



SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)

Sree Sainath Nagar, Tirupati

Department of Master of Computer Applications

Supporting Document for 1.1.3

Courses having focus on
Employability/ Entrepreneurship/ skill Development

Program: MCA- Master of Computer Applications

Regulations: SVEC-20

The Courses (with course outcomes) under SVEC-20 Regulations which focus on ***employability/ entrepreneurship/ skill development*** are highlighted with the following colours.

Skill

Employability

Entrepreneurship

MCA I – SEMESTER

(20MC1BS01) COMPUTER ORIENTED STATISTICAL TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Concepts of descriptive statistics; basics in R; Probability distributions; Correlation and Regression analysis; Testing of hypothesis.

COURSE OUTCOMES:

After successful completion of the course students should be able to:

CO1. Understand the concepts of descriptive statistics, basics in R, Probability distributions, Testing of Hypothesis, Correlation and Regression.

CO2. Apply testing of hypothesis on small and large sample tests using Z-test, t-test, F-test and chi-square test to draw the valid inferences and solve the problems on probability distributions.

CO3. Use R programming tools to Simulate Binomial, Poisson and Normal distributions, Calculate Correlation and Regression Coefficients, Fitting lines of Regression.

CO4. Analyze the relationship between variables using Correlation and Regression.

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO DESCRIPTIVE STATISTICS (9 Periods)

Measures of Central Tendency: Arithmetic Mean, Arithmetic Mean Computed from Grouped data, Median, Mode, Empirical Relation Between the Mean, Median, and Mode, Geometric Mean, Harmonic Mean.

Measures of Dispersion: The Range, The Mean Deviation, The Semi- Interquartile Range, The Standard Deviation, The Variance, coefficient of variation and Moments, measures of Skewness and Kurtosis.

UNIT II - BASICS IN R (10 Periods)

Introduction, R Studio, how to run R, Variables, Data Types, Vectors, Data Frames, Lists, Matrices, Arrays, Classes, Functions, Graphical and diagrammatical presentations in R.

UNIT III - PROBABILITY DISTRIBUTIONS (8 Periods)

Discrete Probability Distributions: Binomial Distribution- Mean and variance and

fitting of Binomial distribution; Poisson distribution -Mean and variance and fitting of Poisson distribution.

Continuous Probability Distributions: Normal Distribution- Mean, variance and area properties of Normal distribution.

Implementing in R: Simulate Binomial, Poisson and Normal distributions

UNIT IV- CORRELATION AND REGRESSION ANALYSIS. (8 Periods)

Correlation Analysis: Linear Correlation, scatter diagram, Karl Pearson's coefficient of Correlation and Spearman's Rank correlation coefficient (with and without tied ranks).

Regression Analysis: Regression Lines, Fitting of two lines of Regression, Regression coefficients and multiple regression

Implementing in R: Calculate Correlation and Regression Coefficients and Fitting lines of Regression

UNIT V - TESTING OF HYPOTHESIS (10 Periods)

Large sample Tests: Null hypothesis and Alternative hypothesis, Type-I and Type-II errors, Level of significance, Critical Region, one tailed and two tailed tests; Test of Significance of single proportion, Difference of two Proportions, Single mean, Difference of two Means.

Small sample tests: t-test: Single mean, Difference of two Means; F-test; chi-square test: chi-square test for independence of attributes, chi-square test for goodness of fit.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. T. K. V. Iyengar, B. Krishna Gandhi et al., "Probability and Statistics," S. Chand and Company Ltd: New Delhi, 3rd Edition, 2011.
2. Allerhand M. Tiny Handbook of R – Springer Briefs in Statistics, 2011

REFERENCE BOOKS:

1. Shanaz Bhatul, "Probability and Statistics," RIDGE Publications, 2nd Edition, 2006.
2. S.C. Gupta and V.K. Kapoor, "Fundamentals of Applied Statistics," S. Chand and Sons, New Delhi, 2010.
3. Baayen R. "Analyzing Linguistic Data - A Practical Introduction to Statistics using R," 2008.

4. Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters "*Beginner's Guide to R,*" Springer,2009.

ADDITIONAL LEARNING RESOURCES:

1. <http://www.nptelvideos.in/2012/11/probability-and-statistics.html>.
2. <https://www.classcentral.com/course/swayam-probability-and-statistics-5228>.
3. <https://www.coursera.org/browse/data-science/probability-and-statistics>.

MCA I - SEMESTER
(20MC10101) COMPUTER NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:--

COURSE DESCRIPTION:

Concepts of Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sub layer; The Network Layer; The Transport Layer; The Application Layer.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Understand the concepts of Networking, reference models, transmission media, framing and routing policy, internetworking in data communication.

CO2. Apply error and flow control techniques and implement congestion control mechanisms and transport protocols for reliable data communication.

CO3. Analyze design issues of layers, medium access control protocols, techniques for quality of service, elements of transport and application Protocols ensuring the communication procedures.

CO4. Examine the layered and e-mail architectures, networking protocols and e-mail message formats in compliance with communication standards.

DETAILED SYLLABUS:

UNIT I- NETWORK CONCEPTS AND PHYSICAL LAYER (11 Periods)

Network Concepts: Uses of Computer Networks, Network Hardware LAN, MAN and WAN, Topologies, Wireless Network-system interconnection, Wireless LAN, Wireless WAN. Internetworks, Network Software-Protocol hierarchies, Design issues for the layers, Connection Oriented and Connection less Service, Service Primitives, The relationship of Services to Protocols, Reference Models-OSI, TCP/IP.

The Physical Layer: Guided Transmission media - Magnetic Media, Twisted Pairs, Coaxial Cable, Fiber Optics. Wireless Transmission - The Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission and Light Transmission.

UNIT II- THE DATA LINK LAYER

(14 Periods)

The Data Link Layer: Data Link layer design issues, Error Detection and Correction, Elementary Data Link Protocols - Unrestricted simplex protocol, Simplex stop-and-wait protocol, Simplex protocol for a noisy channel. Sliding Window protocols - One-bit sliding window protocol, Protocol using Go back N, Protocol using Selective Repeat.

The Medium Access Control Sub layer - The Channel Allocation problem, Multiple access protocols-ALOHA, Pure ALOHA, Slotted ALOHA. Carrier Sense Multiple Access Protocols-Persistent and Non persistent CSMA - CSMA with collision detection. Collision Free protocols - Bit map protocol, Token Passing, Binary countdown, Limited Contention protocols.

UNIT III- THE NETWORK LAYER

(12 Periods)

Network layer design issues, Routing Algorithms-Optimality principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts, Routing in Ad Hoc Networks. Congestion Control Algorithms-Congestion Prevention Policies, Jitter Control, Techniques for achieving good quality of service, Congestion control for multicasting, Internetworking, The Network layer in the Internet-The IP Version 4 protocol, IP Addresses, IP version 6 protocol, Internet control protocols-OSPF, BGP.

UNIT IV- THE TRANSPORT LAYER

(11 Periods)

The Transport service, Elements of Transport protocols - Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Multiplexing and Crash recovery; A simple Transport protocol, The Internet Transport protocols - Introduction to UDP, Remote Procedure Call, Real time transport Protocol; Introduction to TCP, The TCP Service Model, TCP protocol and TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Transmission Policy, TCP Sliding Window, TCP Timer Management, TCP Congestion Control.

UNIT V -THE APPLICATION LAYER

(7 Periods)

The Application Layer: Introduction to Application Layer, DNS - The Domain name space, Resource records and Name servers; Electronic Mail-Architecture and services, the user agent, message formats, message transfer and Final Delivery.

Topics for self-study are provided in the lesson plan.

TEXT BOOK:

1. Andrew S. Tanenbaum and David J. Wetherall, "*Computer Networks*," Pearson Education,
5th Edition, 2015.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, "*Data Communications and Networking*," The McGraw-Hill, 4th Edition, 2011.
2. James F. Kurose and Keith W. Ross, "*Computer Networking: A Top-Down Approach*," Pearson Education, 6th Edition, 2017.

ADDITIONAL LEARNING RESOURCES:

1. <https://nptel.ac.in/courses/106/105/106105081/>
2. <https://www.cisco.com/c/en/us/solutions/small-business/resource-center/networking/networking-basics.html>
3. <https://memberfiles.freewebs.com/00/88/103568800/documents/Data.And.Computer.Communications.8e.WilliamStallings.pdf>
4. [https://www01.ibm.com/servers/resourcelink/svc0302a.nsf/pages/zVMV7R1sc246333/\\$file/kijl0_v7r1.pdf](https://www01.ibm.com/servers/resourcelink/svc0302a.nsf/pages/zVMV7R1sc246333/$file/kijl0_v7r1.pdf)
5. https://www.youtube.com/watch?v=6_PINy02_g0
6. <http://ns2simulator.com/ns2-tcp-congestion-control/>

MCA I-SEMESTER
(20MC10102) DATABASE MANAGEMENT SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --.

