MANIPAL INSTITUTE OF TECHNOLOGY

 $\sum_{w_{ED} \in V} (A \text{ constituent unit of MAHE, Manipal})$

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING) END SEMESTER ON-LINE PROCTORED EXAMINATIONS,

DECEMBER 2021

DATA STRUCTURES AND ALGORITHMS [ELE 4078]

REVISED CREDIT SYSTEM

| Time:75 Minutes+10Minutes | Date: 20 December 2021 | Max. Marks: 20 |
|---------------------------|------------------------|----------------|
| ime:/5 minutes+10minutes | Date: 20 December 2021 | Max. Marks: 20 |

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.
- Time: 75 minutes for writing + 10 minutes for uploading.
- **1A.** Determine the minimum spanning tree using Kruskal's algorithm for the given weighted graph. Verify the same using prim's algorithm. Write the pseudo codes (for both techniques) and show the steps clearly.



- 1B. It is required to have a change for ₹7, and infinite supply of coins of denominations {1, 2, 5} is available. In how many ways can the change be made? The order of coins doesn't matter. Solve the problem using Dynamic programming technique. Also write the algorithm. Show all the steps clearly.
- **1C.** Write a suitable pseudocode to insert a node at the rear end in a linked list.
- **2A.** Develop a binary tree using the following details.

In-order traversal: HFBAGDICEK

- Preorder traversal: ABFHCDGIEK
- 2B. Analyze the given Graph and obtain the shortest path from node 6 to all other nodes in the given graph using Dijkstra's algorithm. Write the pseudo code and show all the steps clearly. The contents of *reached*, *distance* and *previous* arrays must be shown clearly. (04)

(04)

(04)

(02)

(04)



2C. Solve the recurrence equation using master's theorem and determine the time complexity.

$$T(n) = -\begin{cases} d; & n = 1\\ 8T(\frac{n}{2}) + n; & n > 1 \end{cases}$$
(02)