

| Column Name  | Data Type | Size | Attribute   |
|--------------|-----------|------|---|
| Challan_no   | Varchar2  | 6    | Primary key, first two letters must start with 'CH' |
| S_order_no   | Varchar2  | 6    | Foreign key references sales_order                  |
| Challan_date | Date      |      |   |
| Billed_yn    | Char      | 1    | Values in 'Y', 'N' default 'N'                      |

Table Name: Challan\_Details

Description: This table stores the information about challan detail.

| Column Name | Data Type | Size | Attribute  |
|-------------|-----------|------|--|
| Challan_no  | Varchar2  | 6    | Primary key, foreign key references challan_master table |
| Product_no  | Varchar2  | 6    | Primary key, foreign key references product_master table |
| Qty_disp    | Number    | 4,2  | Not null   |

## SOLVE THE FOLLOWING QUERIES BY USING ABOVE TABLES.

- 1) Retrieve the list of names and cities of all the clients.
- 2) List the various products available from product\_master.
- 3) Find out the clients who stay in a city whose second letter is 'a'.
- 4) Find the list of all clients who stay in the city 'CHENNAI' or 'DELHI'.
- 5) List all the clients located at 'CHENNAI'.
- 6) Print the information from sales order as the order the places in the month of January.
- 7) Find the products with description as 'Floppy Drive' and 'Pen drive'.
- 8) Find the products whose selling price is grater than 2000 and less than or equal to 5000.
- 9) Find the products whose selling price is more than 1500 and also find the new selling price as original selling price \*15.
- 10) Find the products in the sorted order of their description.
- 11) Divide the cost of product '540 HDD' by difference between its price and 100.
- 12) List the product number, description, sell price of products whose description begin with letter 'M'.
- 13) List all the orders that were cancelled in the month of March.
- 14) Count the total number of orders.
- 15) Calculate the average price of all the products.
- 16) Determine the maximum and minimum product prices.
- 17) Count the number of products having price grater than or equal to 1500.
- 18) Find all the products whose quantity on hand is less than reorder level.
- 19) Find out the challan details whose quantity dispatch is high.
- 20) Find out the order status of the sales order, whose order delivery is maximum in the month of March.
- 21) Find out the total sales made by the each salesman.
- 22) Find the total revenue gained by the each product sales in the period of Q1 and Q2 of year 2006.
- 23) Print the description and total qty sold for each product.
- 24) Find the value of each product sold.
- 25) Calculate the average qty sold for each client that has a maximum order value of 1,50,000.
- 26) List the products which has highest sales.
- 27) Find out the products and their quantities that will have to deliver in the current month.
- 28) Find the product number and descriptions of moving products.
- 29) Find the names of clients who have purchased 'CD DRIVE'.
- 30) List the product numbers and sales order numbers of customers having quantity ordered less than 5 from the order details for the product '1.44 Floppies'.
- 31) Find the product numbers and descriptions of non-moving products.
- 32) Find the customer names and address for the clients, who placed the order '019001'.

| <b>SEMESTER</b> | <b><u>MCA 108 (24): COMMUNICATION</u></b><br><b><u>SKILLS</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
|-----------------|---|----------|----------|----------|----------|
| <b>I</b>        |   |          | -        | 3        | -        |

# SEMESTER II

# MASTER OF COMPUTER APPLICATIONS

## SEMESTER-II

|          |  |   |   |   |   |
|----------|--|---|---|---|---|
| Semester | <b><u>MCA 201 (24): SOFTWARE ENGINEERING</u></b> | L | T | P | C |
| II       |  | 3 | 1 | 0 | 4 |

### LEARNING OBJECTIVE (LO):

|     |  |
|-----|--|
| LO1 | The need of software engineering, its different life cycles and different phases |
| LO2 | To measure cost, efforts, time and team management etc,                          |
| LO3 | Testing and maintenance techniques of big projects and                           |
| LO4 | Different risks and its management systems                                       |
| LO5 | Learn about quality management.  |

### COURSE OUTCOMES (CO):

At the end of the course, the student will be able to

|     |   |
|-----|---|
| CO1 | Describe software engineering layered technology and process framework                            |
| CO2 | Evaluate the different process models and choose the best model for their project                 |
| CO3 | Understand the different development practices and its advantages                                 |
| CO4 | Explain software testing approaches, software tactics and metrics for process and project domains |
| CO5 | Analyse estimation techniques, quality management and formal methods                              |

### CORRELATION BETWEEN OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S) AND PROGRAM SPECIFIC OUTCOMES (PSO'S):

| CO  | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
|-----|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
|     | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| CO1 |    |   |   | 2 |   |   |   |   |   | 2  |    | 2  | 2   |   | 2 |
| CO2 |    | 3 | 2 |   |   |   |   |   |   | 2  |    |    | 2   |   | 2 |
| CO3 |    | 3 | 2 | 3 |   |   |   |   |   | 3  |    |    | 2   |   | 2 |
| CO4 |    | 3 | 2 | 3 |   |   |   |   |   | 3  |    |    | 2   |   | 2 |
| CO5 |    | 3 | 2 | 3 |   |   |   |   |   | 2  |    |    | 2   |   | 2 |

## MCA 201 (24): SOFTWARE ENGINEERING

### **Unit-I:**

**Introduction to Software Engineering:** The Evolving Role of Software, Software, The Changing Nature of Software, Legacy Software: The Quality of legacy software, Software Evolution, Software Myths.

**A Generic View of Process:** Software Engineering-A Layered Technology, A Process Framework, The capability Maturity Model Integration (CMMI), Process Patterns, Process Assessment, Personal and Team Process Models: Personal Software Process (PSP), Team Software Process (TSP), Process Technology, Product and Process.

**Process Models:** Prescriptive Models, The Waterfall Model, Incremental Process Models: The Incremental Model, The RAD Model, Evolutionary Process Model: Prototyping, The Spiral Model, The Concurrent Development Model, Specialized Process Models: Component Based Development, The formal Methods Model, The Unified Process.

**An Agile View of Process:** What is Agility? What is Agile Process? Agile Process Models: Extreme Programming, Adaptive Software Development, Dynamic Systems Development Method, Scrum, Crystal, Feature Driven Development, Agile Modeling.

### **Unit-II**

**Software Engineering Practice:** Software Engineering Practice, communication practices, Planning Practices, Modeling Practices, Construction Practices, and Deployment.

**System Engineering:** Computer Based Systems, the System Engineering Hierarchy, Business Process Engineering: An Overview, System Modeling.

**Building the Analysis Model:** Requirement Analysis, Analysis Modeling Approaches, Data Modeling Concepts, Object Oriented Analysis, Scenario Based Modeling, Flow Oriented Modeling, Class Based Modeling, Creating a Behavioral Model.

**Design Engineering:** Design within the context of Software Engineering, Design Process and Design Quality, Design Concepts, The Design Model, Pattern Based Software Design.

### **Unit-III**

**Testing Strategies:** A strategic Approach to Software Testing, Strategic Issues, and Test Strategies for conventional Software, Testing Strategies for Object Oriented Software, Validation Testing, System Testing, the Art of Debugging.

**Testing Tactics:** Software Testing Fundamentals, Black Box and White Box Testing, White Box Testing, Basis Path Testing, Control Structure Testing, Black Box Testing, Object Oriented Testing Methods, Testing Methods Applicable at the class level, InterClass Test Case Design, Testing for Specialized Environments, Architectures and Applications, Testing Patterns.

**Project Management:** The Management Spectrum, the People, The Product, The Process, The Project, The W5HH Principles.

**Metrics for Process and Projects:** Metrics in the Process and Project Domains, Software Measurement, Metrics for Software Quality, Integrating Metrics within Software Process, Metrics for Small Organizations, Establishing a Software Metrics Program.

