		L	T	P	C
24TMA303	PROBABILITY AND STATISTICS	3	1	0	4

COURSE OBJECTIVES

- This course aims at providing the required skill to apply the statistical tools in engineering
- To introduce the basic concepts of probability and random variables..
- To introduce the basic concepts of two dimensional random variables
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems..
- To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

UNIT-I   PROBABILITY AND RANDOM VARIABLES   9+3

Axioms of probability – Conditional probability – Baye's theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Exponential and Normal distributions – Functions of a random variable.

UNIT-II   TWO - DIMENSIONAL RANDOM VARIABLES   9+3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT-III   ESTIMATION THEORY   9+3

Unbiased estimators - Efficiency - Consistency - Sufficiency - Robustness - Method of moments - Method of maximum Likelihood - Interval estimation of Means - Differences between means, variations and ratio of two variances.

UNIT-IV   NON- PARAMETRIC TESTS   9+3

Introduction - The Sign test - The Signed - Rank test - Rank - sum tests - The U test - The H test - Tests based on Runs - Test of randomness - The Kolmogorov Tests.

UNIT-V   STATISTICAL QUALITY CONTROL   9+3

Control charts for measurements (X^- and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

Total Periods: 60

COURSE OUTCOMES:

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

CO1: Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.

CO2: Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.

CO3: Apply the concept of testing of hypothesis for small and large samples in real life problems

CO4: Apply the basic concepts of classifications of design of experiments in the field of agriculture And statistical quality control.

CO5: Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

TEXT BOOKS:

1. Johnson. R.A., Miller. I.R and Freund. J.E, " Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2016.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata Mc Graw Hill, 4th
3. Edition, 2007.
4. John E. Freund, "Mathematical Statistics", Prentice Hall, 5th Edition, 1992.

REFERENCE BOOKS:

1. Gupta. S.C. and Kapoor. V. K., "Fundamentals of Mathematical Statistics", Sultan Chand &
2. Sons, New Delhi, 12th Edition, 2020.
3. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning,
5. Ross. S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 5thEdition, Elsevier, 2014.
7. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 4th Edition, 2012.
8. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9th Edition, 2010.

CO's-PO's & PSO'S Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	2	-	-	2	-	-
CO2	3	3	-	-	-	-	-	-	2	-	-	2	-	-
CO3	3	3	-	-	-	-	-	-	2	-	-	2	-	-
CO4	3	3	3	2	-	-	-	-	2	-	-	2	-	-
CO5	3	3	2	2	-	-	-	-	2	-	-	2	-	-
Avg	3	3	1	1	-	-	-	-	2	-	-	2	-	-

1 - low,2-medium,3-high, '-' -no correlation

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III SEMESTER

24TIT301   **DATA STRUCTURES AND ALGORITHMS**

	L	T	P	C
	3	0	0	3

COURSE OBJECTIVES
- To understand the concepts of ADTs.
- To learn linear data structures – lists, stacks, and queues.
- To understand non-linear data structures – trees and graphs.
- To understand sorting, searching and hashing algorithms.
- To apply Tree and Graph structures.

UNIT – I   LISTS   9
Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Circularly linked lists – Doubly-linked lists – Applications of lists – Polynomial ADT – Radix Sort – Multilists, Introduction to analysis of algorithms – asymptotic notations.

UNIT – II   STACKS AND QUEUES   9
Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions- Infix to Postfix conversion – Function Calls – Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues.

UNIT – III   TREES AND MULTIWAY SEARCH TREES   9
Tree ADT – Tree Traversals - Binary Tree ADT – Expression trees – Binary Search Tree ADT – AVL Trees – multiway search treesB-Tree – B+ Tree, Priority Queue (Heaps) – Binary Heap.

UNIT – IV   GRAPHS   9
Graph Definition – Representation of Graphs – Types of Graph – Graph Traversal– Bi-connectivity – Euler circuits – Topological Sort – greedy algorithms –Dynamic programming - Minimum Spanning Tree - Shortest path.

UNIT – V   SEARCHING, SORTING AND HASHING TECHNIQUES   9
Searching – Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort –. Merge Sort – Hashing – Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

Total Periods: 45

COURSE OUTCOMES:
At the end of the course, learners will be able to
CO1: Define linear and non-linear data structures.
CO2: Implement linear and non–linear data structure operations.
CO3: Use appropriate linear/non–linear data structure operations for solving a given problem.
CO4: Apply appropriate graph algorithms for graph applications.
CO5: Analyze the various searching and sorting algorithms.

