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Roll no – 31282

Assignment No 01

Code :

```
class Graph :
  def __init__(self):
    self.graph = {}    # dictionary to store vertices and edges
    self.BSFsearch = []    # list to store BSF vertex list
    self.DSFsearch = []    # list to store DSF vertex list

  def add_vertex(self, vertex):
    if vertex not in self.graph :
      self.graph[vertex] = []    # vertex : key,  array of corresponding vertices : value
    else:
      print("Vertex " + vertex + " already present in graph.")

  def add_edge(self, vertex1, vertex2):
    if vertex1 and vertex2 in self.graph :
      self.graph[vertex1].append(vertex2)
      self.graph[vertex2].append(vertex1)
    else:
      print("These pair of vertex not present in graph.")

  def BSF(self, vertex):
    if vertex not in self.BSFsearch :
      self.BSFsearch.append(vertex)        # append vertex to list

    adjacentVertexList = self.graph[vertex]
    newAdjacentVertexList = []
    for j in adjacentVertexList:
            if j not in self.BSFsearch:
                newAdjacentVertexList.append(j)     # to avoid edge's vertex repeat ambiguity

        for i in adjacentVertexList :
            if i not in self.BSFsearch :
                self.BSFsearch.append(i)

        for i in newAdjacentVertexList :
            if i in self.BSFsearch :
                self.BSF(i)             # exlopre a vertex then move to next vertex

    def displayBSF(self):
        print("BSF order - ")
        for i in self.BSFsearch:
            print(i, end=", ")

        print()
        print("Vertices and adges - ", end=" ")
        print(self.graph)

    def DSF(self, vertex):
        if vertex not in self.DSFsearch :
            self.DSFsearch.append(vertex)          # append vertex to list

        adjacentVertexList = self.graph[vertex]
        newAdjacentVertexList = []

        for j in adjacentVertexList:
            if j not in self.DSFsearch:
                newAdjacentVertexList.append(j)     # to avoid edge's vertex repeat ambiguity
        for i in newAdjacentVertexList :
            self.DSF(i)            # exlopre a vertex till it ends then return to earlier vertex


    def displayDSF(self):
        print("DSF order - ")
        for i in self.DSFsearch:
            print(i, end=", ")


        print()
        print("Vertices and adges - ", end=" ")
        print(self.graph)


g=Graph();
while (True) :
    print("Menu")
    print("1. Add vertices\n2. Add edges\n3. Perform BSF\n4. Perform DSF")
    choice = int(input("Enter choice - "))
    if(choice==1):
        n = int(input("Enter total number of vertices - "))
        for i in range(0,n):
            a = int(input("Vertex - "))
            g.add_vertex(a)
    elif (choice==2) :
        v1 = int(input("Enter vertex 1 of edge - "))
        v2 = int(input("Enter vertex 2 of edge - "))
        g.add_edge(v1,v2)
    elif (choice==3) :
        g.BSF(1)
        g.displayBSF()
    elif (choice==4) :
        g.DSF(1)
        g.displayDSF()
    else :
        break
```

Breadth First Search Output :

```
C:\Users\Lenovo\PycharmProjects\SE\venv\Scripts\python.exe
C:/Users/Lenovo/PycharmProjects/SE/venv/31282_Aditya_LP2_Assign01.py

Menu

1. Add vertices

2. Add edges

3. Perform BSF

Enter choice - 1

Enter total number of vertices - 7

Vertex - 1

Vertex - 2

Vertex - 3

Vertex - 4

Vertex - 5

Vertex - 6

Vertex - 7

Menu

1. Add vertices

2. Add edges

3. Perform BSF

Enter choice - 2

Enter vertex 1 of edge - 1

Enter vertex 2 of edge - 2

Menu

1. Add vertices

2. Add edges
```

```
3. Perform BSF

Enter choice - 2

Enter vertex 1 of edge - 1

Enter vertex 2 of edge - 4

Menu

1. Add vertices

2. Add edges

3. Perform BSF

Enter choice - 2

Enter vertex 1 of edge - 1

Enter vertex 2 of edge - 5

Menu

1. Add vertices

2. Add edges

3. Perform BSF

Enter choice - 2

Enter vertex 1 of edge - 2

Enter vertex 2 of edge - 3

Menu

1. Add vertices

2. Add edges

3. Perform BSF

Enter choice - 2

Enter vertex 1 of edge - 2

Enter vertex 2 of edge - 6

Menu

1. Add vertices

2. Add edges

3. Perform BSF

Enter choice - 2

Enter vertex 1 of edge - 7
```

