Question Paper

Exam Date & Time: 10-May-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SIXTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, APRIL/MAY 2024

OPEN ELECTIVE-FUNDAMENTALS OF DATA STRUCUTRES AND ALGORITHMS [ICT4303]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1)		Write a function to create a Binary Search Tree. Construct a BST for the following elements assuming the elements are generated one after another and as and when an element is generated it must be inserted into the BST. 12, 9, 3, 14, 56, 23, 5, 15, 35, 32, 57, 22, 89	(5)
	A)		
	B)	Show the stack content at each step for the evaluation of infix expression: 9/4-(5+3)*2	(3)
	C)	Differentiate between malloc()and free() operations in C	(2)
2)		Write a complete C program to create a structure called 'electricity-bill' with the following fields: i. Meter number ii.Consumer name iii.Total units iv.Total bill Read value for the fields Meter number, Consumer name and Total units. Write a function to calculate Total bill as per the following criteria: If the Total units consumed is less than or equal to 100, Total bill is calculated as 5 Rs per unit. If it is between 101 and 150, Total bill is calculated a Rs. 5 per unit upto 100+Rs. 8 for the units above 100 If the units consumed is above 150, Total bill is calculated as Rs.5 per unit upto 100+Rs. 8 per unit above 100 and upto 150+Rs.10 per unit above 150. Display all the fields in the 'main' function.	(5)
	A)		
	B)	Write a function to count the total number of odd numbers in a singly linked list.	(3)
	C)	Convert A+(B-C)*D+F/G^(H-J) to prefix.	(2)
3)		Write a function to delete an element from a Binary Search Tree considering all the cases.	(5)
	A)		
	B)	Write functions to perform preorder, inorder and postorder traversal of a given tree.	(3)
	C)	Write state of the circular queue with maximum size 8 after performing each of the following operations: add(10), add(20), add(30), delete(), delete(), add(40), add(50), delete(), add(60), delete(), delete(), add(70). Assume that front and rear are initialised to 0.	(2)
4)		Write different representations of a graph and write functions to traverse a graph using BFS and DFS techniques.	(5)
	A)		
	B)	Write a function to find transpose of a matrix and determine it's time complexity using step count method.	(3)
	C)	Consider an array of size 20 which is used to implement 5 equal sized stacks. How can you divide	(2)

the array to accommodate these stacks? Write top and boundary of all the stacks. Write a C function to perform the same.

5) Write the necessary functions to sort an array of elements using quick sort. Sort the following array using quick sort technique. Show all the steps of first pass. (5)

A) 13, 12, 56, 3, 24, 11, 26, 78, 65, 45, 67

B) Construct an expression tree for the infix expression: (A + B) * C - (D - E) * (F + G). (3)

C) Given the postorder and inorder traversal of a binary tree, construct the unique binary tree. (2)
Post order: G D B E H I F C A
Inorder: B G D A E C H F I

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