COURSE DESCRIPTION:

Databases; Database Architecture and Database Design; Concepts of Relational Database and its Design; Representation of ER Diagram to Relational model; SQL queries; Normal forms; Recovery and Concurrency Control mechanism; Storage and Indexing mechanism.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1. Understand the concepts of Relational Database Design, Transaction management, Recovery management, Storage and indexing mechanisms.

CO2. Analyze schema refinement, data normalization techniques, Storage and Index data structures for the construction of relational database systems.

CO3. Design Entity Relationship diagrams, Integrity Constraints over Relations, Database design and basics of SQL to find solutions of real time applications.

CO4. Use SQL to create Nested Queries, Joins, Views, Group functions in updating and managing the relational database system.

CO5. Apply Transaction processing approaches, Concurrency control and Recovery mechanisms for an optimal database application system.

DETAILED SYLLABUS:

UNIT I- INTRODUCTION TO DATABASES, DATABASE ARCHITECTURE AND DATABASE DESIGN (11 Periods)

Databases and Database Users: Concepts, 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, Database system environment, Centralized and Client/Server Architectures for DBMS, Classification of Database Management Systems.

Database Design: Database design and ER-diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER-model, Conceptual Design with the ER-Model.

UNIT II - RELATIONAL MODEL AND BASIC SQL (10 Periods)

Relational Model: Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational.

Case Study: ER-diagram for banking enterprise and university database.

Basic SQL: SQL data definition and data types, CREATE table command in SQL, attribute data types in SQL, specifying constraints in SQL: specifying attribute constraints and attribute defaults, specifying key and Referential integrity constraints, specifying CHECK constraints on tuples.

UNIT III - SQL, SCHEMA REFINEMENT AND NORMAL FORMS (12 Periods)

SQL: Form of Basic SQL Query, Examples of queries in SQL: Insert, Delete and Update statements; Nested Queries, Correlated Nested Queries, Set Comparison Operators, Aggregate Operators, NULL values, Comparison using Null values, Logical connectives: AND, OR, NOT; Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Views, Destroying /altering Tables and Views, Triggers and Active Databases.

Schema Refinement and Normal Forms: Schema Refinement: Problems Caused by redundancy, Decompositions; Problem related to decomposition, Functional dependencies, Normal Forms: FIRST, SECOND, THIRD Normal forms, BCNF; Properties of decompositions: Loss less, join decomposition, Dependency preserving decomposition.

UNIT IV - OVERVIEW OF TRANSACTION MANAGEMENT, CRASH RECOVERY AND CONCURRENCY CONTROL (11 Periods)

Overview of Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock Based Concurrency Control, Performance of Locking.

Concurrency Control: 2Phase Locking (2PL), Serializability and Recoverability, Lock Management, Lock Conversions.

Crash recovery: ARIES, the Log, Other Recovery related Structures, Write-Ahead Log Protocol, Check pointing, Recovering from a System Crash.

UNIT V - OVERVIEW OF STORAGE AND INDEXING (11 Periods)

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing: Clustered Indexes, Primary and Secondary Indexes; Index Data Structures: Hash based Indexing, Tree based Indexing.

Storing Data: Memory Hierarchy: Magnetic disks, Performance implications of disk structure; Redundant Arrays of Independent Disks.

Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, "*Data base Management Systems*," Tata McGraw-Hill, 3rd Edition, 2013.
2. RamezElmasri, ShamkantB.Navathe, "*Database Systems*," Pearson Education, 6th Edition, 2013.

REFERENCE BOOKS:

1. A.Silberschatz, H.F. Korth, S.Sudarshan, "*Data base System Concepts*," McGraw hill, 6th Edition, 2011.
2. C.J.Date, "*Introduction to Database Systems*," Pearson Education, 8th Edition, 2006.

ADDITIONAL LEARNING RESOURCES:

1. <http://www.nptelvideos.in/2012/11/database-management-system.html>
2. <http://www.oracle.com/technetwork/tutorials/index.html>
3. <https://www.tutorialcup.com/dbms>
4. <https://www.javatpoint.com/oracle-tutorial>

MCA I-SEMESTER
(20MC10103) DATA STRUCTURES AND ALGORITHMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:--

COURSE DESCRIPTION:

Algorithm Analysis; Linked Lists; Stacks and Queues; Trees; Binary search trees; AVL trees; Heaps; Multiway search trees; Graphs; Sorting and Searching; Hashing

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Understand the fundamental concepts of data structures, asymptotic notations and algorithm analysis techniques to measure the performance of an algorithm.

CO2. Analyze performance of sorting and searching algorithms by making use of time and space complexity.

CO3. Design algorithms to solve societal problems by applying linked lists

CO4. Solve computational problems by using stacks and queues

CO5. Apply suitable data structure to perform operations on trees and graphs

CO6. Construct hash tables by using Hash functions and relevant collision resolution technique.

DETAILED SYLLABUS:

UNIT I- INTRODUCTION, SORTING AND SEARCHING (11 periods)

Introduction: Introduction to data structures, Introduction to Algorithm, Performance Analysis- Space Complexity, Time Complexity, Asymptotic Notation- Big Oh, Omega, Theta notations, Guidelines for Asymptotic Analysis, Algorithms Analysis: Problems and Solutions.

Sorting: Bubble Sort, Insertion sort, Selection Sort, Shell Sort, Radix sort and their performance analysis.

Searching: Linear Search, Binary Search and their performance analysis

UNIT II – LINKED LIST (8 periods)

Single Linked List, Circular Linked List, Double Linked List, Circular Double Linked List, Applications of Linked List- Sparse Matrix Representation and its performance analysis, Addition of Polynomials and its performance analysis

UNIT III – STACKS AND QUEUES (8 periods)

Stacks: Introduction, Definition, Implementation of stacks using arrays, Implementation of stacks using linked list, Applications of Stacks

Queues: Introduction, Definition, Implementation of queues using arrays, Implementation of queues using linked list, Circular Queue, Deque, Priority Queue, Applications of Queues

UNIT IV – TREES, SEARCH TREES AND HEAPS (9 periods)

Trees: Basic Terminologies, binary trees, Properties of binary tree, Representation of Binary Tree, Binary tree traversals.

Search Trees: Binary Search Trees, Operations on Binary Search Trees, AVL Trees and Operations on AVL trees

Heap: Heap Trees, Implementation of Heap Trees, Applications of Heap – Heap Sort and Its performance Analysis

UNIT V – MULTI WAY TREES, GRAPHS AND HASHING (9 periods)

Multway Trees: M-way search trees, B-trees, Operations on B-trees, B+-trees

Graphs: Introduction, Basic Terminologies, Representation of Graphs, Breadth First Search and its Complexity Analysis, Depth First Search and its Complexity Analysis

Hashing: Introduction, Hash Table Structure, Hash Functions, Linear Open Addressing, Chaining and their performance analysis.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Debasis Samanta, "*Classic Data Structures*," PHI Learning private limited, Second Edition, 2017.
2. Narasimha Karumanchi, "*Data Structures and Algorithms made easy*," Career Monk, 5th Edition, 2017.

REFERENCE BOOKS:

1. G A V Pai, "*Data Structures and Algorithms: Concepts, Techniques and Applications,*" Mc graw Hill Edition.
2. Satraj Sahani, "*Data Structures, Algorithms and Applications in Java,*" Universities Press, 2nd Edition, 2008.
3. Michael T. Goodrich, Roberto Tamassia, "*Data Structures and Algorithms in java,*" Wiley India, 2nd Edition, 2007.

ADDITIONAL LEARNING RESOURCES:

1. <https://www.coursera.org> > Browse > Computer Science > Algorithms
2. <https://nptel.ac.in/courses/106102064>
3. <https://nptel.ac.in/courses/106103069>
4. <https://nptel.ac.in/courses/106102064/24>
5. <https://swayam.gov.in/course/235-data-structure>

MCA I-SEMESTER
(20MC10104) PYTHON PROGRAMMING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:--

COURSE DESCRIPTION:

Data types and Expressions; Control Statements; Strings; Text Files; Lists; Dictionaries; Functions; Objects and their use; Exception Handling; Design with Classes; Graphical user Interface.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

- CO1.** Understand the concepts of computer algorithms, problem solving, data types, control structures, expressions, lists, dictionaries, and tuples.
- CO2.** Use functions, modules, algorithms to solve recursive and non-recursive problems.
- CO3.** Apply python programming constructs, Objects, strings and text files to develop Object Oriented Programming applications using Jupyter Notebook.
- CO4.** Implement towers of hanoi, Cigarette Use/ Lung cancer Correlation programs using Dictionaries, list, sets, tuples and functions.
- CO5.** Develop GUI based applications using tkinter, Python programming and object-oriented programming constructs to solve problems.