#### **Unit-IV**

**Estimation:** Observations on Estimations, The project planning process, Software Scope and Feasibility, Resources, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimations for Object Oriented Projects, Specialized Estimation Techniques, The Make/Buy Decision

**Quality Management:** Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Statistical Software Quality Assurance, Software Reliability, The ISO 9000 Quality Standards, the SQA Plan

**Formal Methods:** Basic Concepts, Object Constraint Language (OCL), The Z specification language, The Ten Commandments for Formal Methods.

**Cleanroom Software Engineering:** The Cleanroom Approach, Functional Specification, Cleanroom Design, Cleanroom Testing.

#### **PRESCRIBED BOOK:**

- 1) Roger S Pressman, "Software Engineering—A Practitioner's Approach", Sixth Edition, TMH International.

#### **REFERENCE BOOKS:**

- 1) Sommerville, "Software Engineering", Seventh Edition Pearson Education (2007)
- 2) S.A.Kelkar, "Software Engineering – A Concise Study", PHI.
- 3) Waman S.Jawadkar, "Software Engineering", TMH.
- 4) Ali Behforooz and Frederick J.Hudson, "Software Engineering Fundamentals", Oxford (2008).

|           |   |          |          |          |          |
|-----------|---|----------|----------|----------|----------|
| Semester  | <b><u>MCA 202 (24): COMPUTER NETWORKS</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>II</b> |   | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

### LEARNING OBJECTIVE (LO)

The course is designed to meet the objectives of:

|     |  |
|-----|--|
| LO1 | Understanding the state-of-the-art in network protocols, architectures, and applications |
| LO2 | Examining and studying of different protocols in OSI and TCP/IP                          |
| LO3 | Understanding of network addressing, mapping etc   |
| LO4 | Understanding error control, flow control, packet recovery etc                           |
| LO5 | Understanding internetworking of devices   |

### COURSE OUTCOMES (CO):

At the end of the course, the student will be able to

|     |   |
|-----|---|
| CO1 | Analyse basic taxonomy and terminology of the computer networking area. |
| CO2 | Describe the configuration and design of a small network                |
| CO3 | Explain about research areas and future internets research fields       |
| CO4 | Learn components and rules of communications                            |
| CO5 | Construct and implement layer protocols within an environment           |

### CORRELATION BETWEEN OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S) AND PROGRAM SPECIFIC OUTCOMES (PSO'S):

| CO  | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
|-----|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
|     | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| CO1 |    | 2 |   | 2 |   |   |   |   |   | 2  |    | 2  |     | 3 | 2 |
| CO2 |    | 2 | 2 |   |   |   |   |   |   | 2  |    |    |     | 3 | 2 |
| CO3 |    | 2 | 2 | 3 |   |   |   |   |   | 3  |    |    |     | 3 | 2 |
| CO4 |    | 2 | 2 | 3 |   |   |   |   |   | 3  |    |    |     | 3 | 2 |
| CO5 |    | 2 | 2 | 3 |   |   |   |   |   | 2  |    |    |     | 3 | 2 |

## MCA 202 (24): COMPUTER NETWORKS

### UNIT-I

**Introduction:** Uses of Computer Networks: Business Application, Home Applications, Mobile Users – Social Issues. Network Hardware: Local Area Networks – Metropolitan Area Networks – Wide Area Networks – Wireless Networks – Home Networks – Internetworks. Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection Oriented and Connectionless Services – Service Primitives – The relationship of Services to Protocols. Reference Models: The OSI Reference Model – The TCP/IP Reference Model – A Comparison of OSI and TCP/IP reference Model – A Critique of the OSI Model and Protocols – A Critique of the TCP/IP reference model. Example Networks: The Internet – Connection Oriented Networks: x.25, Frame Relay, and ATM – Ethernet – Wireless LANs Network Standardization: Who's who in the Telecommunication World – Who's who in the International Standards World – Who's who in the Internet Standards World?

**Physical Layer:** Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics

**Data Link Layer:** Data Link Layer Design Issues: Services Provided to the Network Layer – Framing – Error Control – Flow Control. Error Detection and Correction: Error correcting Codes – Error Detecting Codes. Elementary Data Link Protocols: An unrestricted Simplex Protocol – A simplex Stop- and – wait Protocol – A simplex Protocol for a Noisy channel. Sliding Window Protocols: A one-bit sliding Window Protocol – A Protocol using Go Back N – A Protocol using selective Repeat. Example Data Link Protocols: HDLC – The Data Link Layer in the Internet.

### UNIT-II

**The Medium Access Control Sublayer:** Ethernet: Ethernet Cabling – Manchester Encoding – The Ethernet MAC sublayer Protocol – The Binary Exponential Backoff Algorithm – Ethernet Performance – Switched Ethernet – Fast Ethernet – Gigabit Ethernet – IEEE 802.2: Logical Link Control – Retrospective on Ethernet. Wireless Lans: The 802.11 Protocol Stack - The 802.11 Physical Layer - The 802.11 MAC sublayer Protocol - The 802.11 Frame Structure. Bluetooth: Bluetooth Architecture – Bluetooth Applications – The Bluetooth Protocol Stack – The Bluetooth Radio Layer – The Bluetooth Baseband Layer – The Bluetooth L2CAP layer – The Bluetooth Frame Structure. Data Link Layer Switching: Bridges from 802.x to 802.y – Local Internetworking – Spanning Tree Bridges – Remote Bridges – Repeaters, Hubs, Bridges, Switches, Routers and Gateways – Virtual LANs.

### UNIT-III

**The Network Layer:** Network Layer Design Issues: Store – and Forward Packet Switching – Services provided to the Transport Layer – Implementation of Connectionless Services – Implementation of Connection Oriented Services – Comparison Of Virtual Circuit and Datagram subnets. Routing Algorithms: The Optimality Principle – Shortest Path Routing – Flooding – Distance Vector Routing – LinkState Routing – Hierarchical Routing – Broadcast Routing – Multicast Routing – Routing for Mobile Hosts. Internet Working: How Networks

Differ – How Networks can be connected – Concatenated Virtual Circuits – Connectionless Internetworking – Tunneling – Internet work Routing – Fragmentation. The Network Layer in the Internet: The IP Protocol – IP address – Internet Control Protocols – OSPF – The Internet Gateway Routing Protocol – BGP – The Exterior Gateway Routing Protocol.

**The Transport Layer:** The Transport Service: Services provided to the Upper Layers – Transport Services Primitives – Berkeley Sockets. Elements of Transport Protocols: Addressing – Connection Establishment – Connection Release – Flow Control and Buffering – Multiplexing – Crash Recovery. The Internet Transport Protocols: UDP

Introduction to UDP – Remote Procedure Call – The Real Time Transport Protocol. The Internet Transport Protocols: TCP Introduction to TCP – The TCP Service Model – the TCP Protocol – The TCP segment header – TCP connection establishment – TCP connection release – Modeling TCP connection management- TCP Transmission Policy – TCP congestion Control – TCP Timer Management – Wireless TCP and UDP – Transactional TCP.

#### **UNIT-IV:**

**The Application Layer:** DNS: The Domain Name System: The DNS Name Space – Resource Records – Name Servers. Electronic Mail: Architecture and Services – The User Agent – Message Formats – Message Transfer – Final Delivery. The World Wide Web: Architecture Overview – Static Web Documents – Dynamic Web Documents – HTTP – The Hyper Text Transfer Protocol – Performance Enhancements – The Wireless Web. Multimedia: Introduction to Digital Audio – Audio Compression – Streaming Audio – Internet Radio – Voice Over IP – Introduction to Video – Video Compression – Video on Demand.

#### **PRESCRIBED BOOK:**

- 1) Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, PHI.