Enter vertex 2 of edge - 2

Menu

1. Add vertices

2. Add edges

3. Perform BSF

Enter choice - 3

BSF order -

1, 2, 4, 5, 3, 6, 7,

Vertices and adges - {1: [2, 4, 5], 2: [1, 3, 6, 7], 3: [2], 4: [1], 5: [1], 6: [2], 7: [2]}

Menu

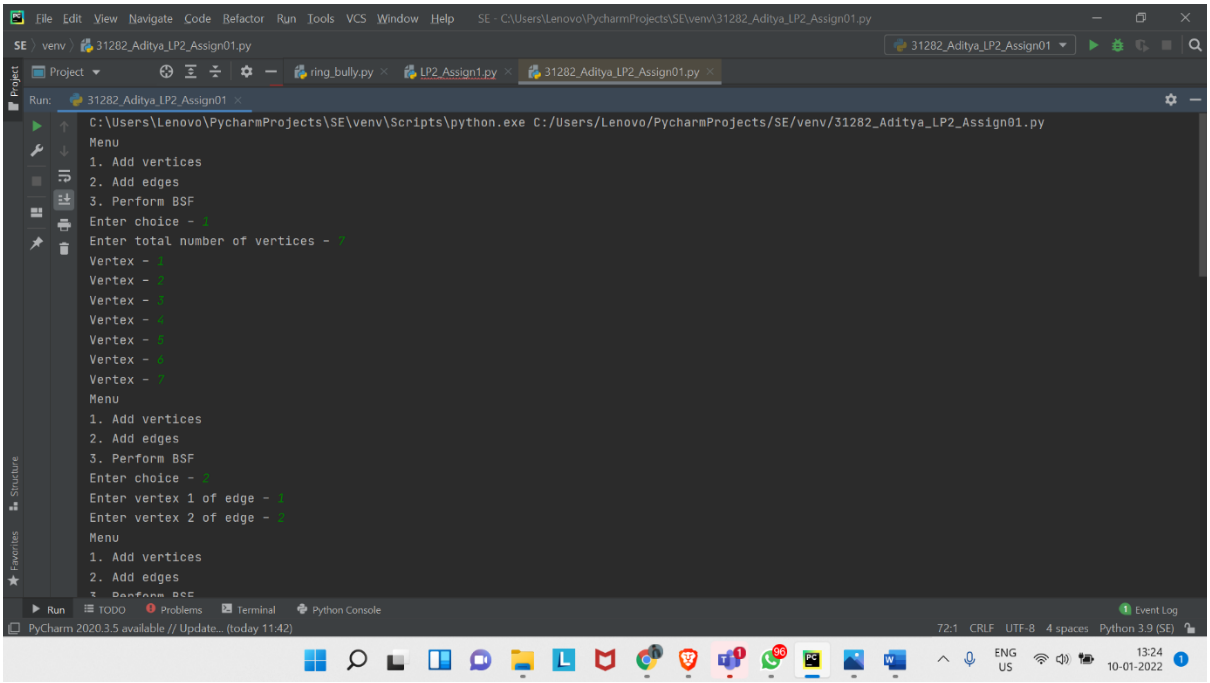
1. Add vertices

2. Add edges

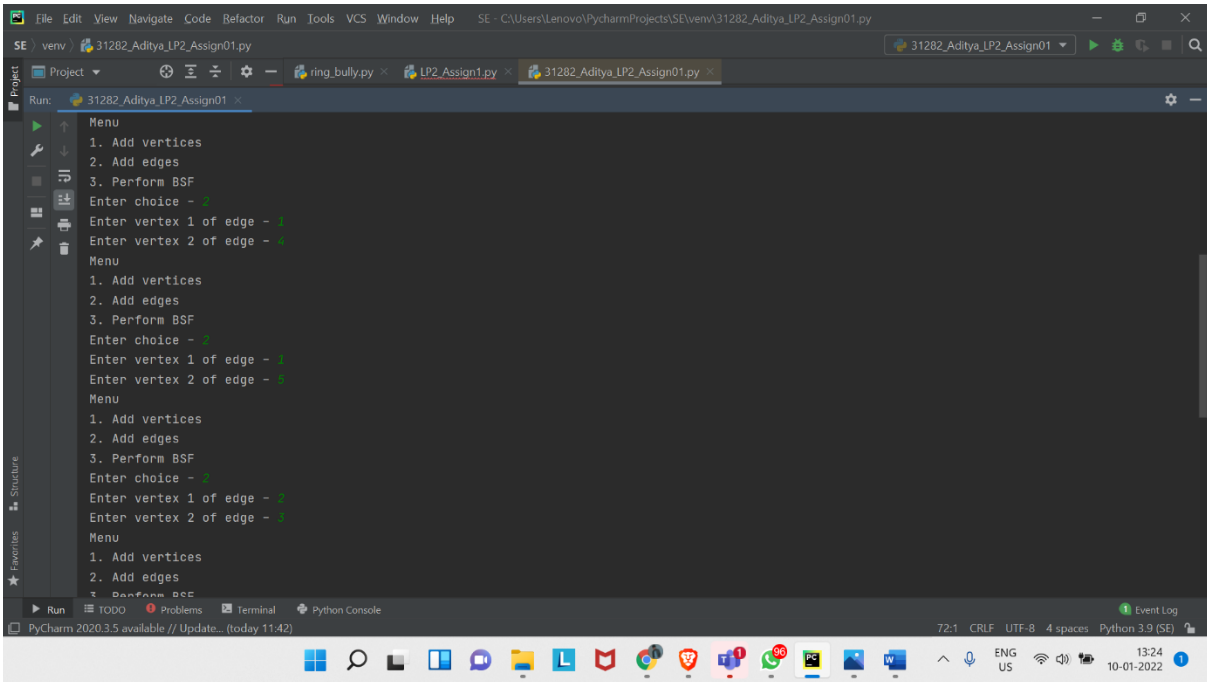
3. Perform BSF

Enter choice - 4

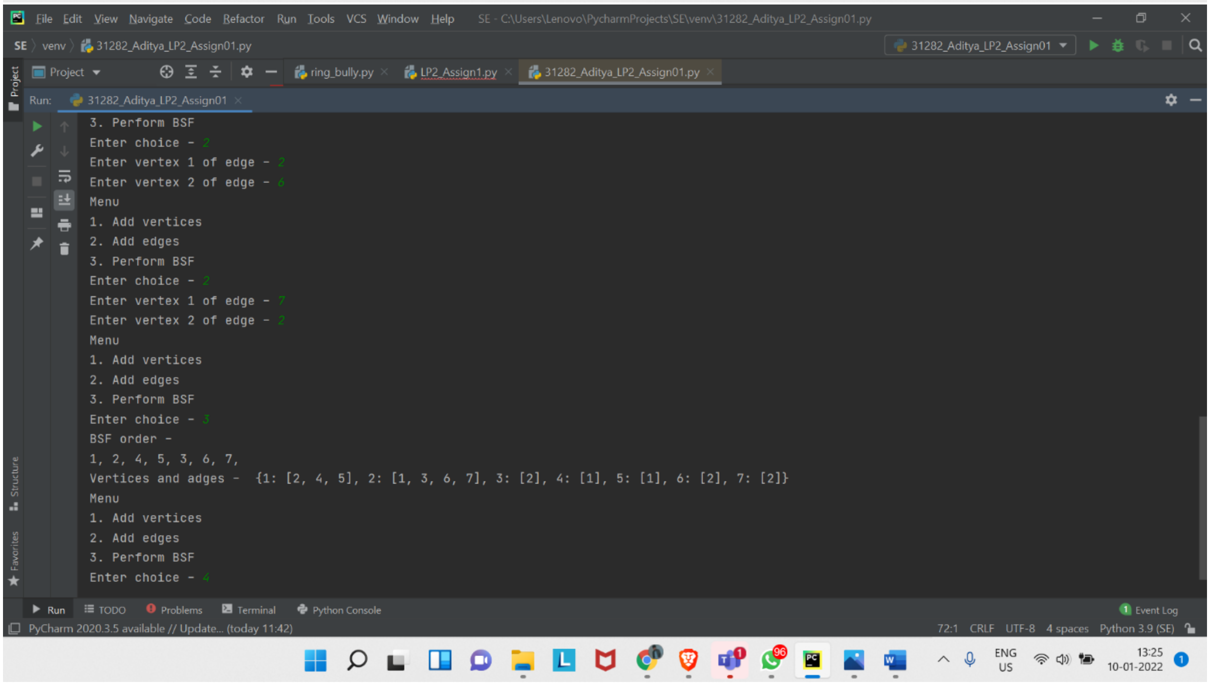
Process finished with exit code 0


File Edit View Navigate Code Refactor Run Tools VCS Window Help
SE - C:\Users\Lenovo\PycharmProjects\SE\venv\31282_Aditya_LP2_Assign01.py
SE 〉 venv 〉 31282_Aditya_LP2_Assign01.py
31282_Aditya_LP2_Assign01
Project
ring_bully.py
LP2_Assign1.py
31282_Aditya_LP2_Assign01.py
Run: 31282_Aditya_LP2_Assign01
Run
TODO
Problems
Terminal
Python Console
Event Log
PyCharm 2020.3.5 available // Update... (today 11:42)
72:1 CRLF UTF-8 4 spaces Python 3.9 (SE)
ENG US
13:24
10-01-2022

```
C:\Users\Lenovo\PycharmProjects\SE\venv\Scripts\python.exe C:/Users/Lenovo/PycharmProjects/SE/venv/31282_Aditya_LP2_Assign01.py
Menu
1. Add vertices
2. Add edges
3. Perform BSF
Enter choice - 1
Enter total number of vertices - 7
Vertex - 1
Vertex - 2
Vertex - 3
Vertex - 4
Vertex - 5
Vertex - 6
