02000CS205092002

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third semester B.Tech examinations (S) September 2020

Course Code: CS205

Course Name: DATA STRUCTURES (CS,IT)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

			Marks
1		Differentiate between top down and bottom up approach of problem solving?	(3)
2		What is frequency count? With the help of an example, explain how frequency count is used to calculate the running time of an algorithm?	(3)
3		Compare a Singly linked list and Doubly Linked List.	(3)
4		Write an algorithm/pseudocode to delete a given element k from an array A of n elements? Assume that the element k is always present in A.	(3)

PART B

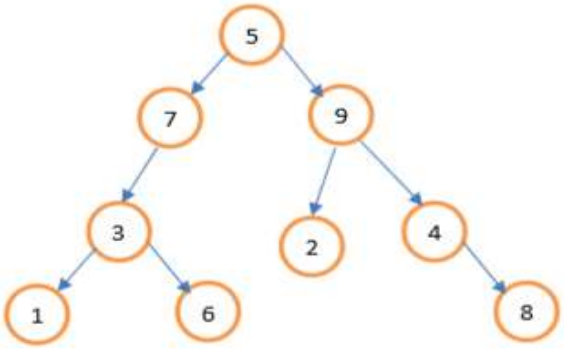
Answer any two full questions, each carries 9 marks.

5	a)	What do you mean by space complexity and time complexity of an algorithm? Write an algorithm/pseudo code for linear search and mention the best case and worst case time complexity of Linear Search algorithm?	(6)
	b)	Explain modular programming with suitable example.	(3)
6	a)	Write an algorithm/pseudocode to delete a node at the end of a doubly linked list.	(4.5)
	b)	Define Big-O notation. Derive the Big – O notation for $5n^3+2n^2+3n$.	(4.5)
7	a)	Write an algorithm/pseudocode to count the number of nodes in a Singly Linked List?	(6)
	b)	How will you represent header node in a Linked List?	(3)

PART C

Answer all questions, each carries 3 marks.

8		What is Polish and Reverse polish notation? Give examples for each?	(3)
9		How can you represent a Binary Tree in memory using array?	(3)
10		Write down the inorder, preorder and postorder traversal of the following binary tree	(3)



11 Evaluate the following postfix expression ABC*D/+ where A=2 B=3 C=4 D=6 (3)

PART D

Answer any two full questions, each carries 9 marks.

12 a) Write an algorithm/pseudocode to convert a given infix expression to postfix expression? Trace the steps involved in converting the given infix expression ((A +B)^C)-((D*C)/F) to postfix expression. (7)

b) What is DEQUEUE? (2)

13 a) Write a non recursive algorithm/pseudocode for pre-order traversal of a Binary Tree. (3)

b) Write an algorithm/pseudocode to perform the following operations on a binary search tree (6)

(i) insert an element k

(ii) search for an element k

14 a) What is a Binary Search Tree (BST)? Show the structure of the binary search tree after adding each of the following values in that order: 10, 25, 2, 4, 7, 13, 11, 22. What is the height of the created binary search tree? (5)

b) How can you represent a multiple stack using array? (4)

PART E

Answer any four full questions, each carries 10 marks.

15 a) Give any two representations of graphs? What do you mean by in-degree and out-degree of a graph? (4)

b) Give algorithm/pseudocode for DFS. Demonstrate DFS using suitable example? (6)

16 a) Design an algorithm/ pseudocode for selection sort. Illustrate the working of selection sort on the following array with 7 elements : 30,45,25,32,55,60,49 (6)

b) What you mean by Open Addressing and Closed Addressing? (4)

17	a)	Explain Merge Sort algorithm/pseudocode with the help of an example? Mention the best case and worst case time complexity of Merge sort algorithm?	(6)
	b)	Why Binary Search algorithm is more efficient that linear search? Depict your answer with suitable example? Mention the time complexity level of two algorithms.	(4)
18	a)	Write an algorithm/pseudocode to sort elements using Heap sort technique? Illustrate the working of Heap sort algorithm on the following input : 35,15,0,1,60	(7)
	b)	Define hashing, hash function and collision.	(3)
19	a)	List any three applications of BFS algorithm.	(3)
	b)	A hash table contains 7 buckets and uses linear probing to solve collision. The key values are integers and the hash function used is key%7. Draw the table that results after inserting in the given order the following values: 16,8,4,13,29,11,22.	(7)
20	a)	With the help of an algorithm/pseudocode and suitable example, explain how would you perform binary search on an array of n elements. Find the time complexity of binary search algorithm.	(7)
	b)	Write short notes on separate chaining.	(3)

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