#### **REFERENCE BOOKS:**

- 1) James F.Kurose, Keith W.Ross, "Computer Networking", Third Edition, Pearson Education
- 2) Behrouz A Forouzan, "Data Communications and Networking", Fourth Edition, TMH (2007)
- 3) Michael A. Gallo, William M. Hancock, "Computer Communications and NetworkingTechnologies", Cengage Learning (2008)

|           |  |   |   |   |   |
|-----------|--|---|---|---|---|
| Semester  | <b><u>MCA 203 (24): WEB TECHNOLOGIES</u></b> | L | T | P | C |
| <b>II</b> |  | 2 | 1 | 1 | 5 |

### LEARNING OBJECTIVE (LO):

The course is designed to meet the objectives of:

|     |  |
|-----|--|
| LO1 | Design and develop Web applications  |
| LO2 | Create web pages using HTML, DHTML and Cascading Styles sheets.                          |
| LO3 | Analyze and build interactive web applications using JSP and Servlets.                   |
| LO4 | Design and develop Web applications  |
| LO5 | Designing Enterprise based applications by encapsulating an application's business logic |

### COURSE OUTCOMES (CO):

At the end of the course, the student will be able to

|     |   |
|-----|---|
| CO1 | Explain the technologies used in web applications.                                      |
| CO2 | Demonstrate HTML5, CSS, JavaScript coding for web applications                          |
| CO3 | Design creative websites using object based scripting concepts                          |
| CO4 | Learn to access database through Java programs, using Java Database Connectivity (JDBC) |
| CO5 | Create dynamic web pages, using Servlets and JSP  |

### CORRELATION BETWEEN OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S) AND PROGRAM SPECIFIC OUTCOMES (PSO'S):

| CO  | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
|-----|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
|     | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| CO1 | 2  |   | 2 | 2 |   |   |   |   |   | 2  |    |    | 2   |   | 2 |
| CO2 | 2  |   | 2 | 2 |   |   |   |   |   | 2  |    |    | 2   |   | 2 |
| CO3 | 2  |   | 2 | 3 |   |   |   |   |   | 3  |    |    | 3   |   | 3 |
| CO4 | 2  |   | 2 | 3 |   |   |   |   |   | 3  |    |    | 3   |   | 3 |
| CO5 | 2  |   | 2 | 3 |   |   |   |   |   | 3  |    |    | 3   |   | 3 |

## MCA 203 (24): WEB TECHNOLOGIES

### UNIT I

**Java Basics:** Java buzzwords, Review of OOP concepts, dynamic binding, abstract classes and methods, interfaces, Packages.

**GUI Programming with JAVA:** Event Handling, Applets, Swing - Introduction to Swing, Swing vs. AWT, MVC architecture, Hierarchy for Swing components, Containers, JFrame, JApplet, JWindow, JDialog, JPanel, A simple swing application, Overview of several swing components, Layout management - Layout manager types - border, grid, flow, box.

### UNIT II

**HTML: Common Tags:** List, Tables, images, forms, Frames, Cascading Style Sheets;

**Java Script:** Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

**XML:** Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

### UNIT III

**JDBC:** Introduction to JDBC - Connections - Internal Database Connections - Statements - Results Sets - Prepared Statements - Callable Statements.

**Network Programming and RMI:** why networked Java - Basic Network Concepts - looking up Internet Addresses - URLs and URIs - UDP Datagrams and Sockets - Remote Method Invocation.

### Unit-IV

**Web Servers and Servlets:** Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

**Introduction to JSP:** The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

### **PRESCRIBED TEXT BOOKS:**

- 1) The Complete reference Java, Herbert Schildt, 7<sup>th</sup> Edition, McGraw Hill.
- 2) Java Programming with JDBC ;Donald Bales, O'Reilly
- 3) Web Technologies - a computer science perspective, Jeffrey C. Jackson, Pearson, 2007.

### **REFERENCE TEXT BOOKS:**

- 1) Java Network Programming, elliotte Rusty Harold, 3rd Edition
- 2) Java Server Pages - Hans Bergsten, SPD O'Reilly
- 3) Robert W. Sebesta, "Programming the World Wide Web", Third Edition, Pearson Education (2007).
- 4) Anders Moller and Michael schwartzbach, "An Introduction to XML and Web Technologies", Addison Wesley (2006)
- 5) Chris Bates, "Web Programming-Building Internet Applications", Second Edition, Wiley (2007).

|          |   |   |   |   |   |
|----------|---|---|---|---|---|
| Semester | <b><u>MCA 204 (24): ARTIFICIAL INTELLIGENCE</u></b> | L | T | P | C |
| II       |   | 3 | 1 | 0 | 4 |

**LEARNING OBJECTIVE (LO):**

|     |  |
|-----|--|
| LO1 | To introduce the basic principles, techniques, and applications of Artificial Intelligence |
| LO2 | To Formulate a given problem in the language/framework of different AI methods             |
| LO3 | Explore weal slots, structures and game planning in AI.                                    |
| LO4 | To equip students with the knowledge and skills in logic programming using Prolog          |
| LO5 | To explore the different paradigms in knowledge representation and reasoning               |

**COURSE OUTCOMES (CO):**

At the end of the course, the student will be able to

|     |  |
|-----|--|
| CO1 | Understand the history, development and various applications of artificial intelligence        |
| CO2 | Illustrate knowledge base system   |
| CO3 | Solve different problems using AI algorithm  |
| CO4 | Analyze how uncertainty is being tackled in the knowledge representation and reasoning process |
| CO5 | Classify the expert systems  |

**CORRELATION BETWEEN OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S) AND PROGRAM SPECIFIC OUTCOMES (PSO'S):**

| CO  | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |   |
|-----|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|---|
|     | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |   |
| CO1 | 2  |   |   |   |   |   |   |   |   | 2  |    |    | 2   |   |   |   |
| CO2 | 2  |   |   |   |   |   |   |   |   | 2  |    |    | 2   |   |   |   |
| CO3 | 2  |   |   |   |   |   |   |   | 2 |    | 2  | 2  | 3   |   |   |   |
| CO4 | 2  |   |   |   |   |   |   |   | 2 |    | 2  | 3  | 3   |   |   |   |
| CO5 | 2  |   |   |   |   |   |   |   |   | 2  |    |    | 3   |   |   | 3 |

|                 |  |          |          |          |          |
|-----------------|--|----------|----------|----------|----------|
| <b>Semester</b> | <b><u>MCA 205.1 (24): PROGRAMMING AND<br/>PROBLEM SOLVING USING PYTHON</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>II</b>       |  | <b>3</b> | <b>1</b> | <b>1</b> | <b>5</b> |

**LEARNING OBJECTIVE (LO):**

|     |  |
|-----|--|
| LO1 | Install and run the Python interpreter                     |
| LO2 | Create and execute Python programs                         |
| LO3 | Understand the concepts of file I/O                        |
| LO4 | Be able to read data from a text file using Python         |
| LO5 | Plot data using appropriate Python visualization libraries |

**COURSE OUTCOMES (CO):**

At the end of the course, the student will be able to

|     |   |
|-----|---|
| CO1 | Demonstrate understanding of modern version control tools.  |
| CO2 | Exhibit facility with a Linux command line environment.   |
| CO3 | Demonstrate understanding of the role of testing in scientific computing, and write unit tests in Python. |
| CO4 | Use command line tools to write and edit code.  |
| CO5 | Develop publication-ready graphics from a dataset.  |

**CORRELATION BETWEEN OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S) AND PROGRAM SPECIFIC OUTCOMES (PSO'S):**

| CO  | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
|-----|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
|     | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| CO1 | 2  |   |   | 2 |   |   |   |   |   |    |    |    | 2   |   |   |
| CO2 | 2  |   |   | 2 |   |   |   |   |   |    |    |    | 2   |   |   |
| CO3 | 3  |   |   | 3 |   |   |   |   | 2 |    |    | 2  | 3   |   |   |
| CO4 | 3  |   |   | 3 |   |   |   |   | 2 |    |    | 3  | 3   |   | 3 |
| CO5 | 3  |   |   | 3 |   |   |   |   |   |    |    |    | 3   |   | 3 |

# MCA 205.1 (24): PROGRAMMING AND PROBLEM SOLVING USING PYTHON

## UNIT I

**Introduction:** The Process of Computational Problem Solving, Python Programming Language. **Python Data Types:** Expressions, Variables and Assignments, Strings, List, Objects and Classes, Python Standard Library

**Imperative Programming:** Python programs, Execution Control Structures, User-Defined Functions, Python Variables and Assignments, Parameter Passing.