Vertex - 7
Menu
1. Add vertices
2. Add edges
3. Perform BSF
Enter choice - 2
Enter vertex 1 of edge - 1
Enter vertex 2 of edge - 2
Menu
1. Add vertices
2. Add edges
3. Perform BSF
```



```
Menu
1. Add vertices
2. Add edges
3. Perform BSF
Enter choice - 2
Enter vertex 1 of edge - 1
Enter vertex 2 of edge - 4
Menu
1. Add vertices
2. Add edges
3. Perform BSF
Enter choice - 2
Enter vertex 1 of edge - 1
Enter vertex 2 of edge - 5
Menu
1. Add vertices
2. Add edges
3. Perform BSF
Enter choice - 2
Enter vertex 1 of edge - 2
Enter vertex 2 of edge - 3
Menu
1. Add vertices
2. Add edges
3. Perform BSF
```



```
3. Perform BSF
Enter choice - 2
Enter vertex 1 of edge - 2
Enter vertex 2 of edge - 6
Menu
1. Add vertices
2. Add edges
3. Perform BSF
Enter choice - 2
Enter vertex 1 of edge - 7
Enter vertex 2 of edge - 2
Menu
1. Add vertices
2. Add edges
3. Perform BSF
Enter choice - 3
BSF order -
1, 2, 4, 5, 3, 6, 7,
Vertices and adges -  {1: [2, 4, 5], 2: [1, 3, 6, 7], 3: [2], 4: [1], 5: [1], 6: [2], 7: [2]}
Menu
1. Add vertices
2. Add edges
3. Perform BSF
Enter choice - 4
```

Depth First Search Output :

C:\Users\Lenovo\PycharmProjects\SE\venv\Scripts\python.exe C:/Users/Lenovo/PycharmProjects/SE/venv/31282_Aditya_LP2_Assign01.py