DETAILED SYLLABUS:

UNIT I- PYTHON PROGRAMMING CONCEPTS (10 Periods)

Computer science and problem solving, Computer and algorithms a perfect match, Computer software - Syntax, semantics and problem translation, the process of computational problem solving, The Python programming language, python development environment, basics of python, first program in Python-calculating the drake equation.

Data Types and Expressions: Literals, Variables and Identifiers, Operators, Expressions and Data types, program to calculate individuals age in seconds.

UNIT II- CONTROL STRUCTURES, LISTS, DICTIONARIES, TUPLES AND SETS (9 Periods)

Control Structures: Control structures, Boolean expressions, Selection control and Iterative control.

Lists: List structures, Lists in Python, Iterations over lists, Assigning and copying lists, List comprehensions.

Dictionaries, Tuples and Sets: Dictionary types, Implementation of Dictionary, Tuples, Sets, program to add and access elements from the dictionary.

UNIT III- DESIGN FUNCTIONS, MODULES, STRINGS AND TEXT FILES (8 Periods)

Functions: Program routines, Functions.

Recursion: Recursion-Recursive functions, Recursive problem solving, comparing Iteration with Recursion.

Case study 1: Towers of Hanoi using recursion (The Towers of Hanoi problem is based on a legend of unknown origin. According to the legend, there is a Vietnamese temple with a large room containing three pegs and 64 golden disks. Each disk has a hole in it so that it can be slipped onto any of the pegs. In addition, each disk is of different size. The 64 disks are moved by priests from one peg to another with the following conditions:

- Only one disk can be moved at a time.
- At no time can a larger disk be placed on top of a smaller one.

Text Files: Using text files, String processing, Exception handling.

Module Design: Modules, Top-down design, Python modules.

Case study 2: Cigarette Use/ Lung cancer Correlation program. (Computing the correlation between Cigarette use/ Lung cancer)

UNIT IV- OBJECTS AND OBJECT ORIENTED PROGRAMMING (9 Periods)

Objects: Software objects, Turtle graphics- Creating a turtle graphics window, default turtle, Fundamental turtle attributes and behaviour, Additional turtle attributes, creating multiple turtles.

Case Study: Horse Race Simulation problem (design, implement and test a program that simulates a horse race)

Object Oriented Programming: concepts of object-oriented programming, Encapsulation, Inheritance and Polymorphism.

UNIT V- GRAPHICAL USER INTERFACE PROGRAMMING (9 Periods)

Tkinter Overview - tkinter pragmatics, Documentation, Extensions, structure; making widgets; tkinter coding alternatives, configuring widgets, adding buttons and callbacks-lambda, bound method, callable class object, Binding events; adding multiple widgets, Reusable GUI Components with classes, Dialogs, Entry, check buttons, Radio buttons, Scales and Menus.

Case Study: Create a Canvas with options, where user presses the button, it should draw a required shape on the canvas.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Charles Dierbach, "*Introduction to Computer Science using Python: A Computational Problem-Solving Focus*," Wiley India Edition, 2016.
2. Mark Lutz, "*Programming Python*," O'Reilly Publications, 4th Edition, 2011.

REFERENCE BOOK:

1. Kenneth Lambert and B.L. Juneja, "*Fundamentals of Python*," Cengage Learning, 3rd Edition, 2012.

ADDITIONAL LEARNING RESOURCES:

1. <https://docs.python.org/3/tutorial/>
2. <https://pythonprogramming.net/introduction-to-python-programming/>

MCA I-SEMESTER
(20MC1HS31) COMMUNICATIVE ENGLISH LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE REQUISITE: --

COURSE DESCRIPTION:

Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Reading Comprehension; Information Transfer; Listening Comprehension

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1. Demonstrate knowledge of Phonetics by examining and applying sounds of English in vocabulary.

CO2. Analyze the situations and apply appropriate listening, speaking, reading, writing skills for effective communication through grammatical structures.

CO3. Function effectively as an individual and as a member in diverse teams examining and applying public speaking skills through just a minute sessions and role play to communicate effectively with the engineering community and society.

***First ten exercises are mandatory among the following:**

LIST OF EXERCISES:

1. Just a Minute, Elocution/Impromptu

Steps to be followed, Useful tips, Do's & Don'ts, Preparation, Examples.

2. Phonetics

Sounds of English, Consonants, Vowels, Speech Organs, Phonetic Transcription, Word Accent, Basics of Intonation.

3. Vocabulary Building

Prefixes & Suffixes, Synonyms & Antonyms, Phrasal verbs, Idioms, One word substitutes, Words often confused.

4. Grammar

Tenses, Nouns, Word order and error correction.

5. Giving Directions

Useful phrases, Sample conversations, Exercises.

6. Role Plays

Useful tips, Do's and Don'ts, Exercises, Role Plays for practice.

7. Public Speaking

Stage presence, Voice control, Body Language, Rehearsals, Audience, Delivery, Do's and Don'ts, Project Submission.

8. Letter Writing

Introduction, Objective, Formats, Types, Exercises.

9. Describing Objects

Jargon, Useful Phrases, Do's and Don'ts, Exercises.

10. Reading Comprehension

Introduction, Types of listening, Practice, Benefits of listening, Exercises.

11. Information Transfer

Tables, Pie-Charts, Venn Diagrams, Graphs, Flow Charts, Steps to be followed, Exercises.

12. Listening Comprehension

Introduction, Types of reading, Inferring, Critical analysis, Exercises.

TEXT BOOK:

1. Communicative English Lab Manual, SVEC, 2019.

REFERENCE BOOKS:

1. D. Sudha Rani, "A Manual for English Language Laboratories," Pearson, Noida, 2010.
2. Nira Kumar, "English Language Laboratories," PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARES:

1. SoftX
2. Speech Solutions
3. English Pronunciation Dictionary by Daniel Jones
4. Learning to Speak English 8.1, The Learning Company – 4 CDs.
5. Mastering English: Grammar, Punctuation and Composition.
6. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
7. Dorling Kindersley Series of Grammar.
8. Language in Use 1, 2 and 3
9. Cambridge Advanced Learner's Dictionary - 3rd Edition
10. Centronix – Phonetics
11. Let's Talk English, Regional Institute of English South India.

ADDITIONAL LEARNING RESOURCES:

1. <https://goo.gl/IjE45p>: Amazon India site – with thousands of different product descriptions.
2. <https://goo.gl/3ozeO6>: 15 ways to calm your nerves before giving a presentation.
3. <https://goo.gl/p20ttk>: useful site for more language about introducing yourself.
4. <https://goo.gl/svMHZ1>: information and advice about describing line graphs
5. <https://goo.gl/NqFJuc>: an informative presentation about using line graphs

MCA I-SEMESTER
(20MC10131) DATABASE MANAGEMENT SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES: A course on Database Management Systems

COURSE DESCRIPTION:

Creation of Data Definition commands; Implementation of Data Manipulation Commands; Table level and Column level Constraints; Construction of ER diagrams; Implementation of GROUP BY, HAVING, ORDER By clause; Creation and dropping of Views; Implementation of Nested Queries; Joins; Cursors; Functions; Procedures and Triggers.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

- CO1.** Analyse University, Bank, Library and College database applications to identify the Relations, necessary integrity constraints in creating an optimal relational database system.
- CO2.** Design and implement Entity Relationship diagrams, Relational schemas, table and column level constraints, simple SQL queries to find solutions of real time database applications.
- CO3.** Use SQL language to create Nested Queries, Joins, Views, Group functions in updating and managing the relational database system.
- CO4.** Select and apply Cursors, Triggers, Functions and procedures to develop Relational Database applications using PL/SQL language.
- CO5.** Work independently and in a teams to solve problems with effective communication.
- CO6.** Write and present a technical report/ document effectively.

LIST OF EXERCISES:

1. Creation of DDL Commands

Consider the following relation schemas:

- a) **Client_master**(Client_no, Name, Address1, Address2, City, State, Pincode, Bal_due)
- b) **Product_master**(Product_no, Description, Unit_measure, Qty_on_hand, Record_lvl, Sell_price, Cost_price)
- c) **Salesman_master**(Salesman_id, Name, Address1, Address2, City, State, Pincode, Sal_amt, Target_amt, Remarks)

Create the above tables, insert suitable tuples and perform the following DDL operations (CREATE, ALTER, DROP, RENAME, TRUNCATE) in Oracle SQL.

2. Creation of DML Commands

Using the tables client master and product master implement the following Queries.

- i. Change the selling price of '1.44 floppy drive' to Rs.1150.00
- ii. Delete the record with client 0001 from the client master table.
- iii. Change the city of client_no '0005' to Bombay.
- iv. Change the bal_due of client_no '0001', to 1000.
- v. Find the products whose selling price is more than 1500 and also find the new selling price as original selling price *15.
- vi. Find out the clients who stay in a city whose second letter is a.
- vii. Find out the name of all clients having 'a' as the second letter in their names.
- viii. List the products in sorted order of their description.
- ix. Count the total number of orders
- x. Calculate the average price of all the products.
- xi. Calculate the minimum price of products.
- xii. Determine the maximum and minimum prices. Rename the title as 'max_price' and min_price respectively.
- xiii. Count the number of products having price greater than or equal to 1500.

