CBCS SCHEME

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22MCA13

First Semester MCA Degree Examination, Jan./Feb. 2023
Data Structures

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 classification of data structures with example.	10	L2	CO1
	b.	Explain the two types of representation of a stack with neat diagram.	4	L2	CO1
	c.	Write an algorithm to convert a valid infix expression into postfix expression.	6	L3	CO2
		OR			
Q.2	a.	What is stack? Explain the stack operations push and POP with C functions.	8	L3	CO1
	b.	Convert the following expression from infix to postfix: i) $(A + B) * C - D \wedge E$ ii) $A + B / (D + E) * F \wedge G$	4	L3	CO2
	c.	Write an algorithm to evaluate post fix expression using stack.	8	L3	CO2
		Module – 2			
Q.3	a.	What is recursion? Write C program to find GCD of 3 Nos using recursion.	8	L3	CO2
	b.	What is Queue? Write C program to implement queue operations Enqueue, Dequeue and display using array as datastructure.	12	L3	CO3
		OR			
Q.4	a.	Explain queue varients with neat diagram.	4	L2	CO3
	b.	Implement circular queue operations Insert, Remove and Display using C program.	10	L3	CO3
	c.	Write a C program to find factorial of a number using recursion.	6	L3	CO3
		Module – 3			
Q.5	a.	What is DMA? Discuss different types of memory management functions in C.	10	L2	CO2
	b.	Write functions in C to demonstrate the following operations on singly linked list: i) Insert at front ii) Remove node from front iii) Insert node at end.	10	L3	CO3

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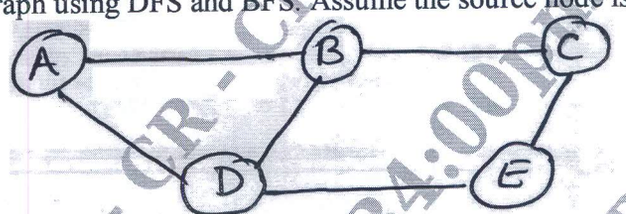
		OR			
Q.6	**a.**	Explain getNode( ) and freeNode( ) operation with C code snippet.	**6**	**L2**	**CO3**
	b.	Write a note on header nodes in linked list with neat diagram.	**4**	**L2**	**CO3**
	c.	Write C code snippet to demonstrate application of linked list as stack for implementing push and POP operations.	**10**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	What is binary tree? Write note on threaded binary tree with neat diagram.	**10**	**L2**	**CO3**
	b.	Construct the binary search tree for the data 27, 5, 36, 47, 19, 250, 21, 44, 6. Perform preorder, Inorder and Postorder traversal for the constructed BST.	**10**	**L3**	**CO4**
		OR			
Q.8	**a.**	Write a note on Array and linked representation of binary tree.	**8**	**L3**	**CO3**
	b.	Write recursive function for the following operations on binary search tree: i) Insert key in BST ii) Search key in BST.	**12**	**L3**	**CO3**
		Module – 5			
Q.9	**a.**	Define DFS and BFS. Obtain the difference between both. Traverse the following graph using DFS and BFS. Assume the source node is B.  Fig.Q.9(a)	**10**	**L3**	**CO4**
	b.	What is radix sort? Sort the following numbers using radix sort and show the table of various passes of radix sort. List : 326, 453, 608, 835, 751, 435, 704, 690.	**10**	**L3**	**CO4**
		OR			
Q.10	**a.**	What is a graph? Explain array representation of graph with neat diagram.	**4**	**L2**	**CO4**
	b.	What is hash collision? Explain various methods for resolving hash collisions.	**6**	**L2**	**CO4**
	c.	Implement the hash function h(k) = k% 10 on the numbers: 10, 34, 23, 56, 14, 89, 65, 94, 53, 21, 63, 33. Show the hash table. Resolve hash clashes using separate chaining method.	**10**	**L3**	**CO4**

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