



First Semester MCA Degree Examination, June/July 2024
Data Structures

Max. Marks: 100

Module – 1			M	L	C
Q.1	a.	What are Data Structures? How would you classify them?	6	L2	CO1
	b.	Explain the basic operations on stack data structure.	6	L2	CO1
	c.	Convert the following infix expression to postfix form using a stack: $p + q * r \wedge s - (t * u - v) - w.$	8	L3	CO1
OR					
Q.2	a.	What are the operations that can be performed on data structures in general? Explain each of them.	6	L1	CO1
	b.	Write a program to convert an Infix expression to postfix form using stack.	8	L3	CO1
	c.	Evaluate the following post fix expression using stack: $5\ 3\ 4\ *\ 5\ 6\ 2\ /\ -\ *\ +$	6	L3	CO1
Module – 2					
Q.3	a.	What is Recursion? What are its merits and demerits?	5	L1	CO2
	b.	What is a queue? Write C functions to implement add Q and delete Q operations.	10	L3	CO1
	c.	What is a circular queue? What are its advantages over an ordinary queue?	5	L2	CO2
OR					
Q.4	a.	Write a recursive function in C to calculate the factorial of a given number. Trace your function to calculate the factorial of 4.	6	L3	CO1
	b.	What are priority queues? What are its uses?	5	L1	CO2
	c.	Give a recursive definition of tower of Hanoi problem. Using your definition give the steps to move 3 disks.	9	L3	CO2
Module – 3					
Q.5	a.	What is Linked list? What are its advantages and disadvantages?	6	L2	CO3
	b.	Explain different types of Linked lists.	9	L2	CO3
	c.	Explain the getnode() and freenode() operations.	5	L2	CO3
OR					
Q.6	a.	Write C functions to delete a node from i) beginning ii) end and iii) a given node of a singly linked list and explain the steps.	10	L3	CO3

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b.	What do you mean by static and dynamic memory allocation? Explain some commonly used dynamic memory management functions.	10	L2	CO4
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Module – 4

Q.7	a.	Define: Binary Tree. Explain important properties of binary trees.	10	L2	CO3
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b.	Compare the preorder, inorder and postorder traversal algorithms of binary trees. Give the three traversals of the following tree:	10	L4	CO3
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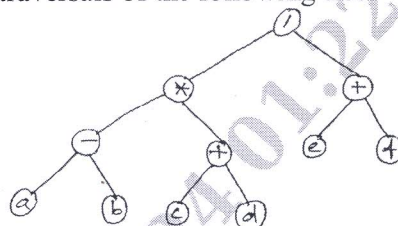


Fig.Q.7(b)

OR

Q.8	a.	What is a binary search tree? What are its applications? Give an algorithm to search for an element in a binary search tree.	8	L3	CO3
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b.	Along with examples, explain the steps to delete an element from a binary search tree for each of the following cases: i) The element is a leaf node ii) It has one child node iii) It has two child nodes.	7	L3	CO3
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c.	With an example, explain how a binary tree can be represented using an array.	5	L2	CO3
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Module – 5

Q.9	a.	Define Graph. Explain how graphs can be represented using adjacency matrix and adjacency lists.	8	L2	CO3
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b.	Explain BFS graph traversal algorithm.	4	L2	CO3
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c.	What is Hashing? Write a short note on hash table organization.	8	L1	CO4
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OR

Q.10	a.	For the given undirected graph: i) Give the adjacency matrix representation. ii) Give the adjacency list representation. iii) List the degree of each vertex. iv) Do a depth first search starting from vertex 2.	10	L3	CO3
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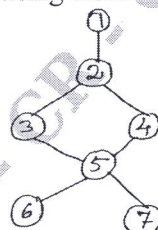


Fig.Q.10(a)

b.	What is Radix sort? Explain how the algorithm works by sorting the following elements using radix sort: 632, 198, 058, 005, 279, 323, 762, 096, 901, 123.	10	L3	CO4
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