Flying Raijin Jutsu

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	256 mebibytes

The fourth Hokage lives in a country with N villages. There are M bidirectional roads to go from one village to another. Each road is 1 kilometer long. The Hokage is a secret ninja who travels from village to village in order to complete his missions. In the mission i, he must go from village A_i to village B_i in order to complete the mission. As The Hokage is a great ninja, he knows many techniques that would take him to the destination quickly. But to complete the mission he needs to collect some data in his journey from A_i to B_i. In order to do that he needs to travel exactly L_i kilometers in the mission i.

As mentioned above, The Hokage knows many super secret techniques. One of them is "Flying Raijin Teleportation Jutsu". To use this technique he has to mark the places with some kind of formula and then he can move between those marked places instantly. But each time he teleports, he loses some of his "chakra" (you can read energy). There are K types of formula and The Hokage can teleport between two places if both are marked with same type of formula. He has already marked all M roads, but he marked one road with only one type of formula and he placed the formula in the middle of the road. So starting from a village, The Hokage needs to run 0.5 kilometer along some road to reach the formula and then he uses the formula to teleport himself to the middle of a road marked with the same type of formula. He might also teleport himself to the same road he started the teleportation from. After that he will run 0.5 kilometer again to go to some village the road is connected with. This way he started from some village, traveled 1 kilometer and reached some village.

Formally, in the mission i, 3 integers $A_i,\ B_i,\ L_i$ will be given. The Hokage will travel along a path $P_0,\ P_1,\ P_2,\ ...,\ P_{L_i}$ where $P_0 = A_i$ and P_{L_i}=B_i and the length of the path is L_i *kilometers*. To go from P_j to P_{j+1} $(0 \leq j \leq L_i - 1)$ he starts running along some road from P_j, reaches the middle of that road and must use the teleportation technique (as it is his favorite one) to reach some road that is marked with the same formula and is connected with P_{j+1} and then runs to village P_{j+1}. But different types of formula requires different amount of chakra and he needs to store as much chakra as possible to complete the mission. So he wonders what is the minimum amount of charkra needed to reach the destination. Can you help the legendary fourth Hokage?

Note that in this sequence a village can appear more than once. Also P_j and P_{j+1} $(0 \leq j \leq L_i - 1)$ could be equal.

Input

The first line of the input contains one integer T - the number of test cases.

The first line of each test case contains four integers $N,\ M,\ K,\ Q$ - the number of villages , the number of roads, the number of types of formula and the number of missions respectively.

Following M lines will contain three integers $U,\ V,\ C$ - between village U and V, there is a road which is marked with a formula of type C in its middle.

The next line will contain K integers $chk_1,\ chk_2,\ ...,\ chk_K$ - chk_i is the amount of chakra needed to use the formula of type i.

Following Q lines will contain three integers $A,\ B,\ L$ - the starting village and the destination village of this mission and the length of the path respectively.

Output

In each test case, print Q lines where $i'th$ of them is the minimum chakra needed to complete the mission i. If it is impossible to reach from A to B running exactly L kilometers then print -1.

Scoring

- Subtask 1 (13 points):

  $1 \leq T \leq 10$; $1 \leq K \leq 20$; $1 \leq L \leq 1000$; summation of Q over all test cases ≤ 10.

- Subtask 2 (16 points):

  $1 \leq T \leq 20$; $1 \leq K \leq 20$; $1 \leq L \leq 2000$; summation of Q over all test cases ≤ 2000.

- Subtask 3 (12 points):

  $1 \leq T \leq 20$; $1 \leq K \leq 20$; $1 \leq L \leq 10^9$; summation of Q over all test cases ≤ 2000.

- Subtask 4 (8 points):

  $1 \leq T \leq 20$; $1 \leq K \leq 20$; $1 \leq L \leq 10^9$; summation of Q over all test cases $\leq 4 * 10^4$.

- Subtask 5 (51 points):

  $1 \leq T \leq 50$; $1 \leq K \leq 50$; $1 \leq L \leq 10^9$; summation of Q over all test cases $\leq 10^5$.

- For all subtasks:

  Summation of N over all test cases $\leq 10^5$; summation of M over all test cases $\leq 10^5$; $1 \leq chk_i \leq 10^7$. All inputs are positive integers.

Example

standard input	standard output
1 5 4 3 6 1 2 1 2 3 2 3 4 1 3 5 3 5 4 5 1 1 1 1 1 2 1 5 1 1 5 2 1 5 3 1 2 1	5 10 -1 10 14 5

Explanation

- In the 1^{st} query optimal path is: 1, 1 with a total 5 unit of chakra. Starting form village 1 you can run along road $1-2$ and teleport from road $1-2$ to road $1-2$ and reach village 1 using total 5 unit of chakra.
- In the 2^{nd} query optimal path is : 1, 2, 1 with a total 10 unit of chakra.
- In the 4^{th} query optimal path is : 1, 3, 5 with a total 10 unit of chakra. To go from village 1 to village 3, you can start running along the road $1-2$ and teleport to the road $3-4$ because both of them are marked with formula of type 1 and lose 5 unit of chakra. And then from village 3 you can run to village 5 using 5 unit of chakra.