SCS1103	DATA STRUCTURES	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT 1 INTRODUCTION **9 Hrs.**

Introduction to algorithms - Recursion - Definition - Design Methodology and Implementation of recursive algorithms - Linear and binary recursion - recursive algorithms for factorial function - Fibonacci sequence - Tower of Hanoi - Tail recursion – Data Structures - Need - classification - operations - Array - characteristics - types - storage representations.

UNIT 2 SEARCHING AND SORTING TECHNIQUES **9 Hrs.**

Basic concepts - List Searches using Linear Search - Binary Search - Fibonacci Search - Sorting Techniques - Insertion sort - Heap sort - Bubble sort - Quick sort - Merge sort - Analysis of sorting techniques.

UNIT 3 STACKS **9 Hrs.**

Basic Stack Operations - Representation of a Stack using Arrays - Algorithm for Stack Operations - Stack Applications: Reversing list - Factorial Calculation - Infix to postfix Transformation - Evaluating Arithmetic Expressions.

UNIT 4 QUEUES **9 Hrs.**

Basic Queue Operations - Representation of a Queue using array - Implementation of Queue Operations using Stack - Applications of Queues - Round robin Algorithm - Enqueue - Dequeue - Circular Queues - Priority Queues.

UNIT 5 LINKED LISTS **9 Hrs.**

Introduction - Single linked list - Representation of a linked list in memory - Operations on a singly linked list - Merging two singly linked lists into one list - Reversing a singly linked list - Applications of singly linked list to represent polynomial expressions and sparse matrix manipulation - Advantages and disadvantages of singly linked list - Circular linked list - Doubly linked list - Circular Doubly Linked List.

Max. 45 Hours

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 : Solve problems using recursive algorithms.
CO2 : Develop different searching and sorting algorithms.
CO3 : Implement stack operations.
CO4 : Solve problems using queues.
CO5 : Create different types of Linked List and perform various operations.
CO6 : Decide the appropriate data structure for a specified problem.

TEXT / REFERENCE BOOKS

1. Jean-Paul Tremblay, Paul G. Sorenson,'An Introduction to Data Structures with Application',, TMH, 2n d Edition.
2. Naps, Thomas L., and Bhagat Singh, "Introduction to Data Structure with Pascal", West Publishing Co., 1986.
3. Richard F, Gilberg, Forouzan, "Data Structures", Cengage, 2nd Edition.

END SEMESTER EXAM QUESTION PAPER PATTERN:

Max. Marks: 100 **Exam Duration: 3 hrs**

PART A: 2 Questions from each unit, each carrying 2 marks 20 Marks
PART B: 2 Questions from each unit with internal choice, each carrying 16 marks 80 Marks

SCSA1203	DATA STRUCTURES	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To impart the basic concepts of data structures and algorithms.
- To be familiar with writing recursive methods.
- To understand concepts about searching and sorting techniques.
- To implement basic concepts about stacks.
- To apply the concepts of queues and its types.

UNIT 1 INTRODUCTION TO ALGORITHMS 9 Hrs.

Introduction Data Structures - Need - classification - operations –Abstract data types (ADT)- Array - characteristics - types - storage representations. Array Order Reversal-Array Counting or Histogram-Finding the maximum Number in a Set, Recursion- Towers of Hanoi-Fibonacci series-Factorial.

UNIT 2 LINKED LISTS 9 Hrs.

Introduction - Singly linked list - Representation of a linked list in memory - Operations on a singly linked list - Merging two singly linked lists into one list - Reversing a singly linked list - Applications of singly linked list to represent polynomial - Advantages and disadvantages of singly linked list - Circular linked list - Doubly linked list - Circular Doubly Linked List

UNIT 3 STACKS 9 Hrs.

Basic Stack Operations - Representation of a Stack using Arrays - Algorithm for Stack Operations - Stack Applications: Reversing list - Factorial Calculation - Infix to postfix Transformation - Evaluating Arithmetic Expressions.

UNIT 4 QUEUES 9 Hrs.

Basic Queue Operations - Representation of a Queue using array - Applications of Queues - Round robin Algorithm - Enqueue - Dequeue - Circular Queues - Priority Queues.

UNIT 5 SEARCHING AND SORTING TECHNIQUES 9 Hrs.

