CBCS SCHEME

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BCS304

Third Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.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 Structures. Explain the classification of data structures with a neat diagram.	8	L2	CO1
	b.	Write a C Functions to implement pop , push and display operations for stacks using assays.	7	L2	CO2
	c.	Differentiate structures and unions.	5	L2	CO1
		OR			
Q.2	a.	Write an algorithm to evaluate a postfix expression and apply the same for the given postfix expression. 6 2 / 3 – 4 2 * +.	7	L3	CO2
	b.	Explain the dynamic memory allocation function in detail.	8	L2	CO1
	c.	What is Sparse matrix? Give the triplet form of a given matrix and find its transpose $A = \begin{bmatrix} 0 & 0 & 3 & 0 & 4 \\ 0 & 0 & 5 & 7 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 6 & 0 & 0 \end{bmatrix}$	5	L3	CO1
		Module – 2			
Q.3	a.	Define Queue. Discuss how to represent a queue using dynamic assays.	8	L2	CO2
	b.	Write a C Function to implement insertion ( ) , deletion ( ) and display ( ) operations on circular queue.	6	L3	CO2
	c.	Write a note on Multiple stacks and queues with suitable diagram.	6	L2	CO2
		OR			
Q.4	a.	What is a linked list? Explain the different types of linked list with neat diagram.	6	L2	CO3
	b.	Write a C function for the following on singly linked list with example : i) Insert a node of the beginning ii) Delete a node at the front iii) Display.	8	L3	CO3
	c.	Write the C function to add two polynomials.	6	L2	CO3

		Module – 3			
Q.5	**a.**	Discuss how binary trees are represented using : i) Assay ii) Linked list.	**6**	**L2**	**CO4**
	b.	Define Threaded binary tree. Discuss In – threaded binary tree.	**6**	**L2**	**CO4**
	c.	Write the C function for the following additional list operation : i) Inverting Singly linked list ii) Concatenating Singly linked list.	**8**	**L3**	**CO3**
		OR			
Q.6	**a.**	Discuss Inorder , Preorder , Postorder and Level order traversal with suitable function for each.	**8**	**L3**	**CO4**
	b.	Define the threaded binary tree. Construct threaded binary tree for the following element : A, B, C, D, E, F, G, H, I.	**6**	**L2**	**CO4**
	c.	Write a C function for the following : i) Insert a node at the beginning of doubly linked list. ii) Deleting a node at the end of the doubly linked list.	**6**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Define Forest , Transform the forest into a binary tree and traverse using inorder , preorder and postorder traversal with an example.	**8**	**L1**	**CO5**
	b.	Define Binary search tree. Construct a binary search tree for the following elements : 100 , 85 , 45 , 55 , 120 , 20 , 70 , 90 , 115 , 65 , 130 , 145.	**6**	**L2**	**CO5**
	c.	Discuss Selection tree with an example.	**6**	**L2**	**CO5**
		OR			
Q.8	**a.**	Define Graph. Explain adjacency matrix and adjacency list representation with an example.	**8**	**L2**	**CO5**
	b.	Define the following terminology with example : i) Digraph ii) Weighted graph iii) Self loop iv) Connected graph.	**6**	**L2**	**CO5**
	c.	Briefly explain about Elementary graph operations.	**6**	**L3**	**CO5**
		Module – 5			
Q.9	**a.**	Explain in detail about Static and Dynamic Hashing.	**6**	**L2**	**CO5**
	b.	What is Collision? What are the methods to resolve collision?	**7**	**L2**	**CO5**
	c.	Explain Priority queue with the help of an examples.	**7**	**L2**	**CO5**
		OR			
Q.10	**a.**	Define Hashing. Explain different hashing functions with suitable examples.	**12**	**L2**	**CO5**
	b.	Write short note on : i) Leftist trees ii) Optimal binary search tree.	**8**	**L3**	**CO5**

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