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TEXT BOOKS:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education, 2005.
2. Kamthane, Introduction to Data Structures in C, 1st Edition, Pearson Education, 2007

REFERENCE BOOKS:

1. Langsam, Augenstein and Tanenbaum, Data Structures Using C and C++, 2nd Edition, Pearson Education, 2015.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, Introduction to
3. Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft ,Data Structures and Algorithms, 1st edition, Pearson, 2002.
4. Kruse, Data Structures and Program Design in C, 2nd Edition, Pearson Education, 2006.

CO's-PO's &PSO'S Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	2	2	1	1	-	1	2	1	3	2	1
CO2	1	2	1	2	2	-	-	-	1	1	1	2	2	2
CO3	2	3	1	2	3	-	-	-	1	1	1	2	2	1
CO4	2	1	-	1	1	-	-	-	2	1	1	2	2	3
CO5	1	2	1	2	2	1	1	-	1	2	1	3	2	2
Avg	1.6	2.2	0.8	1.8	2	0.4	0.4	0	1.2	1.4	1	2.4	2	1.8

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24TIT302   **JAVA PROGRAMMING**

                                                                    L   T   P   C
                                                                    3   0   0   3

COURSE OBJECTIVES:
- To develop applications using Java object-oriented concepts.
- To create User defined Packages and Interfaces.
- To build Software using the concepts of Files and Collection Framework.
- To design GUI using JavaFX.
- To implement Java web application using JDBC, Servlet and JSP.

UNIT – I   JAVA BASICS   9
Features of Java Language - JVM - Bytecode - Data Types - Java Tokens – Control Structure - Access Modifiers - Operators - Arrays one dimensional and multi - dimensional - Control Structures - String Handling - String class - String buffer class

UNIT – II   OBJECT ORIENTED PROGRAMMING   9
Object Oriented Concepts-Classes and Objects - Constructors - Method Overloading - Inheritance - Types - Using Super - Method Overriding - Abstract Classes - Using final with inheritance- Garbage Collection - Introduction to Packages - User Defined Packages - Importing packages - Access protection – Interfaces

UNIT – III   EXCEPTION HANDLING, THREADS AND FILE STREAMS   9
Exception Handling - Using try, catch, throw, throws and finally - Java Thread Model - Main thread - Multithreading - Thread priorities – Synchronization - IO Package - Introduction Input Stream and Output Stream classes - Data Output Stream and Data Input Stream classes - FileInputStream - FileOutputStream. - Reader and Writer Classes - File Reader and File Writer

UNIT – IV   COLLECTIONS, GUI PROGRAMMING, DATA BASE CONNECTIVITY   9
Collections Framework-List, Set, Map - Iterators and Enumerations - ArrayList, LinkedList, HashMap - GUI Programming using Java FX - Explore Events - Accessing Database using JDBC – Basics of networking in Java - Socket programming

UNIT – V   WEB DEVELOPMENT WITH JAVA   9
Servlet - Servlet life cycle - Developing and Deploying Servlets - Expressions - Applications using Servlet – JSP -Building RESTful APIs with Spring Boot - JSON Parsing and Serialization (Jackson/Gson) - Unit Testing with JUnit and Mockito - Deployment with JAR/WAR Files - Version Control with Git – Introduction to microservices.

                                                        Total Periods: 45

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COURSE OUTCOMES:

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

CO1: Develop applications using Java object-oriented concepts.

CO2: Create User defined Packages and Interfaces.

CO3: Build Software using the concepts of Files and Collection Framework.

CO4: Design GUI using JavaFX.

CO5: Implement Java web application using JDBC, Servlets and JSP.

TEXT BOOKS:

1. Herbert Schildt, "Java: The Complete Reference", 11th Edition, McGraw Hill Education, New Delhi, 2019
2. Bruce Eckel, "Thinking in Java", Pearson Education, 4th Edition 2006.
3. Y. Daniel Liang, "Introduction to Java programming", Comprehensive version, 10th Edition, Pearson ltd, 2015.

REFERENCE BOOKS:

1. Cay. S. Horstmann, Gary Cornell, "Core Java-JAVA Fundamentals", Prentice Hall, 10th ed., 2016.
2. Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rd Edition, Pearson, 2015.3. SCJP Sun Certified Programmer for Java 6 Study Guide. 6th edition, McGrawHill.
3. https://docs.oracle.com/javase/tutorial/.

