Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 60009

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025
Third Semester
Computer Science and Engineering
U23IT302 - DATA STRUCTURES
(Common to EEE, ECE, IT, CST and AI&DS)
(Regulation 2023)

Time : Three Hours | Maximum : 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Define an Abstract Data Type (ADT). List its significance in data structure design.	2	K1	CO1
2.	Differentiate singly linked list with doubly linked list.	2	K2	CO1
3.	Compare stacks with queues based on its working principle.	2	K1	CO2
4.	Define balancing symbols in data structures. State how they are checked using stacks.	2	K2	CO2
5.	In a binary tree, what do you mean by depth of a tree?	2	K2	CO3
6.	What is a B+ tree?	2	K1	CO3
7.	Differentiate between a tree and a graph with respect to their structure and properties.	2	K2	CO4
8.	State the process of topological ordering in graphs.	2	K2	CO4
9.	Compare linear search with binary search.	2	K2	CO5
10.	Define hashing and list its key properties.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Elaborate the process of determining the address of an element in an array A of size N, if the base address is BA.	5	K1	CO1
		ii.	Given a Singly linked list pointed to by the pointer FIRST, write a procedure in C to swap the elements at position p and NEXT(p) in the list.	8		
			(OR)			
	b)	i.	Write a program in C to delete an element in the i^{th} position in a Double linked list.	8	K1	CO1
		ii.	Devise a code to perform insertion at end in a Circularly linked list.	5		
12.	a)		Explain how a stack can be used for conversion of input to postfix expression and its evaluation. Show the contents of stack during each step of conversion. Infix notation: (A-B)*[C/(D+E)+F]	13	K2	CO2
			(OR)			
	b)	i.	Demonstrate the Queue ADT implementation using linked list.	6	K2	CO2
		ii.	Explain the concept of priority queues and its operations. Discuss how priority queues are implemented and highlight their applications in real-world scenarios.	7		
13.	a)	i.	Write a C code to construct a Binary search tree for the given set of inputs. Traverse the Binary tree using inorder and print the visited values.	9	K3	CO3
		ii.	Trace your code for the following input sequence: 50,30,70,40,20,10,25,60	4		
			(OR)			
	b)	i.	Explain the characteristics and balancing properties of an AVL tree with an example. Include the process of maintaining balance after insertion or deletion.	7	K2	CO3
		ii.	Define a Splay Tree and describe the different operations performed on it with suitable examples.	6		
14.	a)		Enumerate the various graph traversal methods. Present the algorithms for these traversals and demonstrate any one method with an illustrative example.	13	K3	CO4
			(OR)			

	b)	Using a sample graph, explain the working of Dijkstra algorithm. Include the step-by-step procedure, algorithm, and intermediate results. Analyze the time complexity.	13	K4	CO4
15.	a)	Develop a C program for Quick Sort. Sort the following values using Quick Sort. 38, 27, 43, 3, 9, 82, 10	13	K3	CO5
		(OR)			
	b)	Describe the working principles of any four hash functions in detail with suitable examples and discuss their advantages and limitations. Mention the strategies to apply for avoiding collision.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	Given two polynomials P1 = 5 + 0x^1 + 10x^2 + 6x^3 and P2 = 1 + 2x^1 + 4x^2 Represent them using linked lists. Develop a C program to perform the addition of two polynomials and store the result in P3.	10	K1	CO1
		ii.	Design and explain an algorithm to rotate a list by a specified number of elements. Include stepwise procedure with an example.	5		
			(OR)			
	b)		For the given graph, determine the Minimum Spanning Tree (MST) using Kruskal's and Prim's algorithm. Illustrate the step-by-step procedure, show the intermediate edges selected, and compute the total cost.	15	K3	CO4