QUESTION 1   10 marks

Consider an undirected graph where each of the nodes is labeled consecutively starting from 0.

You will be given a number of queries. For each query, you will be given a list of edges describing an undirected graph. After you create a representation of the graph, you must determine and report the shortest distance to each of the other nodes from a given starting position using the breadth-first search algorithm (BFS). Distances are to be reported in node number order, ascending. If a node is unreachable, print -1 for that node.

For example, given a graph with 5 nodes and 3 edges, $[0, 1]$, $[0, 2]$, $[2, 3]$, a visual representation is:
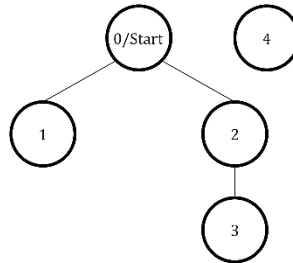
The start node for the example is node 0. Outputs are calculated for distances to nodes 1 through 4: $[1, 1, 2, -1]$.

Input Description:

The first line contains an integer q, the number of queries. Each of the following q sets of lines has the following format:

- The first line contains two space-separated integers n and m, the number of nodes and edges in the graph.
- Each line i of the m subsequent lines contains two space-separated integers, u and v, describing an edge connecting node u to node v.
- The last line contains a single integer, s, denoting the index of the starting node.

Output Description:

For each of the q queries, print a single line of $n - 1$ space-separated integers denoting the shortest distances to each of the $n - 1$ other nodes from starting position s. These distances should be listed sequentially by node number (i.e., $0, 1, \ldots, n - 1$), but should not include node s. If some node is unreachable from s, print -1 as the distance to that node.

SAMPLE INPUT	SAMPLE OUTPUT
2	1 1 -1
4 2	-1 1
0 1	
0 2	
0	
3 1	
1 2	
1	