Menu

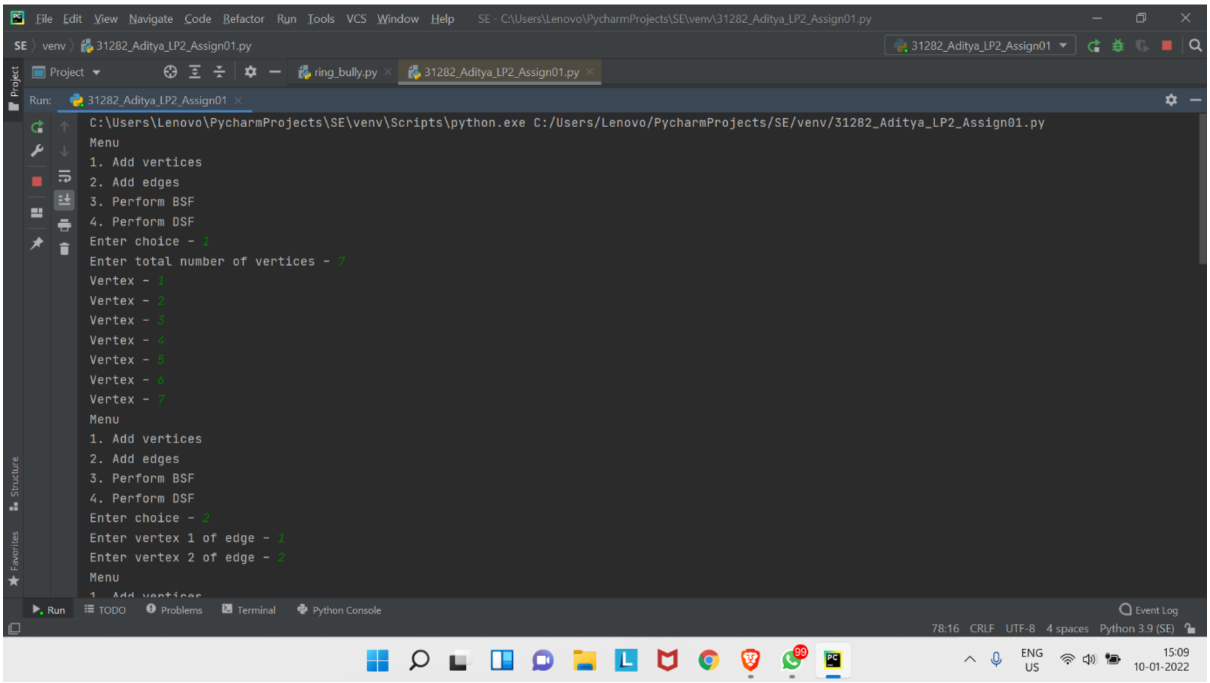
1. Add vertices

2. Add edges

```
3. Perform BSF

4. Perform DSF

Enter choice - 1

Enter total number of vertices - 7

Vertex - 1

Vertex - 2

Vertex - 3

Vertex - 4

Vertex - 5

Vertex - 6

Vertex - 7

Menu

1. Add vertices

2. Add edges

3. Perform BSF

4. Perform DSF

Enter choice - 2

Enter vertex 1 of edge - 1

Enter vertex 2 of edge - 2

Menu

1. Add vertices

2. Add edges

3. Perform BSF

4. Perform DSF

Enter choice - 2

Enter vertex 1 of edge - 1

Enter vertex 2 of edge - 4

Menu

1. Add vertices

2. Add edges

3. Perform BSF
```

