COMSATS University Islamabad, Lahore Campus

☑ Mid Lab Examination Spring 2024

Course Title:	Artificial Intelligence	Course Code:	CSC462	Credit Hours:	4(3,1)
Course Instructor/s:	M.Taimoor Akmal	Programme Name:	BCS	Maximum Marks:	25
Time Allowed:	90 Minutes	Date:	01-04-2024		
Student's Name:		Reg. No.			

Important Instructions / Guidelines:

- Attempt all questions.
- Show all your work for partial credits. Please be neat.
- Upload your solutions in Google Classroom.

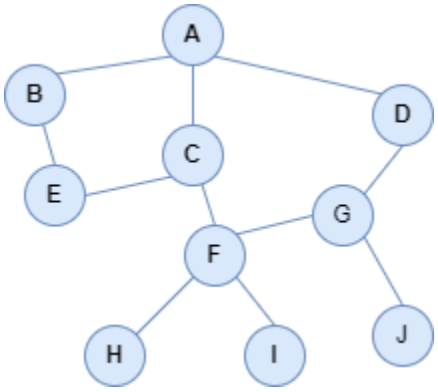
Question 1: CLO: <6>; Bloom Taxonomy Level: <Applying>. [12.5 marks]

Implementing BFS

Scenario:

You are a treasure hunter exploring a vast underground dungeon represented by the given graph. Each node represents a room, and each edge represents a passage between two rooms. Your goal is to find the shortest path from the entrance (room A) to the treasure chamber (room J) using **Depth-First Search (DFS).** However, the dungeon is full of traps and dead ends, so you must navigate carefully to avoid getting lost.

Graph:



Question:

1. Use Depth-First Search (DFS) to find a path from Room A to Room J.

2. Use Depth-First Search (DFS) to find a path from Room A to Room I.

Sample Input/Output:

Path from Room A to Room F is:

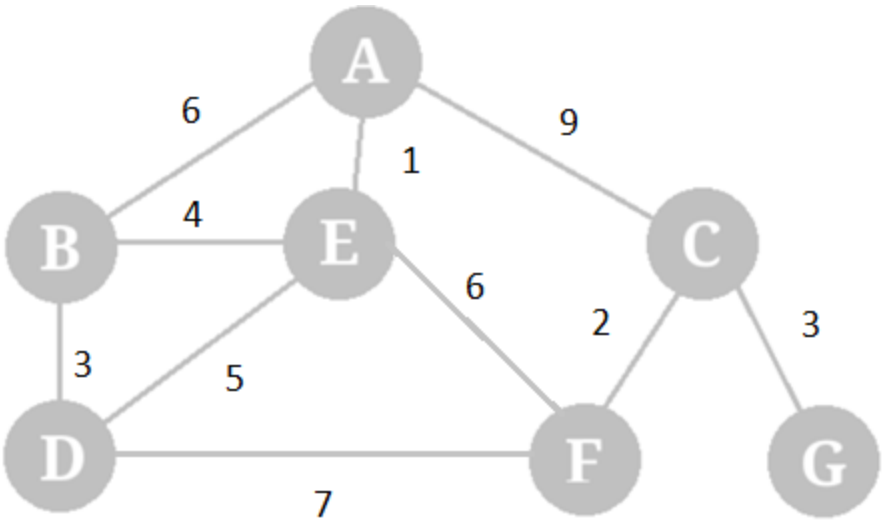
```
Shortest path from A to J: A -> C -> F
```

Hints:

1. Start at node A and explore one path as far as possible before backtracking.
2. Maintain a stack to keep track of the nodes to visit next.
3. Mark each visited node to avoid revisiting nodes.
4. When the goal node is reached, return the path taken to reach that node.

Question 2: CLO: <6>; Bloom Taxonomy Level: <Applying>. [12.5 marks]

Consider the following directed graph representing a network of cities connected by roads, along with the cost of traveling between each pair of cities:



Assume that the heuristic values for each city (estimates of the cost to reach the goal city 'G') are as follows:

```
heuristic_values = {
    'A': 7,  # Estimated cost from A to G
    'B': 5,  # Estimated cost from B to G
    'C': 5,  # Estimated cost from C to G
    'D': 6,  # Estimated cost from D to G
    'E': 5,  # Estimated cost from E to G
    'F': 4,  # Estimated cost from F to G
    'G': 0   # Estimated cost from G to G
}
```

You are starting at city 'A' and want to reach city 'G' using the A* search algorithm.

Question. What is the path from city 'A' to city 'G' and its total cost?