

CS-1005: Discrete Structures

Semester Project: Tourist Guide

Submission Deadline: 10th May 2024

Submission Guidelines

Make a group of 2 students.

Your final zip file should contain the following:

- .cpp file (Code file)

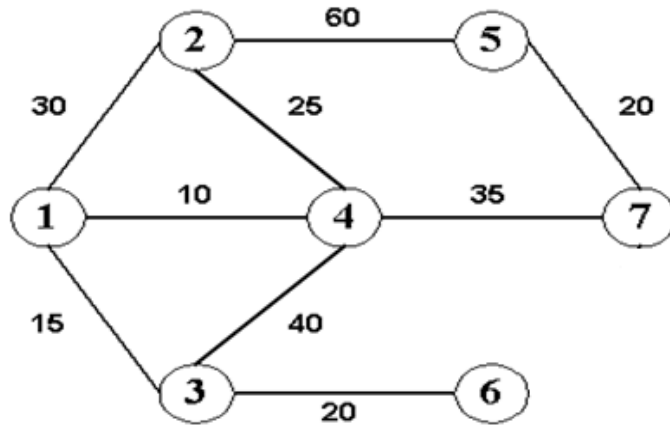
- 1 page explanation of the algorithm showing how you solved it.

There will be a viva after the submission date.

In case of any code/report found plagiarized, the whole assignments marks along with project marks will be marked as ZERO.

No submission will be considered after the deadline and there will be no viva conducted after the specified slot.

The task of the tourist guide is to move around the tourists while using minimum resources. In this problem a tourist guide needs to take some tourists from one city to another. The cities are interconnected with a road network. For each pair of neighboring cities there is a bus service that runs only between those two cities and uses the road that directly connects them. Each bus service has a limit on the maximum number of passengers it can carry. He cannot drop any passenger in the midway. Due to this, the tourist guide knows that some cities would require making extra trips if the number of tourists are more than seating capacity. For example, consider the following road map of 7 cities shown in figure given below. The edges connecting the cities represent the roads and the number written on each edge indicates the passenger limit of the bus service that runs on that road. To take 99 tourists from city 1 to city 7, he will require at least 4 trips, and the route he would take is: 1 - 2 - 4 - 7.



Input:

- The first line of the input will contain two integers: N and R representing the number of cities and the number of road segments respectively. E.g., 7 and 9 given in next column.
- This will be followed by R lines. Each R line will contain three integers C1, C2 and P. Here C1 and C2 are the city numbers and P is the maximum number of passengers to be carried by the bus service on that route. One of the examples is second line where 30 is total number of passengers allowed between city 1 and 2.
- The last line will contain three integers: the starting city (S), the destination city (D) and the number of tourists (T) to be transferred. The last line in the next column represents this case.

| | | |
|---|---|----|
| 7 | 9 | |
| 1 | 2 | 30 |
| 1 | 3 | 15 |
| 1 | 4 | 10 |
| 2 | 4 | 25 |
| 2 | 5 | 60 |
| 3 | 4 | 40 |
| 3 | 6 | 20 |
| 4 | 7 | 35 |
| 5 | 7 | 20 |

Output:

The output contains just one line with one number. This number is the minimum number of trips that would be required to satisfy the last line of the input.

E.g., in the above case the answer will be: **4**

Hint: In case there are no solutions that exists then the output should be 0.