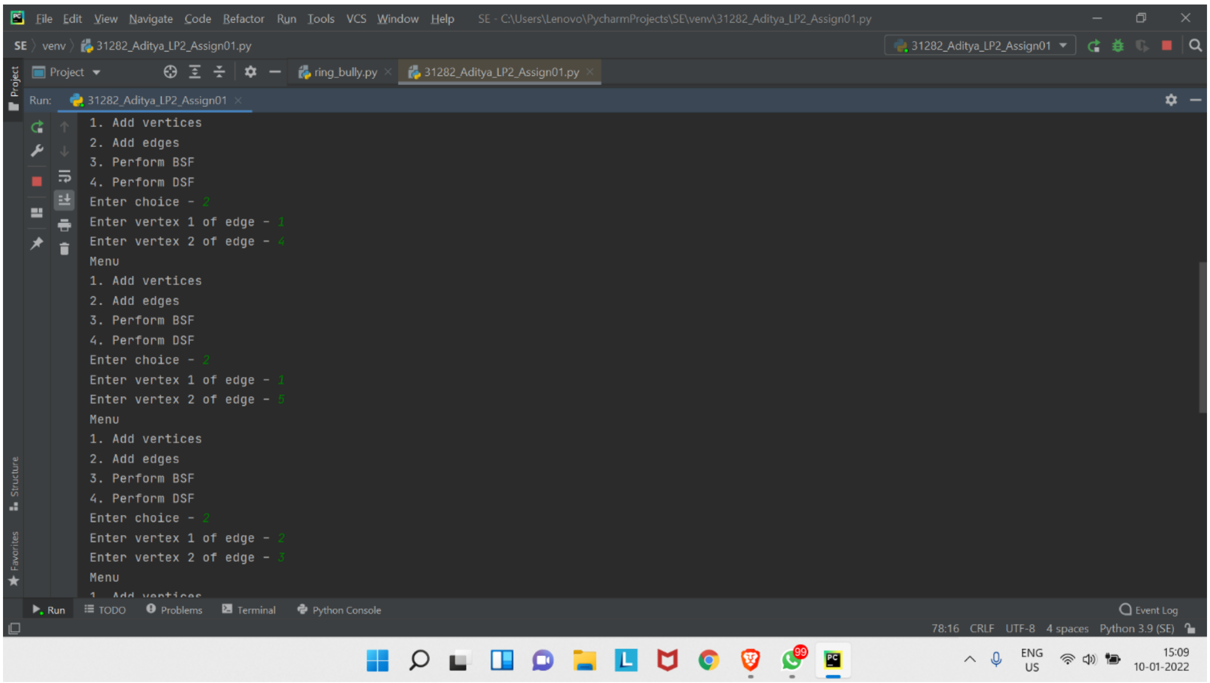
```
4. Perform DSF
Enter choice - 2
Enter vertex 1 of edge - 1
Enter vertex 2 of edge - 5
Menu
1. Add vertices
2. Add edges
3. Perform BSF
4. Perform DSF
Enter choice - 2
Enter vertex 1 of edge - 2
Enter vertex 2 of edge - 3
Menu
1. Add vertices
2. Add edges
3. Perform BSF
4. Perform DSF
Enter choice - 2
Enter vertex 1 of edge - 2
Enter vertex 2 of edge - 6
Menu
1. Add vertices
2. Add edges
3. Perform BSF
4. Perform DSF
Enter choice - 2
Enter vertex 1 of edge - 2
Enter vertex 2 of edge - 7
Menu
1. Add vertices
2. Add edges
```

```
3. Perform BSF

4. Perform DSF

Enter choice - 4

DSF order -

1, 2, 3, 6, 7, 4, 5,