3. Creation of Table level and Column level Constraints

Implement table level and column level constraints like Domain Integrity constraints (NOT NULL, CHECK), Entity integrity constraints (UNIQUE, PRIMARY KEY) and Referential integrity constraints (FOREIGN KEY) for the below tables.

a) Create table **Salesman_master** with the following columns and constraints-

Column name	Data type	Size	Attributes
Salesman_no	Varchar2	6	Primary key/first letter must start with 's'
Sal_name	Varchar2	20	Not null
Address	Varchar2	20	Not null
City	Varchar2	20	
State	Varchar2	20	
Pincode	Number	6	
Sal_amt	Number	8,2	Not null, cannot be 0
Tgt_to_get	Number	6,2	Not null, cannot be 0
Ytd_sales	Number	6,2	Not null, cannot be 0
Remarks	Varchar2	30	

b) Create table **sales_order** with following columns and constraints

Column name	Data type	Size	Attributes
S_order_no	Varchar2	6	Primary/first letter must be 0
S_order_date	Date	6	Primary key reference client_no of client_master table
Client_no	Varchar2	25	
Dely_add	Varchar2	6	
Salesman_no	Varchar2	6	Foreign key references salesman_no of salesman_master table
Dely_type	Char	1	Delivery part(P)/full(F),default F
Billed_yn	Char	1	
Dely_date	Date		Can not be less than s_order_date
Order_status	Varchar2	10	Values ('In Process'; 'Fulfilled'; 'Back Order'; 'Canceled

c) Create table **sales_order_details** with following columns and constraints

Column name	Data type	Size	Attributes
S_order_no	Varchar2	6	Primary key/foreign key references s_order_no of sales_order
Product_no	Varchar2	6	Primary key/foreign key references product_no of product_master
Qty_order	Number	8	
Qty_disp	Number	8	
Product_rate	Number	10,2	

4. Construction of ER diagram

a) Construct an ER diagram for a **University** database application. Identify the Relations and include necessary integrity constraints.

Problem: An University has many departments, where each department has multiple Instructors. An Instructor belongs to only one department. Each department offers multiple Courses, each of which is taught by a single Instructor. A student may enroll for many courses offered by the department.

For the above problem create the following:

- i. Analyze the data required
- ii. Normalize the attributes
- iii. Create the logical data model (ER diagram)

a) Construct an ER diagram for a **Banking Database** by considering the following set of requirements that is used to keep track of Customer.

Problem:

- i. Each bank has a unique name.
- ii. Each branch has a number, name, address (number, street, city), and set of phones.
- iii. Customer includes their name, set of address (P.O. Box, city, zip code, country), set of phones, and social security number.
- iv. Accounts have numbers, types (e.g. saving, checking) and balance. Other branches might use the same designation for accounts. So to name an account uniquely, we need to give both the branch number to which this account belongs to and the account number.
- v. Not all bank customers must own accounts and a customer may have at most 5 accounts in the bank.
- vi. An account must have only one customer.
- vii. A customer may have many accounts in different branches.

5. Group functions: Implement queries using Aggregate functions, GROUP BY, HAVING, ORDER By clause and Creation, dropping of Views for the above tables using SQL.

6. Sub queries: Implement queries using SUBQUERIES for the above tables using SQL.

7. Joins: Implement queries using JOINS and OUTER JOINS for the above tables using SQL.

PL/SQL PROGRAMS:

8. Implement the following PL/SQL programs using control statements

- a) Check whether the given input is prime or not.
- b) Find the factorial of a given number.
- c) Check whether the given input is character or number or symbol.
- d) Find the reverse of a given number.

9. Write A PL/SQL Program to display all the details of Employee using %Rowtype.

10. PL/SQL CURSOR program: Write a PL/SQL program for generation of Electricity Bill using CURSORS.

Note: Create a table for Electricity bill consists of Customer_no, Customer_name, Customer_type, Prev_met_read, Curr_met_read, Month_name. Assume there are three Customer types namely Industrial, Agriculture and Domestic. Calculate the total charges based on the type of customer.

11. Triggers

Generate a database trigger to update the salary of an employee before/after performing any DML operations.

12. Procedures and Functions

- a) Write a procedure which takes the department_id as an input parameter and lists the names of all employees belonging to that department.
- b) Write a PL/SQL block of code that lists the highest salary drawn by an employee in each of the departments. It should make use of a function dept_highest which return the highest salary drawn by an employee for the given department.

Mini Project 1: Consider the following schema for a **Library Database:**

BOOK(Book_id, Title, Publisher_Name, Pub_Year)

BOOK_AUTHORS(Book_id, Author_Name)

PUBLISHER(Name, Address, Phone)

BOOK_COPIES(Book_id, Branch_id, No-of_Copies)

BOOK_LENDING(Book_id, Branch_id, Card_No, Date_Out, Due_Date)

LIBRARY_BRANCH(Branch_id, Branch_Name, Address)

Implement the following SQL queries to :

1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

Mini Project 2: Consider the schema for **College Database:**

STUDENT(USN, SName, Address, Phone, Gender)

SEMSEC(SSID, Sem, Sec)

CLASS(USN, SSID)

SUBJECT(Subcode, Title, Sem, Credits)

IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)]

Implement the following SQL queries to:

1. List all the student details studying in fourth semester 'C' section.
2. Compute the total number of male and female students in each semester and in each section.
3. Create a view of Test1 marks of student USN '1BI15CS101' in all subjects.
4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.
5. Categorize students based on the following criterion: If FinalIA = 17 to 20 then CAT = 'Outstanding' If FinalIA = 12 to 16 then CAT = 'Average' If FinalIA < 12 then CAT = 'Weak' Give these details only for 8th semester A, B, and C section students.

REFERENCE BOOKS:

1. Ivan Bayross, "SQL, PL/SQL The Programming Language of ORACLE," BPB Publications, 2010.
2. Dr. P. S. Deshpande, "SQL & PL/SQL for Oracle 10g Black Book," Dreamtech Press, 2011.
3. J. J. Patrick, "SQL Fundamentals," Pearson Education, 3rd Edition, 2008.
4. Rick F. Vander Lans, "Introduction to SQL," Addison-Wesley Professional, 4th Edition, 2006.

ADDITIONAL LEARNING RESOURCES:

1. <http://plsql-tutorial.com>
2. <http://k.web.umkc.edu/kumarv/cs471/oracle-arch.htm>
3. <http://www.computer.org>
4. <http://www.dbpd.com>
5. <http://www.dmreview.com>
6. <http://www.oracle.com/oramag/>

MCA I- SEMESTER

(20MC10132) DATA STRUCTURES AND PYTHON PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:

Courses on Python Programming and Data Structures and Algorithms.

COURSE DESCRIPTION:

Implementation of Data Structures; Hands on practice – Scripting using Python Programming constructs; Conditional statements; Loops; Text Files; Lists; Dictionaries; Strings; Functions; GUI.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

- CO1.** Demonstrate python programming constructs, data types, control structures, expressions, objects, lists, dictionaries, tuples, strings, event, exception handling and Data Structures to solve computational problems.
- CO2.** Identify and analyse classes, functions, modules, algorithms to solve searching and sorting problems.
- CO3.** Design and develop GUI based application using tkinter, Python programming and object oriented programming constructs.
- CO4.** Select and Apply python 3.7.5,C, C++, Java, Anaconda Navigator, Jupyter notebook, notepad++ to solve problems.
- CO5.** Work independently or in a team to solve problems with effective Communication.
- CO6.** Write and present a technical report/ document effectively.

LIST OF EXERCISES:

1. Write a program to implement stack and queue.
2. Write a program to implement Singly linked list.
3. Write a program to perform the following searching operations:
 - a) Linear search
 - b) Binary search.
4. Write a program to implement the following sorting algorithms:
 - a) Bubble Sort
 - b) Quick Sort
 - c) Merge Sort
5. Write a program to create Binary Search Tree and perform operations on it.
6. Write a program to implement prim's algorithm.

7. a) Write a python script to display Fibonacci sequence of numbers using while loop, for loop and do-while loop constructs.
b) Write a python script to demonstrate string methods.