CO's-PO's&PSO'S Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	3	-	3	-	-	-	1	-	3	2	-	-
CO2	1	-	3	-	3	-	-	-	1	-	3	2	2	1
CO3	-	-	3	-	3	-	-	-	1	1	3	2	-	3
CO4	-	-	3	-	3	-	-	-	1	1	3	2	-	-
CO5	-	-	3	-	3	-	-	-	1	1	3	2	3	1
Avg	1	-	3	-	3	-	-	-	1	1	3	2	2.5	1.7

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24MAD301   PRINCIPLES OF OPERATING SYSTEMS

	L	T	P	C
	2	0	2	3

COURSE OBJECTIVES

- To provide understanding about the fundamental concepts of operating systems.
- To understand processes and threads
- To analyze scheduling algorithms and process synchronization.
- To analyze various memory and I/O management schemes.
- To be familiar with the basics of virtual machines and Mobile OS like iOS and Android.

UNIT – I   FUNDAMENTALS   5

Introduction - System Architecture - Operating System Structure - Operations - Process Management - Memory Management - Storage Management - System Structure - User Operating System Interface - System Calls - Types - System Programs - Operating System Design and Implementation - Virtual machines.

UNIT – II   PROCESS MANAGEMENT   7

Concept of Processes-Scheduling and Operations-Inter-process Communication-CPU Scheduling-Scheduling Criteria-Scheduling Algorithms-Threads-Multithread Models-Threading Issues - Process Synchronization – Critical Section Problem-Semaphores, Mutex-Classical Synchronization Problems – Monitors-Handling Deadlocks-Deadlock Prevention and Avoidance-Detection and Recovery

UNIT – III   MEMORY MANAGEMENT   5

Main Memory - Swapping - Contiguous Memory Allocation - Paging - Segmentation - Virtual Memory - Demand Paging - Copy on Write - Page Replacement - Allocation of Frames – Thrashing.

UNIT – IV   SECONDARY STORAGE MANAGEMENT   7

Secondary Storage Structure - Disk Structure - Disk Attachment - Disk Scheduling - Disk Management - Swap Space Management - File System - File Concepts: Access Methods - Directory Structure - File System Mounting - File System Implementation - Structure – Implementation - Directory Implementation - Allocation Methods -Free Space Management - I/O Systems - I/O Hardware - Application I/O Interface - Kernel I/O Subsystem.

UNIT – V   VIRTUAL MACHINES AND MOBILE OS   6

Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Linux System -Mobile OS - iOS and Android-Native OS.

30 Periods

PRACTICAL EXERCISES: **30 Periods**

1. Installation of windows operating system
2. Illustrate UNIX commands and Shell Programming
3. Process Management using System Calls: Fork, Exit, Getpid, Wait, Close
4. Write C programs to implement the various CPU Scheduling Algorithms
5. Illustrate the inter process communication strategy
6. Implement mutual exclusion by Semaphore

7. Write C programs to avoid Deadlock using Banker's Algorithm
8. Write a C program to Implement Deadlock Detection Algorithm
9. Implement the paging Technique using C program
10. Write C programs to implement the following Memory Allocation Methods
    a. First Fit b. Worst Fit c. Best Fit
11. Write C programs to implement the various Page Replacement Algorithms
12. Write C programs to Implement the various File Organization Techniques
13. Implement the following File Allocation Strategies using C programs
    a. Sequential b. Indexed c. Linked
14. Write C programs for the implementation of various disk scheduling algorithms
15. Install any guest operating system like Linux using VMware.

Total Periods: 60

COURSE OUTCOMES:
At the end of the course, learners will be able to
CO1: Apply the different concepts and functionalities of operating system
CO2: Explain deadlock prevention and avoidance algorithms.
CO3: Manage concurrent access to shared resources in operating systems
CO4: Collaborate and compare the various file system structures
CO5: Compare iOS and Android Operating Systems.

TEXT BOOKS:
1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 10th Edition, John Wiley and Sons Inc., 2018.
2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition,2022 New Delhi.

REFERENCE BOOKS:
1. William Stallings, "Operating Systems: Internals and Design Principles", 7th Edition, Prentice Hall, 2018.
2. Andrew S. Tanenbaum, "Modern Operating Systems", 4th Edition, Prentice Hall of India Pvt., 2016.

