

BRAC University (Department of Computer Science and Engineering)

CSE 221 (Algorithm) for Fall 2024 Semester

Quiz 4

Set A

Student ID:

Section:

Name:

Full Marks: 20

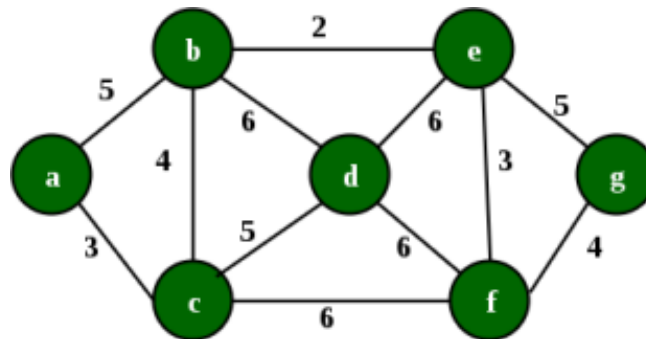
Duration: 40 minutes

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?

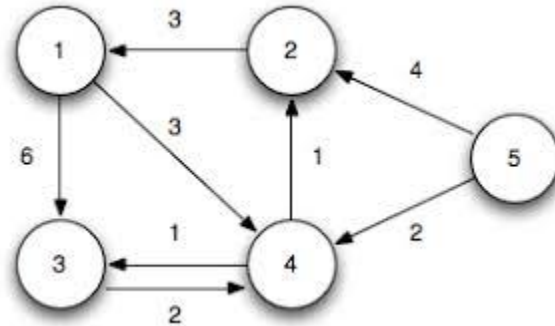
Show the step by step simulation of the algorithm. You may pick any algorithm of your preference that you think will solve the problem.

5



2. Rifa went to Buganda. Common Tourists would surely travel around the main city and some other nearby cities, but Rifa has a different idea. She wants to measure the distances of all the cities from her source and then decide the route.

Problem is that Buganda is very large so she has no idea how to figure this out. Luckily, you are around so she asked you for help. If the nodes of the graph represent cities and edge path costs represent driving distances, Can you tell her, from node “1” what will be the shortest path to go to other cities with minimum cost?



- Which algorithm will you suggest to Rifa? Does this algorithm always work on a negative weighted edge? Explain with an example. 3
- Show the simulation of your suggested algorithm to solve Rifa’s problem. Mention the shortest path and shortest distance for each destination. 5
- What is the time complexity of your algorithm? 1
- If the weight of edge 4->2 is -2, then which algorithm would you use to solve the problem. Also show the step by step simulation of your algorithm. 6

BRAC University (Department of Computer Science and Engineering)
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Quiz 4
Set B

Student ID:

Section:

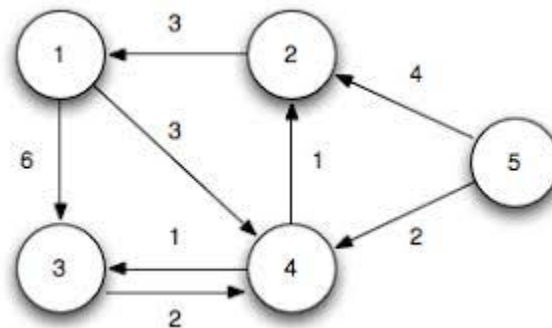
Name:

Full Marks: 20

Duration: 40 minutes

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- b. Show the simulation of your suggested algorithm to solve Rifa's problem. Mention the shortest path and shortest distance for each destination. 5
- c. What is the time complexity of your algorithm? 1
- d. If the weight of edge 4->2 is -2, then which algorithm would you use to solve the problem. Also show the step by step simulation of your algorithm. 6

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