U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

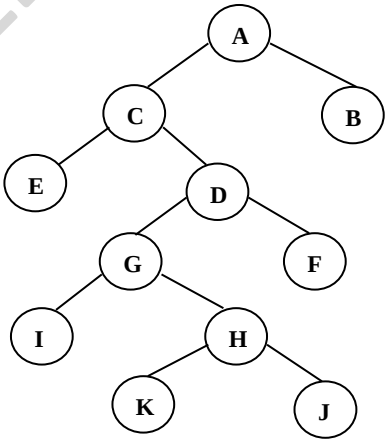
Autonomous Institute Affiliated to VTU

October 2024 Supplementary Examinations

Programme: B.E. **Semester: III**
Branch: CSE(ICB)/CSE(DS)/AI&DS **Duration: 3 hrs.**
Course Code: 23DC3PCDSC **Max Marks: 100**
Course: Data Structures

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

		UNIT - I	CO	PO	Marks
1	a)	With general syntax, explain the purpose of realloc() function in C. Develop a function to allocate memory space dynamically to store the string "BMSCE" and then resize the memory to store the string "B.M.S COLLEGE OF ENGINEERING".	CO1	PO 1	10
	b)	Differentiate linear and non-linear data structures with an example for each.	CO1	PO1	4
	c)	Write a C function that reads and stores the details of 100 students like student id, name, marks for three subjects into a structure and prints the total marks scored by each student.	CO3	PO3	6
		UNIT - II			
2	a)	A node in a Singly Linked List contains the following information with respect to a faculty: name, years of experience. Develop C functions to perform the following operations on this list: **i)** Add a faculty at the beginning of the list. **ii)** Display the details of only those faculty members who have more than 10 years of teaching experience. **iii)** Search for a given faculty name.	CO3	PO3	10
	b)	Differentiate singly linked list and circular singly linked list with an example for each.	CO2	PO2	4
	c)	Write a C function to insert an integer element at a given position in a doubly linked list.	CO3	PO3	6
		OR			
3	a)	Differentiate doubly linked list and circular singly linked list with an example for each.	CO1	PO1	4
	b)	Write a C function to read and store n strings into a singly linked list and search for the existence of a given string. If the string is present, replace the string with its reverse, Otherwise print an appropriate message.	CO3	PO3	10
	c)	Design a C routine to delete middle node in a circular linked list	CO3	PO3	6

			UNIT - III			
	4	a)	Develop a C function to read *n* integers into an array and reverse the array using Stack. Display the contents of the array with suitable messages.	***CO3***	***PO3***	**6**
		b)	Identify limitations of a Simple queue when implemented using an array. Discuss possible ways to overcome this limitation. Write the Pseudocode or C routines for the primitive operations on this alternate queue implementation.	***CO2***	***PO2***	**8**
		c)	Write a C function to evaluate a given postfix expression using stacks.	***CO1***	***PO1***	**6**
			UNIT - IV			
	5	a)	Design a recursive routine to calculate height of a binary tree.	***CO1***	***PO1***	**6**
		b)	Develop C functions to perform the following operations on a Binary Search Tree(BST) i. Display the information of the BST in ascending order. ii. Delete the given key element, if present in the BST.	***CO2***	***PO2***	**8**
		c)	Construct the Binary Search Tree for the following data entered as a sequential set (Do not enter the data if the data already exist in BST). Write the in-order and pre-order tree traversals on the BST constructed. **Data:** E, N, G, I, N, E, E, R, I, N, G	***CO2***	***PO2***	**6**
			OR			
	6	a)	Define Binary search Tree. Develop recursive C functions to perform the following operations on BST. i. Traverse the Binary Tree in Post-order. ii. Count the number of nodes. iii. Print the values of BST in the descending order.	***CO2***	***PO2***	**9**
		b)	Consider the following Binary tree and answer the questions given:  i) Find the Inorder Successor of node G ii) Find the Postorder predecessor of node K iii) Find the sibling of D	***CO2***	***PO2***	**5**
		c)	Given the following Inorder and Postorder traversals, construct the binary tree:	***CO2***	***PO2***	**6**

			Inorder: ECIGKHJDFAB **Postorder:** EIKJHGFGCBA			
			UNIT - V			
	7	a)	What are Red-Black Trees? Mention the rules that every Red-Black tree should follow. Also, compare AVL trees and Red-Black trees.	***CO1***	***PO1***	**8**
		b)	Explain the different rotations performed in AVL trees.	***CO1***	***PO1***	**6**
		c)	Insert the following values sequentially into an initially empty Splay tree: 32,45,22,56,10,50	***CO1***	***PO1***	**6**

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