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Odd Semester Examination-2022

Course Name:Data Structures & Algorithms

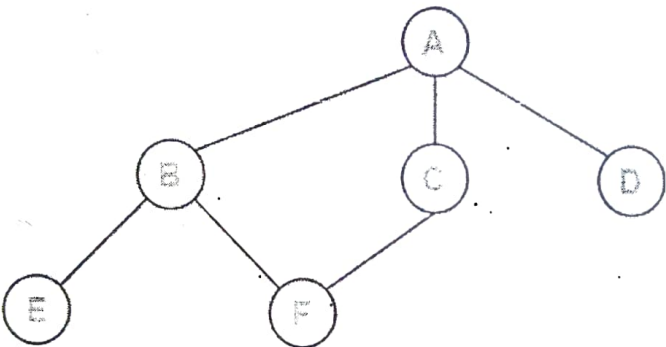
Time: 3 Hours

Paper Code: BTCSE 303/ BTCSEAI 303

Maximum Marks: 75

Follow proper numbering for answering the questions.

Q.No.	Questions	Marks	CO	BL
<u>Section A</u>				
<i>All questions are compulsory.</i>		7×5=35		
1	What is the time complexity of the following code segment? <pre>for(int i=0; i<=n; i++) { for (int j= 1; j<= n/2; j++) { Statements; } }</pre>	5	CO3	L2
2	Write a recursive function for binary search.	5	CO4	L3
3	Define Stack. Convert the expression ((A+ (B - C))/D) into Postfix notation using stack.	5	CO2	L3
4	Differentiate between array & linked list. Is it necessary to check the overflow condition in a linked list? Justify your answer.	5	CO2	L3
5	Draw the binary search tree by inserting the following data arriving in sequence – 80, 55, 16, 116, 38, 75, 124, 100, 45, 200, 98, 16	5	CO6	L1, L2
6	Define maxheap.Construct the min-heap tree for the following elements: 50, 22, 65, 52, 71, 5, 7, 34, 8, 85.Show all the steps.	5	CO1	L3
7	Define : i. In degree and out degree of a vertex in Graph ii. Multigraph iii. Leaf Node iii. Complete binary tree v. Siblings	5	CO3	L2
<u>Section B</u>				
<i>Attempt any Four questions.</i>		4×10=40		
1	i. What are the various types of linked lists? Write a function to add and delete the last node of a doubly linked list. ii. Write a function to split a given singly linked list into two equal halves.	10	CO5	L3
2	i. What are the limitations of a linear queue and how are they removed in a circular queue? Explain the Enqueue operation on circular queue. ii. Using the front and rear pointers, arrive at a formula to calculate	10	CO6	L4

	the number of elements in a circular queue.			
3	i. Write a recursive function for post-order traversal of binary tree. ii. The order of nodes of a binary tree in in-order and pre-order traversal are as follows: In-order: D, H, B, E, A, I, F, C, J, G, K Pre-order: A, B, D, H, E, C, F, I, G, J, K Draw the corresponding binary tree.	10	CO5	L3
4	i. Discuss the concept of quick sort along with its time complexity analysis. ii. Show the trace of the Quick sort algorithm for the following data: 16, 80, 58, 32, 51, 1, 43, 100, 72, 28	10	CO4	L4
5	i. What is an AVL Tree? Explain LR and RL rotations with example. ii. Create an AVL tree by inserting the following numbers in the order in which they are given: 5, 16, 22, 44, 1, 11, 28, 32, 55	10	CO5	L3
6	 i. Represent the given graph using adjacency matrix and adjacency list graph representation techniques. ii. Find the sequence of nodes using Breadth First Search starting from node A or using Kruskal's algorithm for the above graph.	10	CO1	L2

BL-Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3- Applying, 4- Analysing, 5- Evaluating, 6- Creating)