Basic concepts - List Searches using Linear Search - Binary Search - Fibonacci Search - Sorting Techniques - Insertion sort - Heap sort - Bubble sort - Quick sort - Merge sort - Analysis of sorting techniques.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the concept of recursive algorithms.
CO2 - Demonstrate the different types of data structures.
CO3 - Able to understand the operations on linear data structures.
CO4 - Summarize searching and sorting techniques.
CO5 - Choose appropriate data structure as applied to specified problem definition.
CO6 - Understand and implement the applications of linear data structures.

TEXT / REFERENCE BOOKS

1. Jean-Paul Tremblay, Paul G. Sorenson,'An Introduction to Data Structures with Application', TMH, 2017.
2. Richard F, Gilberg, Forouzan, "Data Structures", Cengage, 2004, 2nd Edition.
3. Larry R. Nyhoff, ADTs, Data Structures, and Problem Solving with C++, Prentice Hall Edition, 2004.
4. Thomas H. Cormen, Charles E. Leiserson, "Introduction to Algorithms", 3rd Edition, 2010.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 Exam Duration: 3 Hrs.
PART A: 10 Questions carrying 2 marks each – No choice 20 Marks
PART B: 2 Questions from each unit of internal choice, each carrying 16 marks 80 Marks

SCS4102	DATA STRUCTURES LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

SUGGESTED LIST OF EXPERIMENTS

1. Program to insert and delete an element from an array.
2. Program to sort the elements using insertion sort.
3. Program to sort the elements using quick sort.
4. Program to sort the elements using merge sort.
5. Program to implement operations on a Singly linked list.
6. Program to implement operations on a doubly linked list.
7. Program to implement a Stack using an array.
8. Program to implement a Stack using a Linked list.
9. Program to implement Queue using an array.
10. Program to implement Queue using a Linked list.
11. Program to convert an infix expression to postfix expression.
12. Program to implement display elements of a queue according to their priority.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 : Solve various problems using Array Concept.
CO2 : Identify appropriate sorting algorithm for the given context.
CO3 : Solve Problems using Stack Data Structures.
CO4 : Solve real world problems, using Queue Data Structures.
CO5 : Develop applications using Linked lists.
CO6 : Apply the appropriate Data Structure for the given application.

SCSA2201	**DATA STRUCTURES LAB**	**L**	**T**	**P**	**Credits**	**Total Marks**
		0	**0**	**4**	**2**	**100**

COURSE OBJECTIVES

- To implement linear and non-linear data structures.
- To understand the different operations of search trees.
- To implement graph traversal algorithms.
- To get familiarized to sorting algorithms.
- To implement linear search and binary Search.

SUGGESTED LIST OF EXPERIMENTS

- Program to insert and delete an element in an array.
- Program to implement operations on a Singly linked list.
- Program to implement operations on a doubly linked list.
- Program to sort the elements using insertion sort.
- Program to sort the elements using quick sort.
- Program to sort the elements using merge sort.
- Program to implement a Stack using an array and Linked list.
- Program to implement Queue using an array and Linked list.
- Program to implement Circular Queue.
- Program to convert an infix expression to postfix expression.
- Program to implement display elements of a queue according to their priority.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Remembering the concept of data structures through ADT including List, Stack and Queues.
CO2 - Understand basic concepts about stacks, queues, lists, trees and graphs.
CO3 - Able to apply and implement various tree traversal algorithms and ensure their correctness.
CO4 - Ability to analyze algorithms and develop algorithms through step by step approach in solving problems with the help of fundamental data structures.
CO5 - Compare and contrast Array based and Link based applications of typical data structures such As Stacks and Queues.
CO6 - Design applications and justify use of specific linear data structures for various applications.

SCS1314	DATA COMMUNICATION AND COMPUTER NETWORKS	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT 1 DATA COMMUNICATION 9 Hrs.

Introduction to data communication - Network protocols & standards - Line configuration - Topology - Transmission mode - Categories of networks - OSI model - Layers of OSI model - TCP/IP Model - Transmission media- Guided media - Unguided media.

UNIT 2 DATALINK LAYER 9 Hrs.

