

Lab Evaluation : Graph Theory

Max. Marks : 15

Q : Consider the following input data that defines a graph :

```
5
1 2 9
1 3 12
2 4 18
2 3 6
2 5 20
3 5 15
0
1 5
```

(Handwritten: 2 4 18 is circled, 2 5 20 is circled, and a -4 is written next to the last line)

The input starts with a line that tells how many vertices the graph has. (five vertices).

Let the vertices be numbered 1, 2, 3, 4 and 5. In general, if there are n vertices, then they are numbered 1, ..., n .

Following the first line are the edges, one per line. Each edge line has three integers on it. For example, if a line is 2 4 50, it indicates that there is an edge between vertices 2 and 4, and that its weight is 50.

The end of the input is signalled by a line that contains just a 0.

After that 0 line is a line containing two integers: a start vertex and an end vertex.

- Write a program to represent the graph as an adjacency list and display it [3]
- Compute the shortest from the start vertex to the end vertex. [7]

Your solution should be generic and not specific to the problem. It will be evaluated on another set of inputs.

OR

- Write a function `spanningTree()` which takes as input the graph defined above and returns an integer denoting the sum of weights of the edges of the Minimum Spanning Tree. [7]

Your solution should be generic and not specific to the problem. It will be evaluated on another set of inputs.

- Let us play a game with the above graph. The rules of the game are as follows: [5]

On each vertex of the graph there is a coin. A player has to collect them all starting with some vertex. From current vertex, player can visit only those vertices which are connected to it by an edge. Also if a vertex is visited it cannot be visited again.

The question is whether all the coins can be collected. Write a program to answer the question in Yes or No.