8. a) Write a python script to find GCD of two numbers using recursive and non recursive functions.
- b) Write a python script to convert the following using functions:
 - (i) Fahrenheit to Celsius temperature.
 - (ii) Celsius to Fahrenheit temperature.
9. a) Write a python script to draw a square using set position method in absolute positioning.
- b) Write a python script to draw a triangle using left, right and Forward methods in relative positioning.
- c) Write a python script using penup and pendown methods to draw "W" character using turtle graphics.
- d) Write a python script to create your own polygon shape and create an interesting design with it.
10. a) Write a GUI Script for creating text label in a window.
- b) Write a Python Script to create a command button. When the button is clicked the event should be handled and the message on the window should change from "Hello" to "Good Bye".
11. a) Write a python script to demonstrate the Exception Handling.
- b) Write a Python script to demonstrate the Mouse and Key Event handling.
12. Write a python script to demonstrate menu driven applications.

Note: Exercises from 1 to 6 can be implemented using C/C++/Java language.

REFERENCE BOOKS:

1. Richard F. Gilberg and Behrouz A. Forouzan, "Data Structure: A Pseudo code Approach with C," Thomson India Edition, 2nd Edition, 2007.
2. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus," Wiley India Edition, 2016.
3. Mark Lutz, "Programming Python," O'Reilly Publications, 4th Edition, 2011.

Software / Tools Used:

C/C++/Java, Notepad++, Jupyter notebook, Tkinter, python 3.7.5, anaconda navigator

ADDITIONAL LEARNING RESOURCES:

1. <https://www.coursera.org> > Browse > Computer Science > Algorithms
2. <https://nptel.ac.in/courses/106102064>
3. <https://nptel.ac.in/courses/106103069>
4. <https://nptel.ac.in/courses/106102064/24>
5. <https://swayam.gov.in/course/235-data-structure>
6. <https://docs.python.org/3/tutorial/>
7. <https://pythonprogramming.net/introduction-to-python-programming/>

MCA I- SEMESTER
(20MC1AC01) SOFTWARE ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: --

COURSE DESCRIPTION:

Software Engineering, Process Models, Agile Development, Requirements Modeling; Design Concepts, Architectural and Component-Level Design; User Interface Design, Metrics for Process and Products, Testing Strategies and Risk Management.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1. Understand the concepts of Software engineering, Requirements Engineering, Process models, Data Modeling and Design.

CO2. Analyze requirements modeling strategies, process and design models, risks and testing strategies to develop an application software.

CO3. Use design principles, user interface design rules, Architecture Styles, Architectural Design, component-level design and metrics to design and develop a quality software product.

DETAILED SYLLABUS:

UNIT I - SOFTWARE AND SOFTWARE ENGINEERING, PROCESS MODELS AND AGILE DEVELOPMENT (6 Periods)

Software and Software Engineering: Nature of Software, Unique Nature of WebApps, Software Engineering

Process Models: Generic Process Model, Prescriptive Process Models, Specialized Process Models: Water fall Model, incremental Model, Evolutionary Model; Agile Development process.

UNIT II - REQUIREMENTS MODELING (6 Periods)

Requirements Modeling: Requirements Engineering, Requirements Analysis, Scenario-Based Modeling, Data Modeling Concepts, Class-Based Modeling, Flow-Oriented Modeling, Creating a Behavioral Model.

UNIT III- DESIGN CONCEPTS (6 Periods)

Design Concepts: Design with Context of Software Engineering, Design Process, Design Concepts, Design Model, Software Architecture, Architecture Styles, Architectural Design.

UNIT IV- COMPONENT-LEVEL AND DESIGN USER INTERFACE DESIGN (6 Periods)

Component-Level Design: Component, Designing Class-Based Components, Conducting Component-level Design.

User Interface Design: Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps.

UNIT V - TESTING STRATEGIES AND RISK MANAGEMENT (6 Periods)

Testing Strategies: Strategic approach to software testing, test strategies for conventional software, Validation testing, System testing, Black-box testing and White-box testing.

Metrics for Process and Products: Software measurement and metrics for software quality.

Risk management: software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM plan.

Total Periods: 30

TEXT BOOKS:

1. Roger S. Pressman, "*Software engineering A practitioner's Approach*", Tata Mc-Graw Hill International Education, 7th Edition, 2016.
2. Ian Sommerville, "*Software Engineering*," Pearson, 9th Edition, 2011.

REFERENCE BOOKS:

1. Rajib Mall, "*Fundamentals of Software Engineering*", PHI, 5th Edition, 2018.
2. Hans Van Vliet, "*Software Engineering: Principles and Practices*", Willey Publications, 3rd Edition, 2010.

ADDITIONAL LEARNING RESOURCES:

<https://nptel.ac.in/courses/106101061>

MCA II – SEMESTER
(20MC2HS01) FINANCIAL AND MANAGEMENT ACCOUNTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE REQUISITE:-

COURSE DESCRIPTION: Accounting concepts, Principles of accountancy, Types of accounts, Journal, Ledger and Trial Balance; Trading account, Profit and Loss account, Balance sheet, Computerized Accounting; Ratio analysis, Types of ratios, Financial analysis through ratios; Break - Even - Analysis, Decision making by using BEA, Capital budgeting techniques.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Demonstrate the concepts of Financial Accounting in preparation of Financial Statements.

CO2. Analyze and interpret the financial data using Ratio Analysis, Break-Even Analysis and Capital Budgeting Techniques for the decision-making of an Organization.

DETAILED SYLLABUS:

UNIT I- ACCOUNTING

(11 Periods)

Meaning and Definition - Objectives – Functions – **Principles of accountancy:** Concepts and Conventions - Double entry system of accounting - Types of accounts – Journal - Ledger and Trial Balance

UNIT II- PREPARATION OF FINANCIAL STATEMENTS

(11 Periods)

Trading account - Profit and Loss Account and Balance Sheet (with simple adjustments) – Computerized Accounting – Computerized accounting Vs. Manual Accounting – Advantages and Disadvantages –Tally ERP 9.0.

UNIT III- RATIO ANALYSIS

(11 Periods)

Ratio Analysis – Advantages and disadvantages of Ratio Analysis –Types of Ratios – Profitability Ratios, Activity Ratios, Liquidity Ratios, Solvency Ratios (Simple Problems)

UNIT IV- BREAK-EVEN-ANALYSIS

(11 Periods)

Break-Even-Analysis – Assumptions, Managerial significance of Break-Even-Analysis – Concept of Break Even Point (BEP) – Break-Even Chart –Determination of BEP – Profit/Volume (P/V) ratio – Margin of safety (Simple Problems).

UNIT V- CAPITAL BUDGETING

(11 Periods)

Features, Proposals, **Methods of Capital Budgeting:** Payback Period Method – Accounting Rate of Return (ARR) – Time value of money – Net Present Value Method (NPV) – Profitability Index (PI) – Internal Rate of Return (IRR) (Simple problems)

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Tyagi, C.L. and MadhuTyagi, "*Financial and Management Accounting*," Atlantic Publishers and Distributors, New Delhi, 2016.
2. Madhuvij, "*Financial and Management Accounting*," Anmol Publishers New Delhi, 11th Edition, 2018.

REFERENCE BOOKS:

1. Pauline Weetman, "*Financial and Management Accounting – An Introduction*," Financial Times Prentice Hall, New Delhi, 4th edition, 2014.
2. Jain, S.P. and Narang, K.L., "*Financial Accounting*," Kalyani Publishers, Ludhiana, 2th Edition, 2016.

MCA II – SEMESTER
(20MC20101) DATA WAREHOUSING AND DATA MINING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:

A Course on Database Management Systems.

COURSE DESCRIPTION:

Data Warehouse Components; Building Data Warehouse; Data mining; Data Preprocessing; Association Rule Mining; Classification and Clustering techniques; Mining different types of data and its Applications.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1. Design and develop data warehouse architecture, multidimensional schemas to perform business analysis using OLAP tools.

CO2. Select and apply association rule mining and classification algorithms to identify the frequent patterns and predictions effectively.

CO3. Apply Clustering algorithms on pre-processed datasets to find solutions of real time applications.

CO4. Analyse data pre-processing methods and data mining functionalities to mine text, multimedia, web and spatial data to discover knowledge.

DETAILED SYLLABUS:

UNIT I- DATA WAREHOUSE COMPONENTS

(11 periods)

Data Warehouse Components: Data Warehousing, Paradigm Shift, Business Problem Definition, operational and informational Data Stores, Data Warehouse Definition and Characteristics, A Multi-tiered Data Warehouse Architecture. Meta data, data marts, Data Warehouse Administration and Management, Benefits of Data Warehousing, Multidimensional Data Model-From tables and spread sheets to Data Cubes and Star, Snowflake and fact constellation Schemas, Role of Concept hierarchies, Measures, OLAP Operations, From online Analytical processing to Multidimensional Data Mining.

UNIT II- DATA MINING AND DATA PREPROCESSING

(11 periods)

Data Mining: Motivated Data Mining, Kinds of Data, Data mining Functionalities, classification of Data mining systems, Data mining primitives, Integration of Data mining Systems with a Database or Data Warehouse System, Major issues in Data Mining.