Link layer services - Framing - Flow Control - Error control- Medium Access Control - Ethernet CSMA/CD - Token Ring - FDDI - Token Passing- Wireless LAN - CSMA/CA

UNIT 3 NETWORK LAYER 9 Hrs

Circuit Switching - Packet Switching - Routing - Distance Vector Routing - Link State Routing - Addressing- Subnetting - IPV4- IPV6- ARP - RARP - ICMP - IGMP - DHCP.

UNIT 4 TRANSPORT LAYER 9 Hrs.

TCP- UDP - Connection Management- Flow Control - Retransmission - Congestion Control - Detection and Avoidance.

UNIT 5 APPLICATION LAYER 9 Hrs.

Networking Devices - Repeaters - Switches - Bridges - Routers - Gateways- Domain Name System - FTP - WWW and HTTP - SNMP - SMTP - POP3 - IMAP - MIME.

Max. 45 Hours

COURSE OUTCOMES

On completion of the course, student will be able to:

CO1: Understand and explain the concept of Data Communication and networks, layered architecture and their applications.
CO2: Evaluate data communication link considering elementary concepts of data link layer protocols for error detection and correction.
CO3: Apply various network layer techniques for designing subnets and supernets and analyse packet flow on basis of routing protocols.
CO4: Analyze and Set up protocol designing issues for Communication networks.
CO5: Estimate the congestion control mechanism to improve quality of service of networking application
CO6: Understand and design application layer protocols and internet applications such as network security, Email and DNS,

TEXT / REFERENCE BOOKS

1. Behrouz A. Fourouzan, “Data Communication and Networking”, McGraw-Hill Education India Pvt. Ltd - New Delhi.
2. William Stallings, Data and Computer Communications (8th ed.), Pearson Education, 2007.
3. P.C. Gupta, Data Communications and Computer Networks, Prentice-Hall of India, 2006.
4. Andrew S. Tanenbaum, “Computer Networks”, Fourth Edition, Pearson.
5. L. L. Peterson and B. S. Davie, Computer Networks: A Systems Approach (3rd ed.), Morgan Kaufmann, 2003.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100 Exam Duration : 3 Hrs.

PART A : 10 questions of 2 marks each- No choice 20 Marks

PART B : 2 questions from each unit of internal choice, each carrying 16 marks 80 Marks

SITA1401	DATA COMMUNICATION AND COMPUTER NETWORKS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To understand the network architecture and protocols supported for connecting devices in a network.
- To gain the knowledge of framing in data link layer.
- To learn the functions of network layer and the routing strategies with their associated protocols.
- To introduce the protocols used for end to end packet delivery in transport layer.
- To understand the application layer protocols.

UNIT 1 DATA COMMUNICATION 9 Hrs.

Introduction to data communication - Network protocols & standards - Line configuration - Topology -Transmission mode - Categories of networks - OSI model - Layers of OSI model - TCP/IP Model – Transmission media - Guided media - Unguided media- Switching-Circuit Switching - Packet Switching.

UNIT 2 DATALINK LAYER 9 Hrs.

Error detection and correction– Line Discipline - Flow Control - Error control- Medium Access Control – Ethernet - CSMA/CD - Wireless LAN - CSMA/CA – IEEE 802.11, Bluetooth.

UNIT 3 NETWORK LAYER 9 Hrs.

Routing - Distance Vector Routing - Link State Routing - Addressing-Subnetting - IPV4- IPV6- ARP - RARP - ICMP - IGMP - DHCP.- Networking Devices - Repeaters - Switches - Bridges - Routers – Gateways.

UNIT 4 TRANSPORT LAYER 9 Hrs.

TCP- UDP - Connection Management - Flow Control - Retransmission - Congestion Control – Leaky bucket algorithm - Detection and Avoidance.

UNIT 5 APPLICATION LAYER 9 Hrs.

Message Handling System(MHS) – FTAM – Virtual Terminal (VT) – Domain Name System - FTP - WWW and HTTP - SNMP - SMTP – POP3 - IMAP – MIME -TELNET

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Describe the architecture of a computer network and explain how each device in a network communicates with each other.
CO2 - Explain packet collision in the link layer and how they are corrected.
CO3 - Design a routing protocol in a network and demonstrate how data packet will reach to the intended destination. CO4 - Implementation of flow control mechanism to regulate the traffic in a network.
CO5 - Describe IP addressing and explain its functions.
CO6 - Recognize various application layer protocols and its functions.

