

CBCS SCHEME

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BCS304

Third Semester B.E./B.Tech. Degree Examination, June/July 2025 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. With a neat diagram, explain the classification of data structure.		5	L1	CO1
	b.	Explain dynamic memory allocation functions with suitable examples.		5	L2	CO1
	c.	For the given sparse matrix draw the triplet representation and also draw the transpose of resultant triplet. <div> $A = \begin{bmatrix} 15 & 0 & 0 & 22 & 0 & -15 \\ 0 & 11 & 3 & 0 & 0 & 0 \\ 0 & 0 & 0 & -6 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 91 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 28 & 0 & 0 & 0 \end{bmatrix}$ </div>	10	L3	CO1	
OR						
Q.2	a.	Define stack. With suitable example write the array representation of stack.		5	L1	CO2
	b.	Write a C functions to implement push(), pop() and display() operations for stack using array.		5	L2	CO2
	c.	Translate the following infix expressions to postfix form using stack: i) ((A * B) + C) / D ii) A * B * C + D		10	L3	CO2
Module – 2						
Q.3	a.	What are the disadvantages of linear queue?		5	L1	CO2
	b.	With suitable example discuss the representation of linear queue with array.		5	L2	CO2
	c.	Develop functions in C to implement insertion, deletion and display operations on circular queue of integers.		10	L3	CO2
OR						
Q.4	a.	What is linked list? With suitable examples explain different types of linked lists.		5	L1	CO3
	b.	Write a C functions to implement a stack of integers using a Singly Linked List (SLL).		5	L2	CO3

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- c. Develop a functions in C for the following operations on singly linked list of integers:
- Insert a element at end of SLL
 - Delete a element at end of SLL
 - Concatenation of two SLL

10 L3 CO3

Module – 3

- Q.5 a. Write a structure definition for Doubly Linked List (DLL) of integers. What are the advantages of DLL over SLL?

4 L1 CO3

- b. Develop a C functions for the following operations on DLL of integers:
- Insert a node at front of DLL
 - Delete a node at end of DLL

10 L3 CO3

- c. For the given sparse matrix design the linked list representation.

$$A = \begin{bmatrix} 2 & 0 & 0 & 0 \\ 4 & 0 & 0 & 3 \\ 0 & 0 & 0 & 0 \\ 8 & 0 & 0 & 1 \\ 0 & 0 & 6 & 0 \end{bmatrix}$$

6 L4 CO3

OR

- Q.6 a. Define binary tree. Write array and linked list representation for given binary tree.

4 L1 CO4

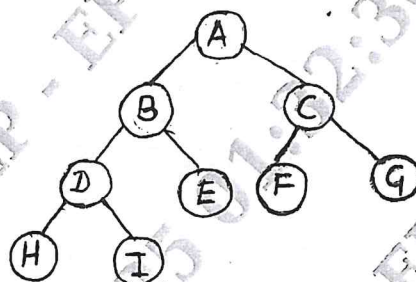


Fig.Q.6(a)

- b. Develop recursive C functions for inorder, preorder and postorder traversal of a binary tree. Find inorder, preorder and postorder traversals for the given binary tree.

10 L3 CO4

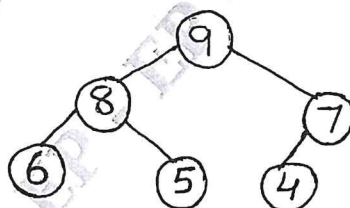
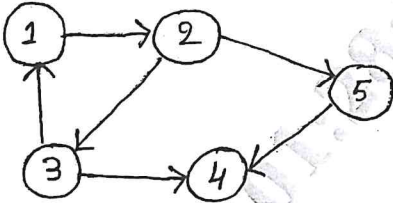
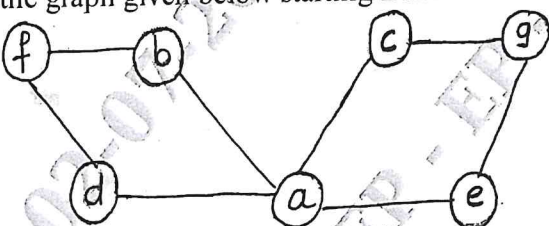


Fig.Q.6 (b)

- c. Design threaded binary tree for the given elements
10, 20, 30, 40, 50

6 L4 CO4

Module – 4

Q.7	a. Write a adjacency matrix and adjacency linked list representation for following given graph.	6	L1	CO4
 <p>Fig.Q.7(a)</p>				
		8	L4	CO4
	b. Develop a C function to traverse a graph using Depth First Search (DFS). Apply DFS for the graph given below starting from C.	8	L4	CO4
 <p>Fig.Q.7(b)</p>		6	L4	CO4
Q.8	a. Define forest data structure. With a suitable example write a procedure to transform forest into binary tree.	6	L1	CO4
	b. For a given data design a binary search tree. Apply inorder, preorder and postorder traversals on resultant binary search tree. 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2	8	L4	CO4
	c. Develop a C functions to perform the following operations on Binary Search Tree (BST): i) Inserting an element into BST ii) Recursive search of given key element on BST.	6	L4	CO4
OR				
Q.9	a. Explain hashing with suitable example. Explain different types of hashing functions in details.	10	L2	CO5
	b. Explain static hashing and dynamic hashing in detail.	10	L2	CO5
OR				
Q.10	a. Write a note on: Leftist trees Optimal binary search trees Priority queues.	6 7 7	L2 L2 L2	CO5 CO5 CO5