CO's-PO's & PSO'S Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	3	2	2	-	-	-	1	2	3	3	2	1
CO3	-	-	-	3	2	-	-	-	-	-	-	-	-	3
CO4	-	-	-	-	-	-	-	2	2	-	-	-	-	-
CO5	3	2	1	1	1	-	-	-	2	2	3	1	3	1
Avg	1.6	0.8	0.8	1.2	1	0	0	0.4	1	0.8	1.2	0.8	1	1

1 - low,2-medium,3-high, '-' -no correlation

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24MAD302	FUNDAMENTALS OF DATA SCIENCE AND ANALYTICS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES
- To understand the techniques and processes of data science.
- To apply descriptive data analytics.
- To visualize data for various applications.
- To understand inferential data analytics.
- To analysis and build predictive models from data.

UNIT - I   INTRODUCTION TO DATA SCIENCE   8
Need for data science – benefits and uses – facets of data – data science process – setting the research goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications.

UNIT - II   DESCRIPTIVE ANALYTICS   10
Frequency distributions – Outliers –interpreting distributions – graphs – averages - describing variability – interquartile range – variability for qualitative and ranked data - Normal distributions – z scores –correlation – scatter plots – regression – regression line – least squares regression line – standard error of estimate – interpretation of r2 – multiple regression equations – regression toward the mean.

UNIT - III   INFERENTIAL STATISTICS   9
Populations – samples – random sampling – Sampling distribution- standard error of the mean - Hypothesis testing – z-test – z-test procedure –decision rule – calculations – decisions – interpretations - one-tailed and two-tailed tests – Estimation – point estimate – confidence interval – level of confidence – effect of sample size.

UNIT - IV   ANALYSIS OF VARIANCE   9
t-test for one sample – sampling distribution of t – t-test procedure – t-test for two independent samples – p-value – statistical significance – t-test for two related samples. F-test – ANOVA – Two-factor experiments – three f-tests – two-factor ANOVA –Introduction to chi-square tests

UNIT - V   PREDICTIVE ANALYTICS   9
Linear least squares – implementation – goodness of fit – testing a linear model – weighted resampling. Regression using StatsModels – multiple regression – nonlinear relationships – logistic regression – estimating parameters – Time series analysis – moving averages – missing values – serial correlation – autocorrelation. Introduction to survival analysis.

45 Periods

PRACTICAL EXERCISES: **30 Periods**
Tools: Python, Numpy, Scipy, Matplotlib, Pandas, statmodels, seaborn, plotly, bokeh

1. Working with Pandas data frames
2. Basic plots using Matplotlib
3. Frequency distributions, Averages, Variability
4. Normal curves, Correlation and scatter plots, Correlation coefficient
5. Regression

6. Z-test
7. T-test
8. ANOVA
9. Building and validating linear models
10. Building and validating logistic models
11. Time series analysis

Total Periods: 75

COURSE OUTCOMES:
At the end of the course, learners will be able to
CO1: Explain the data analytics pipeline.
CO2: Describe and visualize data.
CO3 : Perform statistical inferences from data.
CO4 : Analyze the variance in the data.
CO5 : Build models for predictive analytics.

TEXT BOOKS:
1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (first two chapters for Unit I).
2. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017.
3. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016.

REFERENCE BOOKS:
1. Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2014.
2. Sanjeev J. Wagh, Manisha S. Bhende, Anuradha D. Thakare, "Fundamentals of Data Science", CRC Press, 2022.
3. Chirag Shah, "A Hands-On Introduction to Data Science", Cambridge University Press, 2020.
4. Vineet Raina, Srinath Krishnamurthy, "Building an Effective Data Science Practice: A Framework to Bootstrap and Manage a Successful Data Science Practice", Apress, 2021.

CO's-PO's&PSO'S Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2	1	-	-	-	-	3	1	3	2	2	2
CO2	1	1	2	2	2	-	-	-	2	2	3	2	2	1
CO3	1	1	3	1	1	-	-	-	2	3	1	1	3	3
CO4	2	3	1	3	1	-	-	-	3	3	3	3	1	2
CO5	2	1	1	1	2	-	-	-	3	3	1	3	2	2
Avg	1	1	2	2	2	-	-	-	3	2	2	2	2	2

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III SEMESTER

24MCS304   DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION

	L	T	P	C
	3	0	2	4

COURSE OBJECTIVES
- To analyze and design combinational circuits.
- To analyze and design sequential circuits.
- To understand the basic structure and operation of a digital computer.
- To study the design of data path unit, control unit for processor and to familiarize with the hazards.
- To understand the concept of various memories and I/O interfacing.