Vertices and adges -  {1: [2, 4, 5], 2: [1, 3, 6, 7], 3: [2], 4: [1], 5: [1], 6: [2], 7: [2]}

Menu

1. Add vertices

2. Add edges

3. Perform BSF

4. Perform DSF

Enter choice - 4


Process finished with exit code 0
```

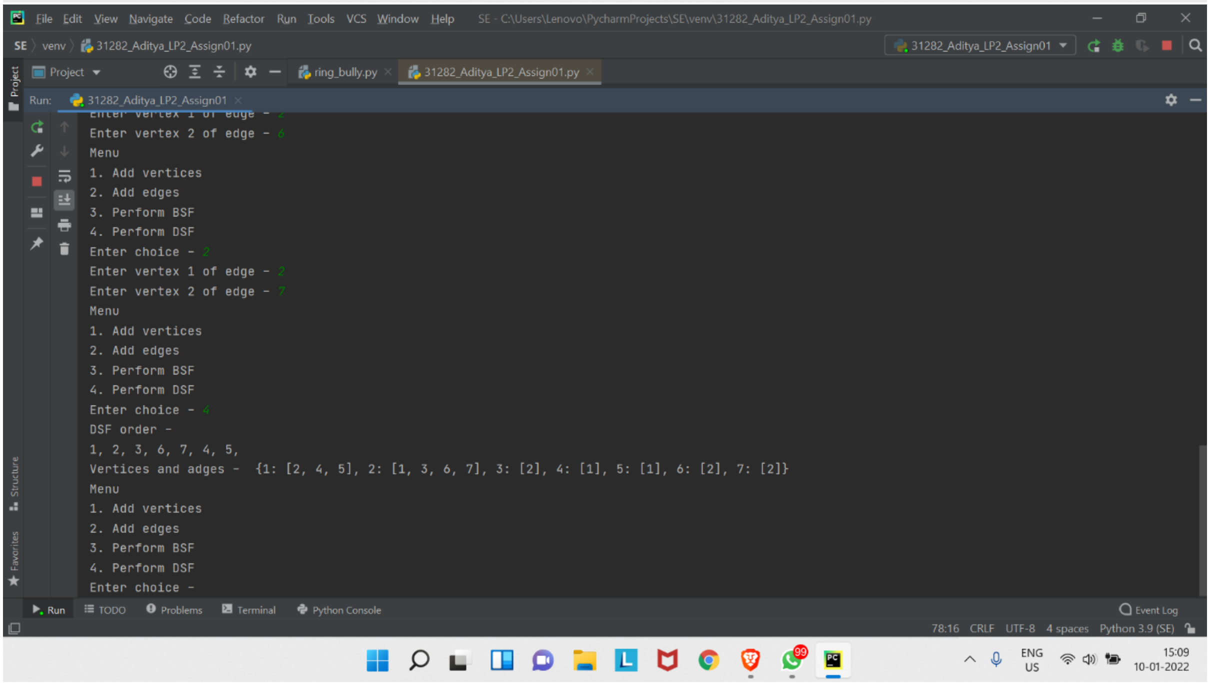


```
C:\Users\Lenovo\PycharmProjects\SE\venv\Scripts\python.exe C:/Users/Lenovo/PycharmProjects/SE/venv/31282_Aditya_LP2_Assign01.py
Menu
1. Add vertices
2. Add edges
3. Perform BSF
4. Perform DSF
Enter choice - 1
Enter total number of vertices - 7
Vertex - 1
Vertex - 2
Vertex - 3
Vertex - 4
Vertex - 5
Vertex - 6
Vertex - 7
Menu
1. Add vertices
2. Add edges
3. Perform BSF
4. Perform DSF
Enter choice - 2
Enter vertex 1 of edge - 1
Enter vertex 2 of edge - 2
Menu
1. Add vertices
```