DATA PREPROCESSING: Need for Pre-processing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT III- ASSOCIATION RULE MINING AND CLASSIFICATION (12 periods)

Association Rule Mining: Basic Concepts, The Apriori algorithm for finding frequent itemsets using candidate generation, generating association rules from frequent itemsets, Mining frequent itemsets without candidate generation.

Classification: Classification, issues in classification and prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-based classification, Prediction: Linear Regression, Accuracy and Error measures, evaluating the accuracy of a classifier or predictor, bagging and boosting.

UNIT IV- CLUSTER ANALYSIS (11 periods)

Clustering: Cluster Analysis, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning methods - k-means and k-medoids methods, CLARANS, Hierarchical Methods-Agglomerative and divisive hierarchical clustering, Density-Based Method-DBSCAN, Grid-Based Method-STING, Outlier Analysis.

UNIT V- MINING DIFFERENT TYPES OF DATA AND ITS APPLICATIONS

(10 periods)

MINING DIFFERENT TYPES OF DATA: Multimedia Data Mining, Text Mining - Text data analysis and informational retrieval, text mining approaches, Spatial Mining, Mining the World Wide Web- Mining web page layout structure, Mining web's link structures, Web usage mining.

Data Mining Applications: Financial data Analysis, Retail Industry, Telecommunication Industry.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Jiawei Han, Micheline Kamber and Jian Pei, Data Mining: Concepts and Techniques, Elsevier, 3rd Edition, 2013.
2. Berson Alex and Stephen J Smith, "Data Warehousing, Data Mining and OLAP," Tata McGraw-Hill, 2004.

REFERENCE BOOKS:

1. Ralph Kimball, Margy Ross, Warren Thornthwaite and Joy Mundy, Bob Becker, "*The Data Warehouse Life cycle Tool kit,*" John Wiley and Sons Inc, 2nd Edition, 2007.
2. William H Inmon, "*Building the Data Warehouse,*" John Wiley and Sons Inc, 4th Edition, 2005.
3. Arun K Pujari, "*Data Mining Techniques,*" Universities Press (India) Pvt. Ltd, 2nd Edition, 2001.
4. G. K. Gupta, "*Introduction to Data Mining with Case Studies,*" Easter Economy Edition, Prentice Hall of India, 2006.

ADDITIONAL LEARNING RESOURCES:

1. <https://nptel.ac.in/courses/106/105/106105174/>
2. <https://www.youtube.com/watch?v=vuc93jbO2Dw>.
3. Data Mining - Concepts and Techniques (3rd edition) by Jiawei Han, Micheline Kamber and Jian Pei.
4. Tutorial on Data Mining Algorithms by Ian.
5. *Mining of Massive Datasets* by Anand Rajaraman and Jeff Ullman.
6. Open source tools for data mining: <http://eprints.fri.uni-lj.si/893/1/2008-OpenSourceDataMining.pdf>

MCA II-SEMESTER

(20MC20102) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:

A course on Data Structures and Algorithms.

COURSE DESCRIPTION:

Principles of Object Oriented Programming; Representation of Java Classes and methods; Inheritance and Polymorphism using Java, Creation of Packages and Interfaces; Implementation of Utility Classes and Input/output; Exception handling mechanism and multithreading; Event handling techniques; GUI applications by using AWT and Swings.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1. Understand the Object Oriented Programming Principles to develop java programs.

CO2. Design and develop user defined classes using packages and interfaces.

CO3. Use advanced java programming concepts AWT, Swings and applets to develop complex user interface applications.

CO4. Analyze Inheritance, Exception Handling mechanisms for implement applications.

DETAILED SYLLABUS:

UNIT I - JAVA PROGRAMMING

(10 Periods)

Java Programming: Java Buzzwords, Object-Oriented Programming, Beginner Program, Data Type, Variables, Operators, Control Statements, Arrays; Classes: Class and Objects, Methods, Constructors, this Keyword, Garbage Collection, finalize Method; Overloading Methods, Access Control, static Keyword, final Keyword, Nested and Inner Classes, String Class.

UNIT II - INHERITANCE AND POLYMORPHISM

(11 Periods)

Inheritance and Polymorphism: Inheritance, super, Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Final with Inheritance, Object Class.

Packages and Interfaces: Packages, Access Protection, Importing Packages; Interfaces: Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

UNIT III - UTILITY CLASSES AND INPUT/OUTPUT

(11 Periods)

Utility Classes: Java Collections, Java Collection Frame Work, Collection Interfaces: Set, List, Queue, Map; Collection Classes: Hash Set, LinkedHashSet, SortedSet, Linked List, Stack, Array List, Vector, Hash table; Iteration over Collections: Iterator Interface, Comparator Interface, ListIterator Interface and Enumeration Interface; StringTokenizer, Date, Calendar, Random, Formatter, Scanner.

Input/output: Stream Classes: Byte Streams, Character Streams, Console Class, Stream I/O, Serialization.

UNIT IV - EXCEPTION HANDLING AND MULTITHREADING (11 Periods)

Exception Handling: Exception Handling, Exception Types, Uncaught Exceptions, try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, User defined Exceptions, Exception Subclasses, Chained Exceptions.

Multithreading: Java Thread Model, Thread life Cycle, Main Thread, Threads, Multiple Threads, Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming and Stopping Threads.

UNIT V - EVENT HANDLING AND GUI PROGRAMMING WITH JAVA (12 Periods)

Event Handling: Delegation Event Model, Event Classes, Sources of Events, Event Listener Interfaces.

JDBC: performing insert, update, and search operations using JDBC,

GUI Programming with Java: Abstract Window Toolkit (AWT): AWT Classes, Windows, Working with Frame Windows, Graphics and Color, AWT Controls: Labels, Buttons, Check Boxes, Lists, Scroll Bars, Text Field, Text Area, Layout Managers; Applets: Applet, Applet Architecture, Applet Skeleton, Applet Display Methods, Passing Parameters to Applets.

Swings: Swings, Hierarchy of Swing Components, JFrame, JWindow, JDialog, JPanel ; Swing Components: JLabel, JTextField, JButton, JToggleButton, Check Boxes, Radio Buttons, JTabbedPane, JScrollPane, JList, JComboBox, Trees, JTable.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOK:

1. Herbert Schildt, "The Complete Reference Java", Tata McGraw-Hill, 10th Edition, 2017.

REFERENCE BOOKS:

1. B. Eswar Reddy, T. V. Suresh Kumar and P. Ragavan, "Object Oriented Programming with Java," Pearson Sanguine Publications, 2nd Edition, 2011.
2. H. M. Dietel and P. J. Dietel, "Java How to Program," Pearson Education India, 10th Edition, 2016.

ADDITIONAL LEARNING RESOURCES:

1. <https://nptel.ac.in/courses/106105191>
2. <https://javabeginnerstutorial.com/core-java-tutorial>
3. <https://www.javatpoint.com/java-tutorial>

MCA II- SEMESTER
(20MC20103) CRYPTOGRAPHY AND NETWORK SECURITY
(Professional Elective – I)

Int.	Ext.	Total	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A course on Computer Networks.

COURSE DESCRIPTION:

Cryptographic algorithms; Classical Encryption Techniques; Public key and Private key encryption; Security models; Hash Algorithms; E-mail, IP and Web Security; ensuring system security and security over the Internet; Intrusion Detection and Trusted systems.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Understand Network security model and cryptographic techniques for secure communication.

CO2. Apply Cryptographic techniques to provide security for E-Mail and IP based communication.

CO3. Analyze Cryptographic algorithms and provide solutions for secure data transmission.

CO4. Use web and system security techniques to prevent the data from digital attacks.

DETAILED SYLLABUS:

UNIT I- COMPUTER AND NETWORK SECURITY CONCEPTS AND CLASSICAL ENCRYPTION TECHNIQUES (09 Periods)

Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, A Model for Network Security, Standards.

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques – Caesar Cipher, Monoalphabetic Ciphers, Polyalphabetic Ciphers, Playfair Cipher and Transposition Techniques.

UNIT II- CONFIDENTIALITY USING SYMMETRIC AND ASYMMETRIC CIPHERS (13 Periods)

Block Ciphers and the Data Encryption Standard: Traditional Block Cipher Structure, The Data Encryption Standard (DES), The Strength of DES, Block Cipher Design Principles.

Advanced Encryption Standard and Block Cipher Operation: AES Structure, Multiple Encryption and Triple DES, Electronic Codebook, Cipher Block Chaining Mode, Cipher Feedback Mode, Output Feedback Mode and Counter Mode. Stream Ciphers and RC4,

Placement of Encryption Function, Traffic Confidentiality.

Public-Key Cryptography: Principles of Public-Key Cryptosystems, Public-Key Cryptographic algorithms - The RSA Algorithm, Diffie – Hellman Key Exchange.

Case Study: Implement RSA and Diffie – Hellman Key Exchange algorithms.