UNIT - I   COMBINATIONAL LOGIC   9
Combinational Circuits – Karnaugh Map - Analysis and Design Procedures – Binary Adder – Subtractor – Decimal Adder - Magnitude Comparator – Decoder – Encoder – Multiplexers – Demultiplexers.

UNIT - II   SYNCHRONOUS SEQUENTIAL LOGIC   9
Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation - Registers – Counters.

UNIT - III   COMPUTER FUNDAMENTALS   9
Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction – Interaction between Assembly and High-Level Language.

UNIT – IV   PROCESSOR   9
Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Microprogrammed Control – Pipelining – Data Hazard – Control Hazards.

UNIT – V   MEMORY AND I/O   9
Memory Concepts and Hierarchy – Memory Management – Cache Memories: Mapping and Replacement Techniques – Virtual Memory – DMA – I/O – Accessing I/O: Parallel and Serial Interface – Interrupt I/O – Interconnection Standards: USB, SATA.

45 Periods

PRACTICAL EXERCISES: **30 Periods**
1. Verification of Boolean theorems using logic gates.
2. Design and implementation of combinational circuits using gates for arbitrary functions.
3. Implementation of 4-bit binary adder/subtractor circuits.
4. Implementation of code converters.
5. Implementation of BCD adder, encoder and decoder circuits
6. Implementation of functions using Multiplexers.

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7. Implementation of the synchronous counters
8. Implementation of a Universal Shift register.
9. Simulator based study of Computer Architecture

Total Periods: 75

COURSE OUTCOMES:
At the end of the course, learners will be able to
CO1: To analyze and design combinational circuits.
CO2: To analyze and design sequential circuits
CO3: To understand the basic structure and operation of a digital computer.
CO4: To study the design of data path unit, control unit for processor and to familiarize with the hazards.
CO5: To understand the concept of various memories and I/O interfacing.

TEXT BOOKS:
1. David A. Patterson, John L. Hennessy, "Computer Organization and Design, The Hardware/Software Interface", Sixth Edition, Morgan Kaufmann/Elsevier, 2020.
2. M. Morris Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog", Sixth Edition, Pearson Education, 2018.

REFERENCE BOOKS:
1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, NaraigManjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw-Hill, 2012
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Tenth Edition, Pearson Education, 2016.
3. M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2016.

CO's-PO's&PSO'S Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	2	1	1	1	1	2	3	2	3
CO2	3	3	3	3	2	1	1	1	1	1	2	3	1	2
CO3	3	3	3	3	2	2	1	1	1	1	2	3	2	3
CO4	3	3	3	3	1	1	1	1	1	1	1	2	1	3
CO5	3	3	3	3	1	2	1	1	1	1	1	2	1	2
Avg	3	3	3	3	1.8	1.6	1	1	1	1	1.6	2.6	1.4	2.6

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III SEMESTER

24LIT301   **DATA STRUCTURES AND ALGORITHMS LABORATORY**

	L	T	P	C
	0	0	3	1.5

COURSE OBJECTIVES
- To design and implement linear data structures – lists, stacks, and queues.
- To implement Sorting, Searching algorithms.
- To implement Hashing algorithms.
- To solve problems using tree and graph structures.

LIST OF EXPERIMENTS:

1. Array implementation of Stack, Queue and Circular Queue ADTs
2. Implementation of Singly Linked List
3. Linked list implementation of Stack and Linear Queue ADTs
4. Implementation of Polynomial Manipulation using Linked list
5. Implementation of Evaluating Postfix Expressions, Infix to Postfix conversion
6. Implementation of Binary Search Trees
7. Implementation of AVL Trees
8. Implementation of Heaps using Priority Queues
9. Implementation of Dijkstra's Algorithm
10. Implementation of Prim's Algorithm
11. Implementation of Linear Search and Binary Search
12. Implementation of Insertion Sort and Selection Sort
13. Implementation of Merge Sort
14. Implementation of Open Addressing (Linear Probing and Quadratic Probing)

Total Periods: 45

COURSE OUTCOMES:
At the end of the course, learners will be able to
CO1: Design, implement, and analyse linear data structures, such as lists, queues, and stacks, according to the needs of different applications.
CO2: Design, implement, and analyse efficient tree structures to meet requirements such as searching, indexing, and sorting.
CO3: Model problems as graph problems and implement efficient graph algorithms to solve them.
CO4: Analyze the various searching and sorting algorithms.
CO5: Implement Hashing techniques and analyse with various inputs.

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TEXT BOOKS:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education, 2005.
2. Kamthane, Introduction to Data Structures in C, 1st Edition, Pearson Education, 2007.

