

BRAC University (Department of Computer Science and Engineering)

CSE 221 (Algorithm) for Spring 2025 Semester

Quiz 4

Set A

Student ID:

Section:

Name:

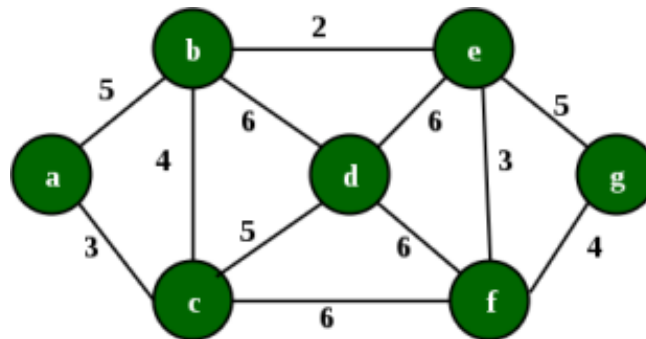
Full Marks: 20

Duration: 20 minutes

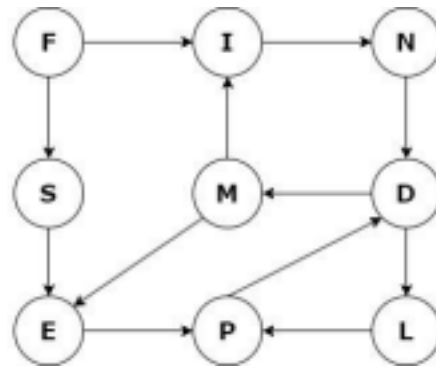
1. You work as an engineer for the Roads and Highways department in a district. The district has 7 thanas that are represented by the 7 vertices in the following graph. The edges between the vertices represent the roads that connect one thana with another and the weight of an edge represents the length of the road.

A recent flood has totally damaged these roads and immediate repair work is needed. The cost to repair a road is proportionate to its length. However, your department does not have the budget to repair all the roads so you need to repair a subset of the roads. Which algorithm should you use here to find out the roads that need to be repaired to keep all the thanas connected to one another with the **minimum** possible cost?

Show the step by step simulation of the algorithm. You may pick any algorithm of your preference that you think will solve the problem. 10



2. Sherlock Holmes found himself in a dire situation where James Moriarty imprisoned his assistant Watson in a maze. The maze is made of 9 different rooms.



When Sherlock tries to save his friend, water suddenly fills the rooms. He needs to find a way to contain the water somehow so that the water doesn't overflow from one place to another. So, he created different isolated closed groups of rooms where he can travel anywhere in that particular group, meaning they have a path from any room to any other room inside the group. A group can contain 1 to N number of rooms where N is the total number of vertices, and no two groups can share the same room.

i) **Mention** the name of a suitable algorithm for this task.

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ii) **Show** simulation for the graph given above.

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