Task 3

We have used Dijkstras algorith in task 1 and modified the code in task 2.

The time complexity for task 1 is $O(N \log N + M)$

The space complexity is $O(N+M)$ for storing all the edges in adjacency list. where N is the vertices and M is the number of edges. In task 2 we only use extra array to store but already the space complexity was $O(N+M)$. The time complexity for task 2 is also $O(N \log N + M)$

If titans in each road is exactly 1 then it will be an unweighted graph. In that case we can use breadth first search to find the shortest path. The time complexity will be $O(N+M)$.