REFERENCE BOOK

6. Langsam, Augenstein and Tanenbaum, Data Structures Using C and C++, 2nd Edition, Pearson Education, 2015.
7. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, Introduction to
8. Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft ,Data Structures and Algorithms, 1st edition, Pearson, 2002.
9. Kruse, Data Structures and Program Design in C, 2nd Edition, Pearson Education, 2006.

CO's-PO's&PSO'S Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	1	-	-	-	-	2	1	2	2	2	2
CO2	3	3	1	1	-	-	-	-	1	1	1	3	1	2
CO3	2	1	3	1	-	-	-	-	1	1	2	3	3	3
CO4	3	1	3	3	-	-	-	-	1	2	3	3	2	1
CO5	3	2	1	1	2	-	-	-	3	3	3	1	3	1
Avg	2.4	1.8	2	1.4	0.4	0	0	0	1.6	1.6	2.2	2.4	2.2	1.8

1 - low,2-medium,3-high, '-' -no correlation

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24LIT302   **JAVA PROGRAMMING LABORATORY**

	L	T	P	C
	0	0	3	1.5

COURSE OBJECTIVES

- To learn basic Java programming concepts like data types, control structures, and arrays.
- To apply object-oriented principles to build modular applications.
- To use Java for exception handling, multithreading, and file operations.
- To explore web development using servlets, JSP, and RESTful APIs.
- To develop a practical project to apply Java programming skills.

LIST OF EXPERIMENTS:

1. Write a Java program to demonstrate Data types, operators and control structures.
2. Write a Java program to perform operations on one-dimensional and multi-dimensional arrays.
3. Write a Java program to perform string manipulation using the String class.
4. Write a Java program to implement method overloading and overriding.
5. Write a Java program to implement abstract classes and interfaces with real-world examples.
6. Write a Java program to develop user-defined packages and demonstrate access protection.
7. Write a Java program to create custom exceptions for any application.
8. Write a Java program to demonstrate thread creation using Thread class and Runnable interface.
9. Write a Java program to Implement thread priorities and synchronization.
10. Write a Java program to read and write text files using FileReader and FileWriter.
11. Implement event-driven programming using JavaFX.
12. Create and deploy servlets to handle HTTP requests and responses.
13. Build dynamic web pages using JSP.
14. Develop RESTful APIs using Spring Boot for basic CRUD operations.
15. Parse and serialize JSON data using Jackson/Gson libraries.
16. Practice Git commands for cloning, committing, pushing, and branching.
17. Explore JAR and WAR file creation for deployment.
18. Develop a **Student Management System** that performs CRUD operations

Total Periods: 45

COURSE OUTCOMES:
At the end of the course, learners will be able to
CO1: Learn basic Java programming concepts like data types, control structures, and arrays.
CO2: Apply object-oriented principles to build modular applications.
CO3: Use Java for exception handling, multithreading, and file operations.
CO4: Explore web development using servlets, JSP, and RESTful APIs.
CO5: Develop a practical project to apply Java programming skills.

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and Data Science
Dhirajlal Gandhi College of Technology
Sikkanampatty, Salem - 636 309,

TEXT BOOKS:

2. Herbert Schildt, "Java: The Complete Reference", 11th Edition, McGraw Hill Education, New Delhi, 2019
3. Bruce Eckel, "Thinking in Java", Pearson Education, 4th Edition 2006.
4. Y. Daniel Liang, "Introduction to Java programming", Comprehensive version, 10th Edition, Pearson ltd, 2015.

REFERENCE BOOKS:

1. Cay. S. Horstmann, Gary Cornell, "Core Java-JAVA Fundamentals", Prentice Hall, 10th ed., 2016.
2. Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rd Edition, Pearson, 2015.
3. SCJP Sun Certified Programmer for Java 6 Study Guide, 6th edition, McGrawHill.
4. https://docs.oracle.com/javase/tutorial/.

CO's-PO's & PSO'S Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	3	-	3	-	-	-	1	-	3	2	-	-
CO2	1	-	3	-	3	-	-	-	1	-	3	2	2	1
CO3	-	-	3	-	3	-	-	-	1	1	3	2	-	3
CO4	-	-	3	-	3	-	-	-	1	1	3	2	-	-
CO5	-	-	3	-	3	-	-	-	1	1	3	2	3	1
Avg	0.4	0	3	0	3	0	0	0	1	0.6	3	2	1	1

1 - low,2-medium,3-high, '-' -no correlation

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