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

Autonomous Institute Affiliated to VTU

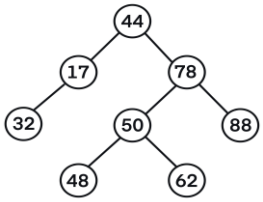
April 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**
Course Code: 23AM3PCDST **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.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

				CO	PO	Marks
			UNIT - I			
1	a)		With diagrammatic representation, give classification of data structures.	CO1	PO1	**4**
	b)		Give a distinction between static and dynamic memory allocation along with syntax and examples.	CO1	PO1	**6**
	c)		Design a program for performing operations on a singly linked list: i. Initialize a list and add an element to the beginning of the list. ii. Remove an element from the end of the singly linked list. iii. Display the list.	CO1	PO2	**10**
			UNIT - II			
2	a)		Elucidate the concept of a stack? Write a Python code employing a list to execute stack operations?	CO1	PO2	**7**
	b)		Build a program to evaluate a postfix expression and apply the same to evaluate AB+CDE-*/, A=5, B=6, C=4, D=3, E=7.	CO1	PO2	**8**
	c)		Solve the following expressions to its equivalent postfix form by showing all steps: (a+b) *d+e/(f+a*d) +c	CO1	PO2	**5**
			UNIT - III			
3	a)		Write a recursive program for creation of binary search tree and its traversals.	CO2	PO2	**7**
	b)		Write a Python program to demonstrate queue operations using singly linked list.	CO2	PO2	**7**
	c)		Elucidate the various classifications of queues with suitable examples for each.	CO2	PO2	**6**
			OR			
4	a)		Write a program to perform front insertion and front deletion in a double ended queue.	CO2	PO2	**8**
	b)		Explain the process of establishing priority in a priority queue and write a python program to illustrate the concept.	CO2	PO2	**8**

		c)	Discuss various applications of queue data structure.	*CO2*	*PO2*	**4**
			UNIT - IV			
	5	a)	Develop a function to find the height of a binary search tree.	*CO3*	*PO2*	**4**
		b)	Build a binary search tree for the following set of data items: 60, 8, 4, 9, 15, 12, 14, 84, 192, 78, 100, 68, 94. Perform inorder, preorder and postorder traversal for the constructed binary search tree?	*CO3*	*PO3*	**10**
		c)	Construct an in-order threaded Binary Search Tree for the following data items:20, 15, 25, 10, 17, 2, 4, 36, 40.	*CO3*	*PO3*	**6**
			UNIT - V			
	6	a)	Illustrate the process of inserting the elements 54 and 12 into the AVL tree. 	*CO3*	*PO2*	**10**
		b)	Elaborate the fundamental principles and key characteristics of a Red-Black Tree. Support with a suitable example.	*CO3*	*PO2*	**10**
			OR			
	7	a)	Construct an AVL tree for the given elements: 64, 1, 14, 26, 13, 110, 98, 85, 12, 61, 70, 50. Balance the tree after each insertion.	*CO3*	*PO3*	**10**
		b)	Illustrate any five splaying in splay tree with an example for each.	*CO3*	*PO2*	**10**

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