## UNIT II

**Text Files:** Strings, Formatted Output, Files, Errors and Exception Handling

**Execution and Control Structures:** if Statement, for Loop, Two Dimensional Lists, while Loop, More Loop Patterns, Additional Iteration Control Statements

**Containers and Randomness:** Dictionaries, Other Built-in Container Types, Character Encoding and Strings, Module random, Set Data Type.

## UNIT III

**Object Oriented Programming:** Fundamental Concepts, Defining a New Python Class, User-Defined Classes, Designing New Container Classes, Overloaded Operators, Inheritance, User-Defined Exceptions

**Namespaces:** Encapsulation in Functions, Global versus Local Namespaces, Exception Control Flow, Modules and Namespaces.

**Objects and Their Use:** Software Objects, Turtle Graphics, Modular Design: Modules, Top-Down Design, Python Modules

**Recursion:** Introduction to Recursion, Examples of Recursion, Run Time Analysis, Searching, Iteration Vs Recursion, Recursive Problem Solving, Functional Language Approach.

## UNIT IV

**Graphical User Interfaces:** Basics of tkinter GUI Development, Event-Based tkinter Widgets, Designing GUIs, OOP for GUI,

**The Web and Search:** The World Wide Web, Python WWW API, String Pattern Matching, Database Programming in Python

## PRESCRIBED BOOK:

- 1) Ljubomir Perkovic, "Introduction to Computing Using Python: An Application Development Focus", Wiley, 2012.

## REFERENCE BOOKS:

- 1) Charles Dierbach, "Introduction to Computer Science Using Python: A Computational Problem-Solving Focus", Wiley, 2013.

|           |   |                           |          |          |          |
|-----------|---|---------------------------|----------|----------|----------|
| Semester  | <b><u>MCA 205.2 (24): INTRODUCTION TO R</u></b> | <b>L</b>                  | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>II</b> |   | <b><u>PROGRAMMING</u></b> | <b>3</b> | <b>1</b> | <b>1</b> |

**LEARNING OBJECTIVE (LO):**

|     |   |
|-----|---|
| LO1 | The basics of statistical computing and data analysis |
| LO2 | How to implement data structure in R                  |
| LO3 | R loop functions and debugging tools                  |
| LO4 | Lists and Vectors concepts in R                       |
| LO5 | Factors and levels in R                               |

**COURSE OUTCOMES (CO):**

At the end of the course, the student will be able to

|     |  |
|-----|--|
| CO1 | Explain critical R programming concepts              |
| CO2 | Demonstrate how to install and configure RStudio     |
| CO3 | Apply OOP concepts in R programming                  |
| CO4 | Explain the use of data structure and loop functions |
| CO5 | Apply various concepts to write programs in R        |

**CORRELATION BETWEEN OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S) AND PROGRAM SPECIFIC OUTCOMES (PSO'S):**

| CO  | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
|-----|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
|     | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| CO1 | 2  |   | 2 |   |   |   |   |   |   | 1  |    |    | 2   |   | 1 |
| CO2 | 2  |   | 3 |   |   |   |   |   |   | 2  |    |    |     |   | 2 |
| CO3 | 2  |   | 2 |   |   |   |   |   |   | 2  |    |    | 2   |   | 2 |
| CO4 | 2  |   | 3 |   |   |   |   |   |   | 3  |    |    | 2   |   | 3 |
| CO5 | 2  |   | 3 |   |   |   |   |   |   | 3  |    |    | 2   |   | 3 |

## MCA 205.2 (24): INTRODUCTION TO R PROGRAMMING

### UNIT I

Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

### UNIT II

Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes.

Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations

### UNIT III

Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations

### UNIT IV

Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables, Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions

### PRESCRIBED TEXT BOOKS:

- 1) Roger D. Peng, "R Programming for Data Science", 2012
- 2) Norman Matloff, "The Art of R Programming- A Tour of Statistical Software Design", 2011

### REFERENCE TEXT BOOKS:

- 1) Jared P. Lander, "R for Everyone - advanced analytics andGraphics", 2nd Edition, Addison-Wesley.
- 2) Paul Teetor, "R Cookbook", 2nd Edition, O'Reilly publications.
- 3) Garrett Grolemund, Hadley Wickham, "Hands-On Programming with R: Write Your Own Functions and Simulations", 1st Edition, 2014.

|          |  |   |   |   |   |
|----------|--|---|---|---|---|
| Semester | <b><u>MCA 206 (24): PYTHON PROGRAMMING LAB</u></b> | L | T | P | C |
| II       |  | 0 | 0 | 6 | 3 |

### LAB CYCLE

#### SIMPLE PROGRAMS

- 1) Write a program using print Pascal triangle.
- 2) Write a program to find out the roots of the quadratic equations.
- 3) Write a program to display the Fibonacci series using generators.
- 4) Write a program to check the given number is palindrome or not.
- 5) Write a program to find the sum of digits of a given number
- 6) Write a Python program to calculate  $X = \frac{1}{2!} + \frac{2}{4!} + \frac{4}{8!} + \frac{8}{16!}$ .
- 7) Write a Python program to remove the punctuations from a string.
- 8) Write a Python program to implement the simple calculator.
- 9) Write a Python program to print the lower and upper triangles of a matrix.
- 10) Write a Python program to merge two mails.

### FUNCTIONS

- 1) Write a recursive Python function that has a parameter representing a list of integers and returns the maximum stored in the list.
- 2) Write a recursive Python function to that generates the top n prime numbers in the range 1 to 1000.
- 3) Write a python function to calculate the multiplication of two matrices.
- 4) Write a Python function to reverse the given string.
- 5) Write a Python function that takes an integer n and a character c, returns a string and displays as "xxxxx" ( Ex: the length of the returned string is 5, then the output as XXXXX)
- 6) Write Python function that the search the given number in the list of numbers by using binary search.
- 7) Write a Python function to convert the given decimal number into binary number by using recursion.
- 8) Write a Python function to sort the list of records in a file.