TEXT / REFERENCE BOOKS

1. Behrouz A. Fourouzan, “Data Communication and Networking”, Fifth Edition, McGraw-Hill Education India Pvt. Ltd - New Delhi., 2013.
2. William Stallings, Data and Computer Communications (8th ed.), Pearson Education, 2007.
3. P.C. Gupta, Data Communications and Computer Networks, Prentice-Hall of India, 2006.
4. Andrew S. Tanenbaum, “Computer Networks”, Fifth Edition, Pearson, 2011.
5. L. L. Peterson and B. S. Davie, Computer Networks: A Systems Approach (3rd ed.), Morgan Kaufmann, 2003.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 Exam Duration: 3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice 20 Marks
PART B: 2 Questions from each unit of internal choice, each carrying 16 marks 80 Marks

SCS1206	DESIGN AND ANALYSIS OF ALGORITHM	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT 1 INTRODUCTION **9 Hrs.**

Fundamentals of Algorithmic Problem Solving - Time Complexity - Space complexity with examples - Growth of Functions - Asymptotic Notations: Big Oh, Little Oh, Omega, Theta - Properties - Complexity Analysis Examples - Performance measurement - Instance Size, Test Data, Experiment setup.

UNIT 2 MATHEMATICAL FOUNDATIONS **9 Hrs.**

Solving Recurrence Equations - Substitution Method - Recursion Tree Method - Master Method - Best Case - Worst Case - Average Case Analysis - Sorting in Linear Time - Lower bounds for Sorting - Counting Sort - Radix Sort - Bucket Sort

UNIT 3 DESIGN OF ALGORITHMS - BRUTE FORCE AND DIVIDE-AND-CONQUER **9 Hrs.**

Brute Force - Travelling Salesman Problem - Knapsack Problem - Assignment Problem - Closest Pair and Convex Hull Problems - Divide and Conquer Approach - Binary Search - Quick Sort - Merge Sort - Strassen's Matrix Multiplication.

UNIT 4 DESIGN OF ALGORITHMS - DYNAMIC PROGRAMMING AND GREEDY APPROACH **9 Hrs.**

Dynamic Programming - Floyd Warshall Algorithm - Optimal Binary Search Algorithms - Greedy Approach - Huffman Code - Kruskal's Algorithm - Prim's Algorithm - Dijkstra's Algorithm

UNIT 5 DESIGN OF ALGORITHMS - BACKTRACKING AND BRANCH AND BOUND **9 Hrs.**

Backtracking - 8 Queens - Hamiltonian Circuit Problem - Branch and Bound - Assignment Problem - Knapsack Problem - Travelling Salesman Problem - NP Complete Problems - Clique Problem - Vertex Cover Problem

Max. 45 Hours

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 : Analyze the efficiency of an algorithm based on time and space complexity.
CO2 : Apply mathematical principles for recursive analysis.
CO3 : Construct algorithms based on brute force and divide and conquer techniques and its real time applications.
CO4 : Design Solutions using dynamic and greedy approaches for real world problems.
CO5 : Design a solution by using Branch and Bound and backtracking techniques.
CO6 : Develop a solution for any given problem by choosing appropriate algorithm.

TEXT / REFERENCE BOOKS

1. Sartaj Sahni, "Data Structures, Algorithms, and Applications in C++", McGraw Hill, 2n d Edition, 2005.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
3. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.
4. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
5. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009.
6. Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs.**

PART A: 2 Questions from each unit, each carrying 2 marks 20 Marks

PART B: 2 Questions from each unit with internal choice, each carrying 16 marks 80 Marks

SCSA1403	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To analyze the performance of algorithms under various scenarios.
- To learn mathematical background for algorithm analysis & solving the recurrence equations.
- To learn various algorithm design techniques.
- To understand and apply the algorithms.

UNIT 1-INTRODUCTION 9 Hrs.

Fundamentals of Algorithmic Problem Solving - Time Complexity - Space complexity with examples - Growth of Functions - Asymptotic Notations: Need, Types - Big Oh, Little Oh, Omega, Theta - Properties - Complexity Analysis Examples - Performance measurement - Instance Size, Test Data, Experimental setup.

UNIT 2-MATHEMATICAL FOUNDATIONS 9 Hrs.

