

CS515 CS Lab 2

Assignment No: 9

Let $G=(V,E)$ be an undirected graph with $|V|=n$ and $|E|=m$. As usual, we take $V=\{0,1,2,\dots,n-1\}$. The distance between two vertices $u, v \in V$, denoted $d(u, v)$, is the length of the shortest path $\langle u, v \rangle$ if u and v are connected, or ∞ otherwise.

Let $P \subseteq V$ be a subsets of vertices (Promiscuous) with $|P|=p$.

(i) Graph Construction

Represent G in the adjacency-list format. Write a function **readgraph** to generate a graph from user inputs. The user enters n and m first. The user then enters m edges (pairs of endpoints). Assume that the user does not enter the same edge multiple times. User gives the set of Promiscuous nodes P .

Write another function **printgraph** to print a graph in the format illustrated in the sample output.

(ii) Write a code without using standard templet library to find the minimum shortest distance between any pair of two different Promiscuous nodes.

Sample output

n = 12

m = 15

{e} =

(3, 10), (9,7), (7,10), (5, 1), (2, 6), (11, 6), (9, 6), (7, 3), (4, 8), (8, 10), (3, 5), (8, 2),

(9, 5), (2, 1), (3, 11)

Promiscuous nodes P = {5, 7, 11}

The constructed graph

```
0    ->
1    ->    2,    5
2    ->    1,    8,    6
3    -> 11, 5, 7, 10
4    ->    8
5    ->    9,    3,    1
6    ->    9,    11,    2
7    ->    3,    10,    9
8    ->    2,    10,    4
9    ->    5,    6,    7
10 -> 8,    7,    3
11 -> 3,    6
```

Minimum shortest distance between two Promiscuous nodes ($5 \rightarrow 7$) is = 2
