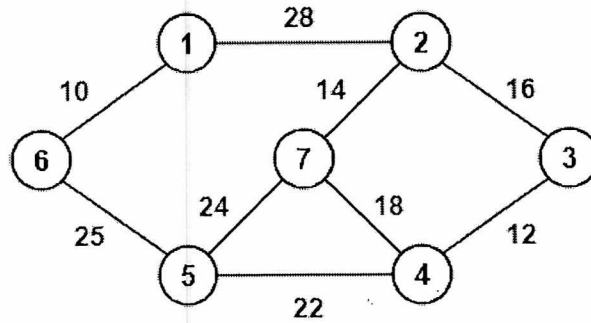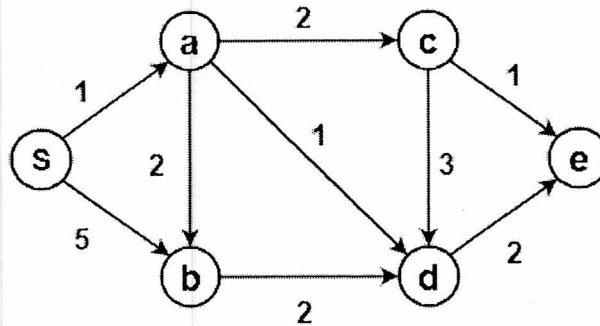Q.4 a) Draw the minimum spanning tree (MST) of the following graph using Kruskal's algorithm. Explain each step and write the weight of the resulting MST. [5]

b) Using Dijkstra's Algorithm, find the shortest distance from source vertex 'S' to remaining vertices in the following graph. Explain each step in detail. [5]

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

b) Write overflow and underflow condition of the Circular queue implemented using array. [2]

c) Write an algorithm to delete an element from the queue implemented using linked list. [3]

d) Write the algorithm for searching an element in singly linked list and discuss its complexity. [3]

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

राष्ट्रीय प्रौद्योगिकी संस्थान हमीरपुर
हमीरपुर (हि.प्र.) — 177 005 (भारत)
NATIONAL INSTITUTE OF TECHNOLOGY HAMIRPUR
HAMIRPUR (H.P.) - 177 005 (INDIA)
(An Institute of National Importance under Ministry of HRD)

Computer Science & Engineering Department

End Semester Exam-November 2023

Course: <u>ECE</u> B.Tech. (76-119)/DD(1-28) **Semester:** 3rd

Subject Code: CS-201 **Duration:** 3 Hours

Subject Name: Data Structures **Max Marks:** 50

Date: 28/11/2023 **Time:** 09:30AM-12:30PM

Note: All questions are compulsory

Q.1 **a)** Define data structure. List the various linear and non-linear data structures and explain them in brief. **[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 efficient algorithm to merge two sorted link list into one sorted link list without using extra space for merging. (few temporary pointers can be used) **[5]**

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

Q.3 **a)** Construct the tree using the following traversals **[5]**
Preorder traversal of the tree is: 7, 1, 0, 3, 2, 5, 4, 6, 9, 8, 10
Inorder traversal of the tree is: 0, 1,2,3,4,5,6,7,8,9,10
Explain each step in detail. What is the Postorder traversal?

b) Draw an AVL tree for the numbers from 1 to 10. After creating the tree delete following numbers one by one: **[5]**
4, 8

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.