### GUI PROGRAMS

- 1) Construct a GUI application to generate the employee pay slip
- 2) Construct a GUI application to generate a Bar Graph for a excel data
- 3) Construct a GUI application to perform the Arithmetic operations
- 4) Read Input Values through input window
- 5) Choose choice and Operation through following windows
- 6) Display the result in Message Box.

|                 |   |          |          |          |          |
|-----------------|---|----------|----------|----------|----------|
| <b>Semester</b> | <b><u>MCA 206 (24): R PROGRAMMING LAB</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>II</b>       |   | <b>0</b> | <b>0</b> | <b>6</b> | <b>3</b> |

- 1) Download and install R-Programming environment and install basic packages using `install.packages()` command in R.
- 2) Learn all the basics of R-Programming (Data types, Variables, Operators etc.)
- 3) Implement R-Loops with different examples.
- 4) Learn the basics of functions in R and implement with examples.
- 5) Implement data frames in R. Write a program to join columns and rows in a data frame using `cbind()` and `rbind()` in R.
- 6) Implement different String Manipulation functions in R.
- 7) Implement different data structures in R (Vectors, Lists, Data Frames)
- 8) Write a program to read a csv file and analyze the data in the file in R
- 9) Create pie charts and bar charts using R.
- 10) Create a data set and do statistical analysis on the data using R.

|           |  |          |          |          |          |
|-----------|--|----------|----------|----------|----------|
| Semester  | <b><u>MCA 207 (24): WEB TECHNOLOGIES LAB</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>II</b> |  | <b>0</b> | <b>0</b> | <b>6</b> | <b>3</b> |

- 1) Write a Java Program to define a class, describe its constructor, overload the constructors and instantiate its object
- 2) Build and run "Celsius Converter" sample application using swings
- 3) Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked
- 4) Develop and demonstrate a HTML document that illustrates the use of external style sheet, ordered list, table, borders, padding, color, and the <span> tag.
- 5) Create a form with the following specifications:
  - a) Our form uses frames, one to hold the links bar at the top of the browser window.
  - b) Other is a larger frame that provides the main view.
  - c) The links bar should contain 5 links, which when clicked, should display the appropriate HTML file in the larger frame.
- 6) Create a webpage with the following using html
  - a) Embed an image in web page
  - b) Fix the hot spots
  - c) Show all the related information when a hot spot is clicked in the map
- 7) Write a JavaScript code to find factorial of N. (Use recursive function)
- 8) Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
- 9) Create a web page using two image files, which switch between one another as the mouse pointer moves over the images. Use the onMouseOver and onMouseOut event handlers.
- 10) Design an XML document to store information about a student in an engineering college affiliated to ANU. The information must include college id, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
- 11) Create an XML document, which contains 10 users information. Implement a program, which takes User Id as an input and returns the user details by taking the user information from the XML document
- 12) write a java program to illustrate java to database connectivity using JDBC
- 13) Write a program to print the Fibonacci numbers using RMI.
- 14) write a java servlet program to conduct online examination and to display student mark list available in a database
- 15) Create a java program to create an airline reservation service and a travel agent and the travel agent is searching for an airline using web services and database.

|                 |                                     |          |          |          |          |
|-----------------|-------------------------------------|----------|----------|----------|----------|
| <b>Semester</b> | <b><u>MCA 208 (24): SEMINAR</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>II</b>       |                                     | <b>4</b> | <b>0</b> | <b>0</b> | <b>2</b> |

# SEMESTER III

**ANDHRA KESARI UNIVERSITY**  
**DEPARTMENT OF COMPUTER SCIENCE**  
**MASTER OF COMPUTER APPLICATIONS**  
**SEMESTER-III**

|                 |  |          |          |          |          |
|-----------------|--|----------|----------|----------|----------|
| <b>SEMESTER</b> | <b><u>MCA 301 : Data Mining and Big Data</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>III</b>      |  | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**LEARNING OBJECTIVES (LO):**

**The course is designed to meet the objectives of:**

|            |  |
|------------|--|
| <b>LO1</b> | To identify the scope and essentiality of Data Warehousing and Mining.             |
| <b>LO2</b> | To analyse data, choose relevant models and algorithms for respective applications |
| <b>LO3</b> | To developers' arch interest towards advances in data mining                       |
| <b>LO4</b> | To provide an overview of an exciting growing field of big data analytics.         |

**COURSE OUTCOMES (CO):**

**Students upon completion of this course will be able to:**

|            |  |
|------------|--|
| <b>CO1</b> | Understand Data Warehouse fundamentals, Data Mining Principles   |
| <b>CO2</b> | Identify appropriate data mining algorithms to solve real world problems   |
| <b>CO3</b> | Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining.     |
| <b>CO4</b> | Understand the key issues in big data management and its associated applications in intelligent business and scientific computing. |
| <b>CO5</b> | Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce in big data analytics.                     |

# MCA 301 Data Mining and Big Data

## Unit-I

**Data Warehouse and OLAP Technology:** An Overview: What is Data Warehouse? - A Multidimensional Data Model - Data warehouse Architecture - From Data Warehousing to Data Mining

**Data mining** – Introduction, Data mining on what kind of data , Data mining functionalities, classification of Data mining systems, Major issues in Data mining

## Unit-II

**Mining Association rules in large databases** - Association rule mining, Mining single-Dimensional Boolean association rules from Transactional databases, Mining multi-Dimensional Association rules from relational Databases and Data Warehouses

**Classification and Prediction** - Introduction classification by decision tree induction, Bayesian Classification. Other classification methods, classification by back propagation, Prediction, classifier accuracy

## Unit-III

**Cluster analysis** – Introduction, Types of data in cluster analysis, a categorization of major clustering methods, partitioning methods, hierarchical methods and Density based methods: DBSCAN, Grid-based method: STING, Model based clustering method: Statistical Approach, outlier analysis.

## Unit-IV

**Big Data:** Introduction – distributed file system – Big Data and its importance, Four Vs. Drivers for Big data, Big data analytics, Big data applications.

**Hadoop:** Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read, Hadoop Map Reduce paradigm. Writing Hadoop Map Reduce Programs

## **Prescribed Books:**

1. Jiawei Han Micheline Kamber, “Data mining & Techniques”, Morgan Kaufmann publishers
2. Boris Lublin sky, Kevint. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
3. Chris Eaton, Dirkderoosetal, “Understanding Big data”, McGrawHill, 2012.
4. Tom White, “HADOOP: The definitive Guide”, Oreilly 2012.

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SEMESTER-III**

|                 |   |          |          |          |          |
|-----------------|---|----------|----------|----------|----------|
| <b>SEMESTER</b> | <b><u>MCA 302 : CLOUD COMPUTING</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>III</b>      |   | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**LEARNING OBJECTIVES (LO):**

**The course is designed to meet the objectives of:**

|            |  |
|------------|--|
| <b>LO1</b> | The student will learn about the cloud environment, buildings of the systems and components that scale to millions of users in modern internet |
| <b>LO2</b> | Cloud concepts capabilities across the various cloud service models including Iaas, Paas, SaaS,  |
| <b>LO3</b> | Developing cloud-based software applications on top of cloud platforms.  |

**COURSE OUTCOMES (CO):**

**Students successfully completing this module will be able to:**

|            |  |
|------------|--|
| <b>CO1</b> | Understanding the key dimensions of the challenge of Cloud Computing   |
| <b>CO2</b> | Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization. |

## MCA 302: CLOUD COMPUTING

### Unit-I

**Cloud Computing Basics:** Cloud Computing Overview, applications, Intranets and the Cloud, First Movers in the Cloud.

**Your Organization and Cloud Computing:** When you can use Cloud Computing, Benefits Limitations.  
**Cloud Computing with Titans:** Google, EMC, Net App, Microsoft, Amazon, Salesforce.com, IBM and partnerships.

### Unit-II

**The Business Case for Going to the Cloud-**Cloud Computing Services, How those Applications Help your Business, Deleting your Data center, Thomson Reuters.

**Hardware and Infrastructure:** Clients, Security- Data Leakage, Off-loading work, Logging, Forensics, Compliance VPNs, Key management; Network; Services - identify, integration, mapping, payment, search.

**Accessing the Cloud:** Plat forms web applications, Web APIs, Web Browsers.

### Unit-III

**Cloud Storage:** Overview, Cloud storage providers.

**Software as a Service:** Overview, Driving Forces, Company Offerings and Industries.

**Software plus Services:** Overview, Mobile Device Integration, Providers, Microsoft online.

### Unit-IV

**Local Clouds, Thin Clients, Thick clients:** Types of Virtualizations, Virtualization in Your Organization, Server Solutions, Thin Clients.