File Edit View Navigate Code Refactor Run Tools VCS Window Help
SE - C:\Users\Lenovo\PycharmProjects\SE\venv\31282_Aditya_LP2_Assign01.py
SE 〉 venv 〉 31282_Aditya_LP2_Assign01.py
31282_Aditya_LP2_Assign01
Project
ring_bully.py
31282_Aditya_LP2_Assign01.py
Run: 31282_Aditya_LP2_Assign01
Structure
Favorites
Run
TODO
Problems
Terminal
Python Console
Event Log
78:16 CRLF UTF-8 4 spaces Python 3.9 (SE)
ENG
US
15:09
10-01-2022


File Edit View Navigate Code Refactor Run Tools VCS Window Help SE - C:\Users\Lenovo\PycharmProjects\SE\venv\31282_Aditya_LP2_Assign01.py
ring_bully.py
31282_Aditya_LP2_Assign01.py
Run: 31282_Aditya_LP2_Assign01
Run
TODO
Problems
Terminal
Python Console
Event Log
78:16 CRLF UTF-8 4 spaces Python 3.9 (SE)
ENG
US
15:09
10-01-2022

```
1. Add vertices
2. Add edges
3. Perform BSF
4. Perform DSF
Enter choice - 2
Enter vertex 1 of edge - 1
Enter vertex 2 of edge - 4
Menu
1. Add vertices
2. Add edges
3. Perform BSF
4. Perform DSF
Enter choice - 2
Enter vertex 1 of edge - 1
Enter vertex 2 of edge - 5
Menu
1. Add vertices
2. Add edges
3. Perform BSF
4. Perform DSF
Enter choice - 2
Enter vertex 1 of edge - 2
Enter vertex 2 of edge - 3
Menu
1. Add vertices
```


File Edit View Navigate Code Refactor Run Tools VCS Window Help SE - C:\Users\Lenovo\PycharmProjects\SE\venv\31282_Aditya_LP2_Assign01.py
ring_bully.py
31282_Aditya_LP2_Assign01.py
Run: 31282_Aditya_LP2_Assign01
Run
TODO
Problems
Terminal
Python Console
Event Log
78:16 CRLF UTF-8 4 spaces Python 3.9 (SE)
ENG
US
15:09
10-01-2022

```
Enter vertex 1 of edge - 2
Enter vertex 2 of edge - 6
Menu
1. Add vertices
2. Add edges
3. Perform BSF
4. Perform DSF
Enter choice - 2
Enter vertex 1 of edge - 2
Enter vertex 2 of edge - 7
Menu
1. Add vertices
2. Add edges
3. Perform BSF
4. Perform DSF
Enter choice - 4
DSF order -
1, 2, 3, 6, 7, 4, 5,
Vertices and adges -  {1: [2, 4, 5], 2: [1, 3, 6, 7], 3: [2], 4: [1], 5: [1], 6: [2], 7: [2]}
Menu
1. Add vertices
2. Add edges
3. Perform BSF
4. Perform DSF
Enter choice -
```