Solving Recurrence Equations - Substitution Method - Recursion Tree Method - Master Method - Best Case - Worst Case - Average Case Analysis - Sorting in Linear Time - Lower bounds for Sorting: - Counting Sort - Radix Sort - Bucket Sort.

UNIT 3-BRUTE FORCE AND DIVIDE-AND-CONQUER 9 Hrs.

Brute Force:- Travelling Salesman Problem - Knapsack Problem - Assignment Problem - Closest Pair and Convex Hull Problems - Divide and Conquer Approach:- Binary Search - Quick Sort - Merge Sort - Strassen's Matrix Multiplication.

UNIT 4-GREEDY APPROACH AND DYNAMIC PROGRAMMING 9 Hrs.

Greedy Approach:- Optimal Merge Patterns- Huffman Code - Job Sequencing problem- -- Tree Vertex Splitting Dynamic Programming:– Dice Throw-- Optimal Binary Search Algorithms.

UNIT 5-BACKTRACKING AND BRANCH AND BOUND 9 Hrs.

Backtracking:- 8 Queens - Hamiltonian Circuit Problem - Branch and Bound - Assignment Problem - Knapsack Problem:- Travelling Salesman Problem - NP Complete Problems - Clique Problem - Vertex Cover Problem .

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 - Determine the suitable algorithmic design technique for a given problem. CO2 -
Identify the limitations of algorithms in problem solving.
CO3 - Analyze the efficiency of the algorithm based on time and space complexity.
CO4 - Implement asymptotic notations to analyze worst-case and average case running times of algorithms.
CO5 - Interpret the fundamental needs of algorithms in problem solving.
CO6 - Describe the various algorithmic techniques and its real time applications.

TEXT / REFERENCE BOOKS

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms David E. Goldberg, "Genetic Algorithm In Search Optimization And Machine Learning" Pearson Education India, 2013.
3. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson Education, 2012.
4. Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Second Edition, Universities Press, 2007.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks:100 **Exam Duration: 3 Hrs.**

PART A: 10 Question of 2 marks each – No choice **20 Marks**
PART B: 2 Questions from each unit of internal choice, each carrying 16 marks **80 Marks**

SCS4304	NETWORKING LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

SUGGESTED LIST OF EXPERIMENTS

1. Creation of Date Server, and also print the client's address on the Server.
2. Creation of UDP Server
3. Creation of Chat Program
4. Calculation of Checksum for packet data and file.
5. Program to implement HTTP Protocol
6. Creation of Mail Client 7. Creation of Web Server
8. Creation of TELNET Protocol
9. Implement FTP using TCP
10. WiFi Simulation
11. WiTotal Simulation
12. Router Configuration

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 : Comprehend the different aspects of client-server networks and User Datagram Protocol (UDP) server models.
CO2 : Make use of HTTP protocol over the internet and examine the formation, transmission in the web servers..
CO3 : Develop a web server with the open source software
CO4 : Implement File Transfer Protocol to communicate with remote server.
CO5 : Design access points for a location using wi-fi Simulation.
CO6 : Create and configure Router to communicate one network to another network.

SITA2401	NETWORKING LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES

- To understand how to implement socket programming.
- To be familiar with simulation tools.
- To understand how to create applications using TCP and UDP.
- To gain Knowledge on various networking protocols.

SUGGESTED LIST OF EXPERIMENTS

1. Study of Socket Programming and Client – Server model.
2. Creation of Date Server, and also print the client's address on the Server.
3. Applications using TCP Sockets like.
   a. Echo client and echo server b. Chat c. File Transfer
4. Applications using TCP and UDP Sockets like.
   a. DNS b. SNMP c. File Transfer
5. Calculation of Checksum for packet data and file.
6. Program to implement HTTP Protocol.
7. Implementation of Stop and Wait Protocol and Sliding Window Protocol.
8. Simulating PING and TRACEROUTE commands.
9. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
10. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
    i. Link State routing ii. Flooding iii. Distance vector
11. WiFi Simulation.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 - Analyze the performance of the protocols in different layers. CO2 -
Implement various protocols.
CO3 - Design with simulation tools.
CO4 - Analyze various routing algorithms. CO5 -
Construct Wi-Fi model.
CO6 - Understand socket programming.