INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DHARWAD
KARNATAKA – 580009

Degree: B.Tech **Semester: II**

Course Code & Title: CS102 – Data Structures

Time: 150 Min **Maximum Marks: 60**

End Semester Examination: July - 2021

Part – A (2*5 = 10 marks)

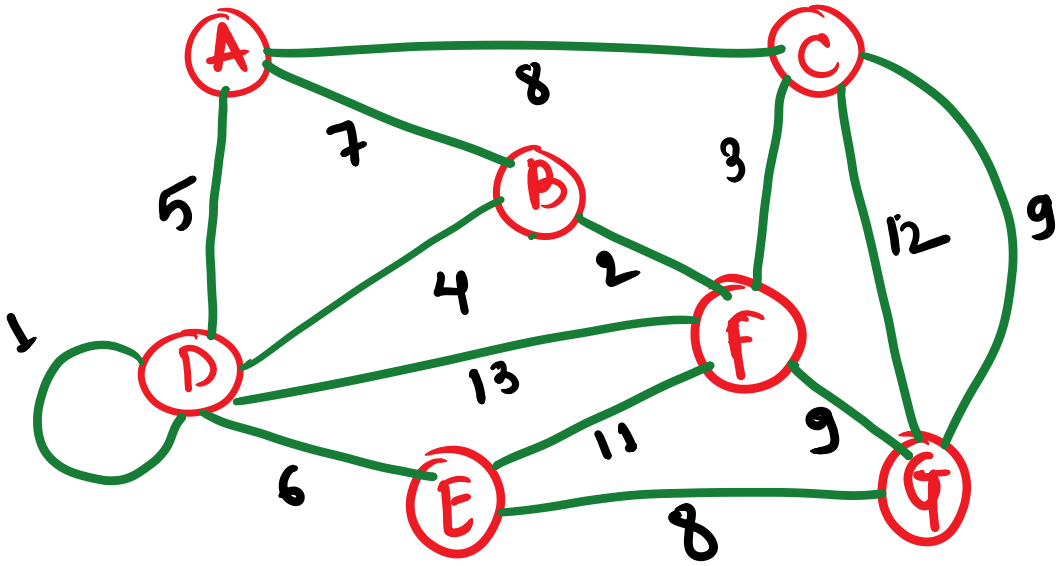
Answer all the following questions:

1. Explain the advantages and disadvantages of a linked list.

2. How to find the maximum and minimum element in the binary search tree?

3. Explain some real-time applications of a binary tree.

4. Draw the Minimum Spanning Tree of the given graph using Prim's algorithm?



5. Draw the Minimum Spanning Tree of the graph given in Que. 4 using the Kruskal algorithm?

Part – B (10*5 = 50 marks)

6. A. Discuss the insertion operation at the start and end in a circular queue.
   B. Discuss the deletion operation at the start and end in a circular queue.

7. A. Construct a **B-Tree** of order 3 by inserting the following sequence of numbers **25, 20, 36, 10, 22, 30, 40, 5, 12, 28, 38, 48, 1, 8, 15, 45,** and **50.**
   B. Delete nodes **15, 5, 40, 10, 36,** and **25** from the above constructed B-Tree.

8. A. Construct an **AVL Tree** by inserting the following sequence of numbers **12, 20, 22, 10, 25, 36, 40, 48, 30, 38,** and **28.**
   B. Delete nodes **28, 30, 20, 25,** and **36** from the above constructed AVL Tree.

9. A. Construct a **Red-Back Tree** by inserting the following sequence of numbers **61, 52, 20, 16, 55, 85, 76, 93, 71, 65, 81, 101,** and **90.**
   B. Delete nodes **76, 81, 61, 20,** and **52** from the above-constructed Red-Black Tree.

10. Find the shortest distance between **source A** and all other nodes in the following graph using
    A. Dijkstra single source shortest path algorithm
    B. Bellman-Ford single source shortest path algorithm