Dr Jyoti Srivastava

4/5/2023 (M)

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(An Institute of National Importance under Ministry of HRD)

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Computer Science & Engineering Department

End Semester Exam-May 2023

Course: B.Tech (76-127)/DD
Subject Code: CS-201
Subject Name: Data Structures
Date: 04/05/2023

Semester: 4th
Duration: 3 Hours
Max Marks: 50
Time: 09:30AM-12:30PM

Note: All questions are compulsory

Q.1 a) Write down the algorithm for Insertion sort. Discuss its best case, average case and worst case analysis in detail. **[5]**

b) How stack can be used to recognize strings like aca, bcb, abcba, bacab, abbcbba? Write the algorithm for it and Show the trace of contents of stack for recognizing the string abcba. **[5]**

Q.2 a) Write an algorithm to merge two sorted link list into one sorted link list without using extra space for merging. **[5]**

b) Write an algorithm for inserting an element into the circular queue. Discuss advantages of Circular Queue over Linear Queue. **[5]**

Q.3 a) The Preorder traversal of a tree is: 7, 1, 0, 3, 2, 5, 4, 6, 9, 8, 10
The inorder traversal of same tree is:
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Construct the tree and write its postorder traversal? **[5]**

b) Draw an AVL tree for the numbers from 1 to 10. After creating the tree delete following numbers one by one:
4, 3
[5]

Follow the order of elements given for insertion and deletion. Show AVL tree after each insertion and deletion. Also mention the type of rotation at each step that is used at the time of insertion and deletion.

P.T.O.

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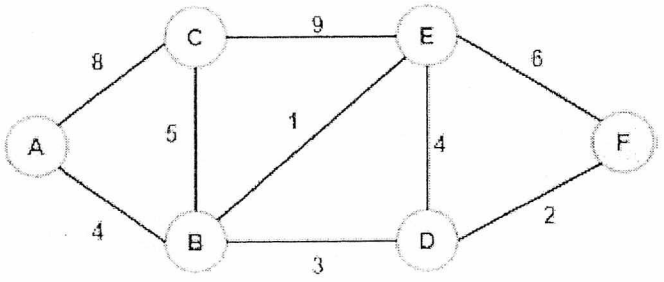
Q.4 a) Find the minimum spanning tree of the graph given below using Kruskal Algorithm. [5]



b) Demonstrate Dijkstra algorithm on graph shown above where the source vertex is A. Write the shortest path and its distance from A to F. [5]

Q.5 a) Write the algorithm for finding the number of internal nodes in a binary tree. [2]

b) Is the sequence 13, 27, 14, 36, 13, 50, 1, 55, 7, 12 a max-heap? Where in a max-heap might the smallest element reside, assuming that all elements are distinct? [2]

c) Write pseudocode for the procedure MINHEAPIFY(A, i), which performs the corresponding manipulation on a min-heap. [3]

d) Demonstrate the insertion of the keys 35, 28, 19, 15, 40, 33, 12, 17, 10, 22, 34 into a hash table with collisions resolved by chaining. Let the table have 9 slots, and let the hash function be h(k) = k mod 9. [3]

**********ALL THE BEST**********