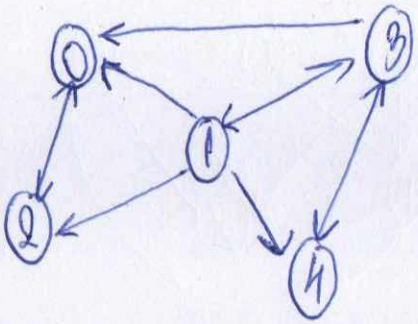

s=3, d=2

Initialization:

queue: [3]
dist: {3:0}
parent: {3: None}

Iteration 1 pop 3, neighbors: [0,1,4]

- visit 0 → dist[0]=1, parent[0]=3
- visit 1 → dist[1]=2, parent[1]=3
- visit 4 → dist[4]=1, parent[4]=3

queue: [0,4]
dist: {3:0, 0:1, 1:1, 4:1}
parent: {3: None, 0:3, 1:3, 4:3}

Iteration 2 pop 0, neighbor: [2]

- visit 2 → dist[2]=2, parent[2]=0

queue: [1,4,2]
dist: {3:0, 0:1, 1:1, 4:1, 2:2}
parent: {3: None, 0:3, 1:3, 4:3, 2:0}

Iteration 3 pop 1, neighbors: [3,0,4,2]
already visited ↑

queue: [4,2]

Iteration 4 pop 4, neighbors: [3]
↑ already visited

queue: [2]

Iteration 5 pop 2, neighbor: [0]
↑ already visited

queue: []

Path reconstruction

- Destination: 2
  parent[2]=0, parent[0]=3, parent[3]='None'

Path: [3,0,2]
Length: 2

$s=2$, $d=1$

Initialization

queue: [2]

dist: {2:0}

parent: {2: None}

Iteration 1 pop 2, neighbor [0]

- visit 0 ⇒ dist[0] = 1, parent[0] = 2

queue: [0]

dist: {2:0, 0:1}

parent: {2: None, 0:2}

Iteration 2 pop 0, neighbor [2]

↑ already visited

queue: [0]

Path reconstruction

- destination: 1

1 is not parent ⇒ unreachable

⇒ there is no path from 2 to 1.

```
14. Given  two vertices, find a lowest length path between them
0. Exit the program
Enter your option: 14
Enter the source vertex: 1
Enter the destination vertex: 100
Shortest distance:  5
Path:  [1, 2, 687, 901, 647, 100]
```

```
14. Given  two vertices, find a lowest length path between them
0. Exit the program
Enter your option: 14
Enter the source vertex: 100
Enter the destination vertex: 1
Shortest distance:  5
Path:  [100, 416, 354, 865, 109, 1]
```

```
14. Given  two vertices, find a lowest length path between them
0. Exit the program
Enter your option: 14
Enter the source vertex: 1
Enter the destination vertex: 100
Shortest distance:  8
Path:  [1, 3300, 6995, 5648, 5731, 5871, 6501, 5804, 100]
```

```
14. Given  two vertices, find a lowest length path between them
0. Exit the program
Enter your option: 14
Enter the source vertex: 100
Enter the destination vertex: 1
Shortest distance:  7
Path:  [100, 5568, 9908, 1820, 5308, 528, 4260, 1]
```

```
14. Given  two vertices, find a lowest length path between them
0. Exit the program
Enter your option: 14
Enter the source vertex: 1
Enter the destination vertex: 100
Shortest distance:  8
Path:  [1, 17024, 27471, 14969, 3075, 70733, 85480, 14973, 100]
```

```
14. Given  two vertices, find a lowest length path between them
0. Exit the program
Enter your option: 14
Enter the source vertex: 100
Enter the destination vertex: 1
Shortest distance:  8
Path:  [100, 44340, 54527, 6606, 53263, 95930, 98655, 58288, 1]
```