

CBCS SCHEME

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BCS304

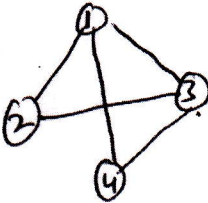
Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Data Structures and Applications

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	Define Data Structure. Explain with neat diagram different types of data structure with examples. What are the primitive operations that can be performed?	10	L2	CO1
	b.	Define structure and union? Explain how they are different from each other, with suitable example.	5	L2	CO1
	c.	What do you mean by pattern matching? Outline Kruth, pattern matching algorithm.	5	L2	CO1
OR					
Q.2	a.	Define stack. Give the implementation of push () POP () and Display () functions by considering its empty and full conditions.	7	L2	CO1
	b.	Write an algorithm to evaluate a postfix expression and apply the same for the given postfix expression 6, 2, 13, -4, 2, ×, +	7	L3	CO1
	c.	Write the postfix form of the following using stack, (i) $A * (B * C + D * E) + F$ (ii) $(A + (B * C) / (D - E))$	6	L3	CO1
Module - 2					
Q.3	a.	What are the disadvantages of ordinary queue? Discuss the implementation of circular queue.	8	L2	CO2
	b.	Write a note on multiple stacks and priority queue.	6	L2	CO2
	c.	Define Queue. Discuss how to represent Queue using dynamic arrays.	6	L2	CO2
OR					
Q.4	a.	What are Linked list? Explain the different types of Linked List with neat diagram.	4	L2	CO2
	b.	Give the structure definition for Singly Linked List (SSL). Write a C function to, (i) Insert an element at the end of SSL. (ii) Delete at node at the end of SSL.	8	L3	CO2

	c.	Write a C function to add two polynomials show the Linked List representation of below two polynomials $p(x) = 3x^{14} + 2x^7 + 1$ $q(x) = 8x^{14} + 5x^5 + 3x^2 + 2$	8	L3	CO2
Module – 3					
Q.5	a.	Write a C-function for the following operation on doubly Linked List (DLL) : (i) Addition of a DLL node. (ii) Concatenation of two DLL.	8	L3	CO3
	b.	Write a C-function for the following operations on circular Linked List (i) Inserting at the front of a List. (ii) Find the number of nodes in circular list.	8	L3	CO3
	c.	Represent the given Sparse matrix using linked list representation. $A = \begin{bmatrix} 2 & 0 & 0 & 0 \\ 4 & 0 & 0 & 3 \\ 0 & 0 & 0 & 0 \\ 7 & 0 & 1 & 1 \\ 0 & 0 & 6 & 0 \end{bmatrix}$	4	L3	CO3
OR					
Q.6	a.	Explain the different types binary tree representation with example.	8	L3	CO3
	b.	Define Threaded Binary tree. Discuss in threaded binary tree.	4	L3	CO3
	c.	Discuss Inorder, preorder, postorder and level order traversal with suitable recursive function for each.	8	L2	CO3
Module – 4					
Q.7	a.	Write a function to perform the following operations on Binary Search Tree (BST): (i) Inserting on element into BST. (ii) Recursive search of a BST.	8	L3	CO4
	b.	Discuss selection Trees with suitable example.	8	L2	CO4
	c.	Explain transforming a forest into a binary tree with an example.	4	L2	CO4
OR					
Q.8	a.	Define graph. Show the adjacency matrix and adjacency. List representation of the graph given below.  Fig. Q8 (a)	6	L3	CO4

	b.	Define the following Terminologies with examples : (i) Vertex (node) (ii) Self loop (iii) Weighted graph (iv) Parallel edges	7	L1	CO4
	c.	Explain in detail elementary graph operations.	7	L1	CO4
Module – 5					
Q.9	a.	What is collision? What are the methods to resolve collision? Explain linear probing with example.	8	L2	CO5
	b.	Explain in details about static and dynamic hashing.	6	L2	CO5
	c.	Discuss Leftist Trees with an example.	6	L2	CO5
OR					
Q.10	a.	Explain different types of HASH functions with example.	6	L2	CO5
	b.	Discuss different types of rotations with suitable examples.	6	L3	CO5
	c.	Define Red-Black Tree, Splay tree. Discuss the method to insert an element into Red-Black tree.	8	L2	CO5