UNIT III-CRYPTOGRAPHIC DATA INTEGRITY ALGORITHMS AND MUTUAL TRUST

(14 Periods)

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Requirements and Security, Hash Functions Based on Cipher Block Chaining and Secure Hash Algorithm (SHA).

Message Authentication Codes: Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MACs, MACs Based on Hash Functions: HMAC and MACs Based on Block Ciphers: DAA and CMAC.

Digital Signatures: Digital Signatures, NIST Digital Signature Algorithm.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates and Public-Key Infrastructure.

User Authentication: Remote User – Authentication Principles, Kerberos, Federated Identity Management, Personal Identity Verification.

Case Study: To check the integrity of files in a system using any open source security algorithm.

UNIT IV- ELECTRONIC MAIL SECURITY AND IP SECURITY

(09 Periods)

Electronic Mail Security: Email Threats and Comprehensive Email Security, S/MIME and Pretty Good Privacy (PGP).

IP Security: IP Security Overview, IP Security Policy, Authentication Header (AH), Encapsulating Security Payload (ESP), Combining Security Associations and Internet Key Exchange.

UNIT V- WEB SECURITY AND SYSTEM SECURITY

(10 Periods)

Transport-Level Security: Web Security Considerations, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction.

System Security: Intruders, Intrusion Detection systems, Viruses and Related Threats, Virus Countermeasures, Firewall Design Principles, Trusted Systems.

Case Study: A study on Challenges to mitigate security risks associated with digital Payments.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. William Stallings, "*Cryptography and Network Security (Principles and Practice)*", Pearson Education, 7th Edition, 2020.
2. William Stallings, "*Cryptography and Network Security*", Pearson Education, 4th Edition, 2009.

REFERENCE BOOKS:

1. William Stallings, "*Network Security Essentials (Applications and Standards)*", Pearson Education, 3rd Edition, 2009.
2. Bernard L. Menezes, Ravinder Kumar, "*Cryptography, Network Security and Cyber Laws*", Cengage Learning, 2019.
3. Behrouz A. Forouzan, "*Cryptography and Network Security*", Tata McGraw-Hill, 2007.

ADDITIONAL LEARNING RESOURCES:

1. <https://nptel.ac.in/courses/106/105/106105031/> lecture by Dr. Debdeep Mukhopadhyay, IIT Kharagpur
2. <https://www.udemy.com/introduction-to-cryptography-online-course-rahsoft-crypto-certificate/> by Dr. Sourabh Prakash Head of Rahsoft Cyber Security and Cryptography Department
3. <https://www.coursera.org/learn/asymmetric-cryptography> offered by university of Colorado
4. <https://www.khanacademy.org/computing/computer-science/cryptography-> Journey into Cryptography.

MCA II- SEMESTER
(20MC20109) MACHINE LEARNING
(Professional Elective-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Learning problems, designing a learning system, Issues in machine learning, decision tree learning, artificial neural networks, evaluation hypotheses, estimation hypothesis accuracy, bayesian learning and computational learning theory, learning sets of rules and analytical learning, combining inductive and analytical learning, reinforcement learning and Dynamic Programming.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Understand Machine learning concepts, learning problems, decision tree learning, artificial neural networks and Bayesian learning, computational learning theory and probabilities.

CO2. Select and apply decision tree learning, artificial neural networks algorithms and probabilities to evaluate Learning problem hypothesis of an applications.

CO3. Analyze learning sets of rules, analytical learning of domain theories and inductive analytical approaches of combining inductive to infer insights for learning problems.

CO4. Analyze reinforcement learning, Bayesian learning and computational learning theory to classify and assess results of real time applications.

DETAILED SYLLABUS:

UNIT I- INTRODUCTION TO MACHINE LEARNING

(10 Periods)

Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning; Concept learning and the general to specific ordering , concept learning task, concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and candidate elimination algorithm, Remarks on version spaces and candidate elimination, inductive bias.

UNIT II - DECISION TREE LEARNING, ARTIFICIAL NEURAL NETWORKS AND EVALUATION HYPOTHESES

(12 Periods)

Decision Tree Learning: Decision tree representation, problems for decision tree learning, basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

Artificial Neural Networks: Neural network representation, problems for neural network learning, perceptions, multilayer networks and the back propagation algorithm, remarks on the back propagation algorithm.

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.

UNIT III - BAYESIAN LEARNING AND COMPUTATIONAL LEARNING THEORY

(12 Periods)

Bayesian Learning: Bayes theorem, 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, example learning to classify text, Bayesian belief networks The EM algorithm.

Computational learning theory: Probability learning, approximately correct hypothesis, sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, and mistake bound model of learning.

UNIT IV - LEARNING SETS OF RULES AND ANALYTICAL LEARNING (11 Periods)

Learning Sets of Rules: Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

Analytical Learning: Learning with perfect domain theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge.

UNIT V - COMBINING INDUCTIVE AND ANALYTICAL LEARNING, REINFORCEMENT LEARNING (10 Periods)

Combining Inductive and Analytical Learning: Motivation, inductive-analytical approaches to Learning, Prior Knowledge to initialize the Hypothesis, Prior Knowledge to alter the Search Objective, Prior Knowledge to Augment Search Operators.

Reinforcement Learning: Learning Task, Q Learning, Non-Deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to Dynamic Programming.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Tom M. Mitchell, "*Machine Learning*," Mc Graw Hill, Indian Edition, 2017.
2. Stephen Marsland, "*Machine Learning: An Algorithmic Perspective*," Taylor and Francis (CRC), 2nd Edition, 2015.

REFERENCE BOOKS:

1. William W Hsieh, "*Machine Learning Methods in the Environmental Sciences, Neural Networks*," Cambridge University Press, 2009.
2. Richard O. Duda, Peter E. Hart and David G. Stork, "*Pattern classification*," John Wiley and Sons Inc., 2001.
3. Chris Bishop, "*Neural Networks for Pattern Recognition*," Oxford University Press, 1995.
4. Peter Flach, "*Machine Learning*," Cambridge University Press, 2012.

ADDITIONAL LEARNING RESOURCES:

<http://www.cs.cmu.edu/~tom/mlbook-chapter-slides.html>

MCA II – SEMESTER
(20MC20131) DATA WAREHOUSING AND DATA MINING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PREREQUISITES:

Courses on Database Management Systems and Data Warehousing and Data Mining.

COURSE DESCRIPTION:

Hands-on experience on developing active/passive transformations; Creation of Datasets; Data Pre-processing; Association Rule Mining; Classification and Clustering techniques using Data Warehouse ETL and WEKA tool.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

- CO1.** Design and develop solutions for data acquisition process from one data source to other target data source using ETL tool.
- CO2.** Select and Apply Classification and Clustering algorithms on pre-processed datasets to infer predictions effectively.
- CO3.** Apply methods of data mining to assess and provide analytical solutions for societal issues.
- CO4.** Analyse pre-processing techniques, data mining algorithms and identify frequent itemsets using Apriori algorithm to extract interesting patterns from large databases using WEKA components.
- CO5.** Function effectively as an individual and as a member in a team to manage and implement data mining applications.
- CO6.** Write and present a technical report/ document effectively.

LIST OF EXERCISES

PART –A

Creation of Active/Passive transformations using Data Warehouse (Extract, Transform, Load) ETL Tool

1. Construct data acquisition process to extract, transform and load data from different databases.
2. Design and implement data acquisition process to perform
 - a) Expression Transformation
 - b) Joiner Transformation

3. Design and implement data acquisition process to perform
 - a) Aggregator Transformation
 - b) Source Qualifier Transformation
4. Design and implement data acquisition process to perform
 - a) Filter Transformation
 - b) Router Transformation
5. Design and implement data acquisition process to perform
 - a) Ranker Transformation
 - b) Sorter Transformation

PART -B

Working with Data Mining - WEKA tool.

6. Create data sets in ARFF and CSV formats and load into the Weka Explorer.
7. Perform data preprocessing steps on weather nominal and student information data sets as follows:
 - a) Handle missing values for categorical and nominal values.
 - b) Select relevant attributes.
 - c) Apply normalization techniques
8. Generate strong Association rules by applying Apriori algorithm on preprocessed dataset with Min_Sup=60% and Min_Conf=80%.
9. i) Implement the Classification using Decision Tree algorithm on 'Weather' dataset. Draw the confusion matrix and report the model with accuracy.
 (ii) Implement Bayesian Classification and analyze the results on 'iris' dataset.
10. Implement simple k-Means clustering algorithm on 'iris' dataset.
11. Use Experimenter WEKA component to rank the performance of j48, oneR, ID3, algorithms on 'weather nominal' dataset.
12. Verify ID3 classifier performance using Gain ration and Ranker method using a Knowledge flow WEKA component.
13. **Minor Project**
 - Step 1: Creation of data set.
 - Step 2: Apply preprocessing techniques on constructed data sets.
 - Step 3: Implement appropriate data mining algorithms such as:
 - a. Apriori algorithm – to find frequent itemsets using various support and confidence levels
 - b. FP growth association mining
 - c. ID3 decision tree classifier

- d. Build a confusion matrix to compute sensitivity, specificity, precision, recall, weighted accuracy and correlation between the attributes.