**Migrating to the Cloud:** Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, Migration

**Best Practices and the Future of Cloud Computing-**Analyze Your Service, Best Practices, How Cloud Computing Might Evolve.

#### **Prescribed Book:**

Anthony T.Velte, To by J. Velte, Robert Elsen peter, “ *Cloud Computing A Practical Approach*”, McGraw-Hill.

#### **REFERENCES:**

1. Michael Miller, “Cloud Computing”, Pearson Education, New
2. Raj Kumar Buyya, Christian Vecchiola, S.ThamaraiSelvi, "Mastering Cloud Computing", McGraw Hill Education.
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On- demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.
4. Cloud Application Architectures, George Reese, ISBN: 8184047142, Shroff/O'Reilly,2009.

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SEMESTER-III**

|                 |  |          |          |          |          |
|-----------------|--|----------|----------|----------|----------|
| <b>SEMESTER</b> | <b><u>MCA 303 : MACHINE LEARNING</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>III</b>      |  | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**LEARNING OBJECTIVES (LO):**

**The course is designed to meet the objectives of:**

|            |  |
|------------|--|
| <b>LO1</b> | To introduce to the students the basic concepts and fundamentals of machine learning |
| <b>LO2</b> | To develop skills of implementing machine learning techniques                        |
| <b>LO3</b> | To familiarize the students with latest technologies                                 |
| <b>LO4</b> | To implement machine learning solutions to classification, regression and clustering |

**COURSE OUTCOMES (CO):**

**Students successfully completing this module will be able to:**

|            |   |
|------------|---|
| <b>CO1</b> | How to make a computer program to learn from experience     |
| <b>CO2</b> | Importance of concept learning                              |
| <b>CO3</b> | Representation of decisions and decision making explicitly  |
| <b>CO4</b> | To come to a conclusion from the observations about an item |
| <b>CO5</b> | Prediction of probabilities                                 |

## MCA 303 Machine Learning

### UNIT-I

**Introduction** - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

**Concept learning and the General to Specific Ordering** – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the Candidate-Elimination algorithm, Remarks on version spaces and Candidate-Elimination, Inductive Bias

### UNIT-II

**Decision Tree learning**–Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

**Bayesian learning** – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

### UNIT-III

**Computational learning theory** – Introduction, Probability Learning an Approximately Correct Hypothesis, Sample Complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The Mistake Bound Model of Learning

**Instance-Based Learning**- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

### Unit-IV

**Genetic Algorithms** – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

**Combining Inductive and Analytical Learning** – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators

**Reinforcement Learning** –Introduction, the Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

### Prescribed Textbook:

Machine Learning–Tom M. Mitchell,-MGH

### Reference Book:

1. Introduction to Machine Learning,- Ethem Alpaydin,-PHI
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor& Francis

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MASTER OF COMPUTER APPLICATIONS  
SEMESTER-III**

|                 |  |          |          |          |          |
|-----------------|--|----------|----------|----------|----------|
| <b>SEMESTER</b> | <b><u>MCA304.1 : CRYPTOGRAPHY AND NETWORK SECURITY</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>III</b>      |  | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**LEARNING OBJECTIVES (LO):**

**The course is designed to meet the objectives of:**

|            |  |
|------------|--|
| <b>LO1</b> | Security breaches can be very expensive in terms of business disruption and the financial losses that may result.  |
| <b>LO2</b> | Increasing volumes of sensitive information are transferred across the internet or intranets connected to it.  |
| <b>LO3</b> | Networking that make use of internet links are becoming more popular because they are cheaper than dedicated leased lines. This, however, involves different users sharing internet links to transport their data. |
| <b>LO4</b> | Directors of business organizations are increasingly required to provide effective information security.   |

**COURSE OUTCOMES (CO):**

**Students successfully completing this module will be able to:**

|            |  |
|------------|--|
| <b>CO1</b> | Identify some of the factors driving the need for network security.  |
| <b>CO2</b> | Identify and classify particular examples of attacks.  |
| <b>CO3</b> | Compare and contrast symmetric and a symmetric encryption systems and the invulnerability to attack, and explain the characteristics of hybrid systems |
| <b>CO4</b> | Describe the use of hash functions and explain the characteristics of one-way and collision- free functions.   |
| <b>CO5</b> | Describe and distinguish between different mechanisms to assure the freshness of a message   |
| <b>CO6</b> | Explain the role of third-party agents in the provision of authentication services.  |
| <b>CO7</b> | Discuss the effectiveness of passwords in access control and the influence of human behaviour  |
| <b>CO8</b> | Identify types of firewall implementation suitable for differing security requirements   |
| <b>CO9</b> | Distinguish between firewalls based on packet-filtering routers, application level gateways and circuit level gateways.                                |

# MCA304.1: CRYPTOGRAPHY AND NETWORK SECURITY

## Unit-I

**Introduction:** Security trends, the OSI security architecture, security attacks, security services, security mechanisms, a model for network security.

**Classical encryption techniques:** Symmetric cipher model, Substitution techniques, Transposition techniques, Rotor machines, Steganography.

**Block cipher and the data encryption standard:** Block cipher principles, the strength of DES, Differential and linear cryptanalysis, Block cipher design principles.

**Confidentiality using Symmetric Encryption:** Placement of encryption function, Traffic confidentiality, key distribution, random number generator.

## UNIT-II

**Public key cryptography and RSA:** Principles of public key crypto systems, The RS Algorithm

**Key management: Other public-key cryptosystems:** Key management, Diffie-Hellman key exchange.

**Message authentication and hash functions:** Authentication requirements, Authentication functions, message authentication codes, Hash functions, security of hash functions and MACs.

**Digital signatures and authentication protocols:** Digital signatures, Authentication protocols, Digital Signature standard.

## UNIT-III

**Authentication Applications:** Kerberos, X.509 authentication service

**Email Security:** Pretty good privacy, S/MIME

**IP security:** IP security overview, IP security architecture, Authentication header, Encapsulating security payload, combining security associations, key management.

**Web security:** Web security considerations, Secure Socket Layer and transport layer security, Secure electronic transaction.

## UNIT-IV

**Intruders:** Intruders, Intrusion detection, password management

**Malicious Software:** Viruses and related threats, virus counter measures, distribute denial of service attacks.

**Firewalls:** Firewall Design principles, trusted systems, common criteria for information technology, security evaluation.

**Prescribed Book:**

William Stallings, "Cryptography and Network Security", Fourth edition, PHI.

**Reference Books:**

1. William Stallings, "Network Security Essentials– Applications and Standards", Third Edition, Pearson Education (2007).
2. Chris McNab, "Network Security Assessment", 2<sup>nd</sup> Edition, OReilly(2007).
3. Jon Erickson, "Hacking–The Art of Exploitation", SPD, NO STARCH Press(2006).
4. Neal Krawety, "Introduction to Network Security", Thomson (2007).

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SEMESTER-III**

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|-----------------|--|----------|----------|----------|----------|
| <b>SEMESTER</b> | <b><u>MCA 304.2 : CYBER SECURITY</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>III</b>      |  | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**Course Objectives (CO):**

The students will be able to:

|            |  |
|------------|--|
| <b>CO1</b> | Understand various block cipher and stream cipher models                                   |
| <b>CO2</b> | Describe the principles of public key crypto systems, hash functions and digital signature |
| <b>CO3</b> | To get a firm knowledge on Cyber Security Essentials                                       |

**Course Outcomes (CO):**

At the end of the course, the students will be able to:

|            |   |
|------------|---|
| <b>CO1</b> | Explain basic security algorithms required by any computing system                                      |
| <b>CO2</b> | Analyze the possible security attacks in complex real time systems and their effective counter measures |
| <b>CO3</b> | Compare various governing bodies of cyber laws  |
| <b>CO4</b> | Infer various privacy policies for an organization  |
| <b>CO5</b> | Solve the vulnerabilities in any computing system and hence be able to design a security solution       |

**Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):**

| CO         | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
|------------|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
|            | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| <b>CO1</b> | 2  |   |   |   |   |   |   | 2 |   | 2  |    |    | 2   | 2 |   |
| <b>CO2</b> | 2  |   |   |   |   |   |   | 2 |   | 2  |    |    | 2   | 2 |   |
| <b>CO3</b> | 3  |   |   |   |   |   |   | 3 |   | 3  |    |    | 3   | 3 | 2 |
| <b>CO4</b> | 3  |   |   |   |   |   |   | 3 |   | 3  |    |    | 3   | 3 | 2 |
| <b>CO5</b> | 3  |   |   |   |   |   |   | 3 |   | 3  |    |    | 3   | 3 | 2 |

## MCA304.2 CYBER SECURITY

### Unit I:

**Introduction to Security:** Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm

**Public Key Cryptography and Hash Algorithms:** Principles of public key crypto systems-The RSA algorithm- Key management-Diffie Hellman Key exchange- Hash functions-Hash Algorithms (MD5, Secure Hash Algorithm)

### Unit II:

**Fundamentals of Cyber Security: Attacker Techniques and Motivations:** How Hackers Cover Their Tracks- Fraud Techniques - Threat Infrastructure.

**Exploration:** Techniques to Gain a Foot hold (Shell code, SQL Injection, Malicious PDF Files) - Misdirection, Reconnaissance, and Disruption Methods

### Unit III:

**Privacy to provide Cyber Security:** Privacy Concepts -Privacy Principles and Policies - Authentication and Privacy- Data Mining- Privacy on the Web- Email Security-Privacy Impacts of Emerging Technologies

### Unit IV:

**Cyber Security Management and Incidents:** Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis – Dealing with Disaster.

**Legal Issues and Ethics:** Protecting programs and Data– Information and the law–Rights of Employees and Employers

**Emerging Topics:** The Internet of Things- Cyber Warfare

### Text book:

1. William Stallings, “Cryptography and Network Security”, Pearson Education, 6th Edition, 2013.
2. Graham. Howard, R., Olson. Cyber Security Essentials, CRC Press, 2011.
3. Charles P.P fleeger Shari Lawrence P fleeger Jonathan Margulies, Security in Computing, 5<sup>th</sup> Edition, Pearson Education, 2015.

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**SEMESTER-III**

|                 |   |          |          |          |          |
|-----------------|---|----------|----------|----------|----------|
| <b>SEMESTER</b> | <b><u>MCA305.1 : MOBILE COMPUTING WITH</u></b><br><b><u>ANDROID</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>III</b>      |   | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**LEARNING OBJECTIVES (LO):**

**The course is designed to meet the objectives of:**

|            |   |
|------------|---|
| <b>LO1</b> | To introduce the concept of mobile android                                  |
| <b>LO2</b> | To introduce the concept of different views of android                      |
| <b>LO3</b> | To understand the designing aspects of android mobiles.                     |
| <b>LO4</b> | To make them familiar with SMS, email, service, binding and deploying APks. |

**COURSE OUTCOMES (CO):**

**Students successfully completing this module will be able to:**

|            |   |
|------------|---|
| <b>CO1</b> | Familiarized with mobile android Terminology.                         |
| <b>CO2</b> | Understand and building interfaces.                                   |
| <b>CO3</b> | Understand and creating menus   |
| <b>CO4</b> | Gain knowledge about the publishing, deploying APK files and Eclipse. |

## **MCA305.1 Mobile Computing with Android**

### **Unit-I**

What is Android? Features of Android, Architecture of Android, Eclipse, Android SDK, and ADT, Creating Android virtual devices, Creating Application and Anatomy application. Understanding Activities – Applying styles and themes to activity, hiding the activity title, displaying a dialog window, displaying a progress dialog. Linking Activities using intents. Calling built-in applications using intents.

### **Unit-II**

Understand the components of a screen, Adapting to display orientation, managing changes to screen orientation, creating the user interface programmatically, listening for UI notifications. Basic views, picker's views, list views. Using images views to display pictures, using menus with views and some additional views.

### **Unit-III**

User preferences, persisting data to files, creating and using data bases, sharing data in android, using a content provider, creating your own content provider, SMS messaging, e-mails and networking.

### **Unit-IV**

Creating own services, communicating between a service and an activity, binding activities to services, publishing, deploying APF files and eclipse.

### **Prescribe Book**

Beginning Android 4 Application Development, Wei- Meng Lee, Wiley

### **Reference Books**

Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox).

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**SEMESTER-III**

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|-----------------|--|----------|----------|----------|----------|
| <b>SEMESTER</b> | <b><u>MCA305.2: BLOCK CHAIN TECHNOLOGY</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>III</b>      |  | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**LEARNING OBJECTIVES (LO):**

**The course is designed to meet the objectives of:**

|            |   |
|------------|---|
| <b>LO1</b> | To introduce the concept of Block chain                                 |
| <b>LO2</b> | To overcome the problems of centralization                              |
| <b>LO3</b> | To introduce the concept of Bit coin                                    |
| <b>LO4</b> | To make them familiar with Bit coin network, payments, clients and APIs |

**COURSE OUTCOMES (CO):**

**Students successfully completing this module will be able to:**

|            |  |
|------------|--|
| <b>CO1</b> | Explain the fundamental concepts of blockchain technology, including decentralization, distributed systems, types of blockchains, and the evolution of blockchain and Bitcoin.           |
| <b>CO2</b> | Analyze cryptographic principles such as symmetric and asymmetric cryptography, public-private key mechanisms, and their role in securing blockchain transactions and financial systems. |
| <b>CO3</b> | Describe the architecture and working of Bitcoin, including digital wallets, transactions, mining process, alternative cryptocurrencies, and the limitations of Bitcoin.                 |
| <b>CO4</b> | Apply knowledge of Bitcoin networks, payment mechanisms, wallets, clients, and APIs to understand real-world blockchain-based financial applications.                                    |

## **MCA305.2Block Chain Technology**

### **Unit-I**

Block chain, the growth of block chain technology, distributed systems, the history of block chain and Bit coin, types of block chain. Decentralization, methods of decentralization, routes of decentralization, block chain and full ecosystem decentralization, smart contracts, Decentralized organizations and platforms for decentralization.

### **Unit-II**

Symmetric Cryptography, working with the Open SSL command line, cryptographic primitives. Public Key Cryptography, asymmetric cryptography, public and private keys and financial markets and trading.

### **Unit-III**

Introducing Bit coin, Bit coin, digital keys and addresses, transactions, block chain, mining. Alternative Coins. Limitations of Bit coin

### **Unit-IV**

Bit coin Network and payments, The Bit coin network, wallets, Bit coin payments, innovation in Bit coin, Bit coin Clients and APIs.

### **Prescribe Book**

Mastering Block chain 2<sup>nd</sup> Edition, Imran Bashir, PACK T Publication

### **Reference Books**

Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Gold feder. Bit coin and crypto currency technologies: a comprehensive introduction. Princeton University Press, 2016.