Data sets: Super Market data, Health data, Banking system, Weather forecasting and social media data.

REFERENCE BOOKS:

1. Ian H. Witten, Eibe Frank, and Mark, "*A Data Mining: Practical Machine Learning Tools and Techniques*," Hall Morgan Kaufmann, 3rd Edition, 2011.
2. Ralph Kimball, "*The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling*," John Wiley and Sons Inc, 3rd Edition, 2013.
3. G. K. Gupta, "*Introduction to Data Mining with Case Studies*," PHI, New Delhi, 3rd Edition, 2009.

ADDITIONAL LEARNING RESOURCES:

1. <https://www.cs.waikato.ac.nz/ml/weka/book.html>
2. <http://infolab.stanford.edu/~ullman/mmds/book.pdf>
3. Open source tools for data mining: <http://eprints.fri.uni-lj.si/893/1/2008-OpenSourceDataMining.pdf>
4. <https://www.kaggle.com/datasets>
5. <https://www.edureka.co/blog/informatica-etl/>
6. <https://www.coursera.org/specializations/data-warehousing>

MCA II-SEMESTER
(20MC20132) LINUX PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PREREQUISITES: --

COURSE DESCRIPTION: LINUX operating system features; LINUX environment; Vi-editor; Types of shell; Shell Script; Scheduling Algorithms; Disk Scheduling Algorithm; Synchronization Problems; Page Replacement Algorithms; Deadlocks ; Memory Management Techniques.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

- CO1.** Demonstrate LINUX operating system concepts and File Handling, Disk, Text Processing and Backup, awk and Bourne shell.
- CO2.** Use the vi editor to execute commands and implement programs in shell script.
- CO3.** Implement LINUX file API's and process API's in LINUX operating system.
- CO4.** Investigate and select appropriate technique from semaphores, Messages and Shared Memory to solve the problems in Inter Process Communication.
- CO5.** Work independently or in teams to solve problems with effective Communication.

LIST OF EXERCISES:

1. Execute the following Linux commands.
 - a) File Handling Utilities and Disk utilities
 - b) Text Processing Utilities and Backup utilities
2.
 - a) Write a shell script that displays a list of all files in the current directory to which the user has read, write and execute permissions.
 - b) Write a shell script that deletes all lines containing the specified word in one or more files supplied as arguments to it.
3.
 - a) Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
 - b) Write a shell script to find factorial of a given number.
4. Write an awk script to implement below using case control structure.
 - a) Splitting a Line Into Fields
 - b) Print multiplication table of a given number
5. Write a C Program to implement FIFO scheduling algorithm.

6. Write a C program to implement LOOK disk scheduling algorithm.
7. Write a C program to implement producer and consumer problem using semaphore.
8. Write a C program to which illustrates inter process communication between using parent and child using pipes.
9. Write a C program to implement internal and external fragmentation concepts.
10. Write a C program to implement banker's algorithm.
11. Write a C program to implement first fit, best fit and worst fit dynamic memory allocation strategies.
12. Write a C program to implement FIFO page replacement algorithms.

REFERENCE BOOKS:

1. W.R. Stevens, "*UNIX Network Programming*," Pearson Education, 2008
2. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "*Operating System Concepts*," John Wiley and Sons. Inc, 8th Edition, 2009.
3. Graham Glass, King Ables, "*UNIX for programmers and users*," Pearson Education, 3rd Edition, 2003.
4. Kernighan and Pike, "*UNIX programming environment*," Pearson Education, 2006.

MCA II-SEMESTER

(20MC20133) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:

Course on Data Structures and Algorithms and Object oriented Programming through JAVA.

COURSE DESCRIPTION:

Object oriented concepts, recursive and non-recursive function; String Tokenizer class; Method Overloading; String Operations; Creation of package and Interfaces; Handling predefined and User Defined Exceptions; Creation of Files and its Operations; Implementation of Multithreading; Creating and testing Applets; Event handling techniques, GUI applications using AWT and Swings.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

- CO1.** Understand the Object-Oriented Programming Principles to develop java programs.
- CO2.** Design and develop user defined classes using packages and interfaces.
- CO3.** Use advanced java programming concepts AWT, Swings and applets to develop complex user interface applications.
- CO4.** Analyse Inheritance and Exception Handling mechanisms to implement in Object oriented applications.
- CO5.** Work independently and in team to solve problems with effective communication.

LIST OF EXERCISES:

1. a) Write a Java program that prints all real solutions to the quadratic equation using command line argument.
$$ax^2 + bx + c = 0.$$

b) Write a Java program to implement Adjacency matrix.
2. a) Write a Java program that prompts the user for an integer and print out all prime numbers up to the given integer.
b) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use StringTokenizer class of java.util)
3. Write a Java program to illustrate method overloading.

4. Write a Java program to implement the Polynomial ADT using a class:
 - a) Addition b) Subtraction
5. Write a Java program to implement the following:
 - a) Create and Access a package b) Interfaces.
6. Write a Java program to implement the following:
 - a) Predefined exceptions b) User defined exceptions
7. a) Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
 - b) Write a Java program to display the number of characters, lines and words in a text file.
8. a) Write a Java program to implement multithreading techniques.
 - b) Write a Java program to implement producer consumer problem using the concept of inter thread communication.
9. a) Write a java program to develop GUI components in java (AWT) with appropriate Event Handling techniques .
 - b) Write a Java program to create user interface to perform integer divisions using Swings.
10. a) Develop an applet in Java to display a message.
 - b) Develop an applet to perform factorial of a given value.

Mini Project

1. Use Eclipse IDE to implement calculator using AWT and SWINGS.

2. Application for Temperature Conversion

- a). Write a temperature conversion applet that converts from Fahrenheit to Celsius.

Use the following formula for the conversion:

$$\text{Celsius} = ((5/9) * (\text{Fahrenheit} - 32)).$$

- b). Enhance the temperature conversion applet by adding the Kelvin temperature scale.

Use the following formula for the conversion between Kelvin and Celsius

$$\text{Kelvin} = \text{Celsius} + 273.15$$

REFERENCE BOOKS:

1. B. Eswar Reddy, T. V. Suresh Kumar and P. Ragavan, "Object Oriented Programming with Java," Pearson Sanguine Publications, 2nd Edition, 2011.
2. Harvey Dietel and Paul Dietel, "Java How to Program," Pearson Education, 11th Edition, 2018.

MCA II- SEMESTER
(20MC2AC01) OPERATING SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES:--

COURSE DESCRIPTION:

Operating Systems; CPU Scheduling Algorithms; Synchronization Methods; Memory Management Techniques; Protection.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1. Identify and analyze System Structures, Inter Process Communication (IPC), Process Synchronization, Memory Management, Process Scheduling, System protection mechanisms.

CO2. Select and apply Synchronization tools, Process Scheduling and Page Replacement algorithms to interpret and resolve optimal resource allocation problems.

DETAILED SYLLABUS:

UNIT I – SYSTEM STRUCTURES (6 periods)

System Structures: Operating System concepts, Role of Operating System, Operating System services, Operating system structure, System calls, types of system calls, System programs, Virtual machines.

UNIT II- PROCESS AND PROCESS SCHEDULING (6 periods)

Processes: Process concept, Process scheduling, Operations on processes, Inter process communication (IPC), Examples of IPC systems.

Process Scheduling: Basic Concepts, Type of Scheduler, Scheduling Criteria, Scheduling Algorithms.

UNIT III - PROCESS SYNCHRONIZATION (6 periods)

Process Synchronization: Concepts, Critical-Section problem, Peterson's Solution, Synchronization hardware, Semaphores, Classic problems of Synchronization, Critical regions.

UNIT IV - MEMORY MANAGEMENT (6 periods)

Memory Management: Concepts, Swapping, Contiguous memory allocation, Paging, Structure of page table, Segmentation.

UNIT V - VIRTUAL MEMORY MANAGEMENT AND SYSTEM PROTECTION(6 periods)

Virtual Memory Management: Concepts, Demand paging, Copy on write, Page replacement, Allocation of frames, Thrashing.

System Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix.

Total Periods: 30

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "*Operating System Concepts*," John Wiley & Sons. Inc, 8th Edition, 2009.

REFERENCE BOOKS:

1. Achyut S. Godbole, "*Operating Systems*," Tata McGraw-Hill, 3rd Edition, 2017.
2. William Stallings, "*Operating Systems: Internals and Design Principles*," Pearson Education, 9th Edition, 2018.

ADDITIONAL LEARNING RESOURCES:

1. <https://www.javatpoint.com/os-tutorial>
2. <https://www.os-book.com/OS10/slide-dir/index.html>