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**SEMESTER-III**

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|-----------------|--|----------|----------|----------|----------|
| <b>SEMESTER</b> | <b><u>MCA 305.3 : MICROSOFT DYNAMICS</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>III</b>      |  | <b>3</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**Learning Objective (LO):**

|     |   |
|-----|---|
| LO1 | Explore Dynamics 365 applications.  |
| LO2 | Discover business value in Dynamics 365 applications and how they support digital transformation. |
| LO3 | Gain in-depth knowledge of CRM application modules.   |
| LO4 | Understand Dynamics 365 customization, configuration, integration, deployment types               |
| LO5 | Design and configure business units   |

**Course Outcomes (CO):**

At the end of the course, the student will be able to

|     |  |
|-----|--|
| CO1 | Understand Dynamics 365 frame work   |
| CO2 | Examine the Design and configuration of Business Units, Configure Security Roles |
| CO3 | Experiment with Creating and managing entities                                   |
| CO4 | Illustrate the Customization of forms, views and visualizations                  |
| CO5 | Develop various process flows and solution management.                           |

**Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):**

| CO  | PO |   |   |   |   |   |   |   |   |    |    |    | PSO |   |   |
|-----|----|---|---|---|---|---|---|---|---|----|----|----|-----|---|---|
|     | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1   | 2 | 3 |
| CO1 | 2  |   |   |   |   |   |   | 2 |   |    | 2  |    | 2   | 2 |   |
| CO2 | 2  |   |   |   |   |   |   | 2 |   |    | 2  |    | 2   | 2 |   |
| CO3 | 3  |   |   |   |   |   |   | 3 |   |    | 3  |    | 3   | 3 | 2 |
| CO4 | 3  |   |   |   |   |   |   | 3 |   |    | 3  |    | 3   | 3 | 3 |
| CO5 | 3  |   |   |   |   |   |   | 3 |   |    | 3  |    | 3   | 3 | 3 |

## **MCA305.3 Microsoft Dynamics SYLLABUS**

### **UNIT 1**

#### **Prerequisites**

- a) Install VS Code - <https://code.visualstudio.com/download>
- b) Install Docker Engine - <https://docs.docker.com/engine/install/>
- c) Install Al Visx file
  - I. Goto visual Studio code and then market place
  - II. Search AL and install the AL Language vsix file
- d) Install Bc Contianer Helper -  
<https://github.com/microsoft/navcontainerhelper/blob/master/NavContainerHelper.md> #Get Started Helper
- e) Install Bc Container using BC Contianer helper -  
<https://github.com/microsoft/navcontainerhelper/blob/master/NavContainerHelper.md>  
#Get Started Run

### **UNITII**

#### **Business Central– Basic Functional Knowledge**

- a) Getting Started - <https://learn.microsoft.com/en-us/training/paths/get-started-dynamics-365-business-central/>
- b) Sales - <https://learn.microsoft.com/en-us/dynamics365/business-central/sales-manage-sales>
- c) Purchase - <https://learn.microsoft.com/en-us/dynamics365/business-central/purchasing-manage-purchasing>
- d) Inventory - <https://learn.microsoft.com/en-us/dynamics365/business-central/inventory-manage-inventory>

### **UNITIII**

#### **Business Central – AL Development**

- a) Getting Started - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/dev-env-get-started>
- b) Creating a Sample Project - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-extension-example>
- c) Keyboard Shortcuts - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/dev-env-keyboard-shortcuts>
- d) Business Objects
  - I. Tables - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/dev-env-tables-overview>
  - II. Pages - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/dev-env-pages-overview>
  - III. Events - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-events-in-al>
  - IV. Reports - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/dev-env-reports>.

## UNITIV

### **Business Central – AL Programming**

- a) Overview - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-it-pro/developer/dev-env-reference-overview>
- b) DataTypes & Methods - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-it-pro/developer/methods-auto/library>
- c) Properties - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-it-pro/developer/properties/dev-env-properties>
- d) Triggers - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-it-pro/developer/triggers-auto/dev-env-triggers>
- e) ALMethods - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-it-pro/developer/dev-env-al-methods>
- f) ALSimpleStatements - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-it-pro/developer/dev-env-al-simple-statements>
- g) ALControlStatements - <https://learn.microsoft.com/en-us/dynamics365/business-central/dev-it-pro/developer/dev-env-al-control-statements>

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**MASTER OF COMPUTER APPLICATIONS**  
**SEMESTER-III**

| SEMESTER |  | L | T | P | C |
|----------|--|---|---|---|---|
| III      | <b><u>MCA306: Data Mining and Big Data LAB</u></b> | 3 | 1 | 0 | 2 |

**CYCLE-1 Data Mining**

(Using Python, Java, WEKA or any open source data mining tool)

- a. Write a program to Generate Association rules by using A prior algorithm
- b. Write a program to implementative Bayes in classification
- c. Write a program to implement k-means clustering algorithm
- d. Write a program to implement k-mediods clustering algorithm
- e. Write a program to implement db scan algorithm

**CYCLE-2      Hadoop**

1. Implement the following Data structures in Java a)Linked Lists b)Stacks c)Queues d)Set e)Map
2. Study and configure hadoop for big data
3. Hadoop commands
4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
5. Implement Matrix Multiplication with Hadoop Map Reduce

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**DEPARTMENT OF COMPUTER SCIENCE**  
**MASTER OF COMPUTER APPLICATIONS**  
**SEMESTER-III**

| SEMESTER |  | L | T | P | C |
|----------|--|---|---|---|---|
| III      | <b><u>MCA 307 : Cryptography and Network Security</u></b><br><b><u>LAB</u></b> | 3 | 1 | 0 | 2 |

1. Write a Java program to perform encryption and decryption using the following algorithms:
  - a) Caesar Cipher
  - b) Substitution Cipher
  - c) Hill Cipher
2. Write a Java program to implement the DES algorithm logic.
3. Write a Java program to implement RSA Algorithm.
4. Write a C/JAVA program to implement the Blow fish algorithm logic.
5. Write a C/JAVA program to implement the Rijndael algorithm logic.
6. Using Java Cryptography, encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.
7. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
8. Write a program to implement digital signature.
9. Compute common secret key between client and server using Diffie-Hellman key exchange technique. Perform encryption and decryption of message using the shared secret key (Use simple XOR operation to encrypt and decrypt the message).
10. Implement DSS algorithm for signing and verification of messages between two parties (obtain H (M) using simple XOR method of hash computation on M).

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DEPARTMENT OF COMPUTER SCIENCE  
MASTER OF COMPUTER APPLICATIONS  
SEMESTER-III**

| <b>SEMESTER</b> | <b><u>MCA 308: Technical Report Writing</u></b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
|-----------------|---|----------|----------|----------|----------|
| <b>III</b>      |   |          | <b>3</b> | <b>1</b> | <b>0</b> |

**SEC – Skill Enhancement Course**

**The department concerned shall design suitable technical report topics and guide students in topic selection, report preparation, and professional technical writing practices.**

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DEPARTMENT OF COMPUTER SCIENCE  
MASTER OF COMPUTER APPLICATIONS  
SEMESTER-III**

| <b>SEMESTER</b> |   | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
|-----------------|---|----------|----------|----------|----------|
| <b>III</b>      | <b><u>MCA309: CLOUD COMPUTING AND DevOps<br/>FUNDAMENTALS</u></b> |          |          |          |          |

**MOOCS**

Students should mandatorily complete one MOOCS Course this semester. The course shall be delivered through approved MOOCs platforms. The department concerned shall recommend suitable courses, guide students in selection and completion, and evaluate outcomes as per university and UGC norms.

# SEMESTER-IV

**ANDHRA KESARI UNIVERSITY  
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SEMESTER-IV**

| SEMESTER |                                     | L | T | P                | C  |
|----------|-------------------------------------|---|---|------------------|----|
| IV       | <b><u>MCA 401: Project Work</u></b> |   |   | 4<br>per<br>week | 16 |

**SEC – Skill Enhancement Course**

The department concerned should guide students in selecting contemporary project topics and provide supervision throughout the project, emphasizing current technologies, research orientation, implementation, and professional documentation.



**Chairman  
Board of Studies  
Department of Computer Science  
Andhra Kesari University**



**Members  
Board of Studies  
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