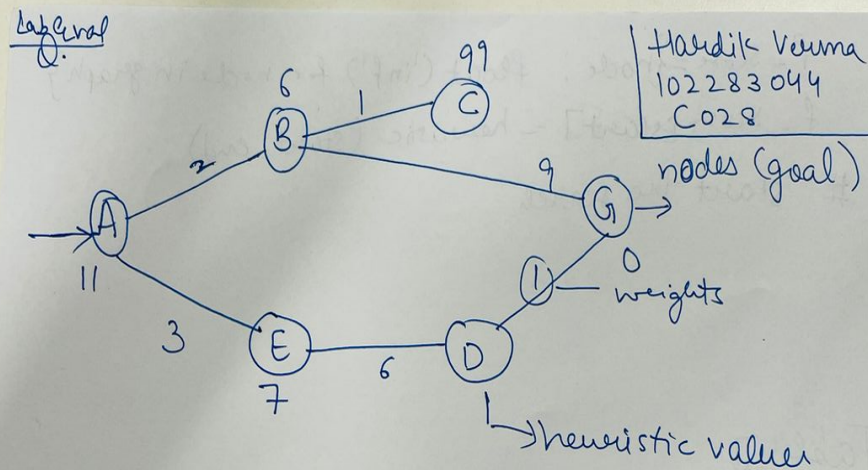


Question:- Python Program for given Graph using A* Algorithm. Output should represent shortest path with cost.



using A* algo

- ① Pseudocode for shortest path (15 min)
- ② Python Program for shortest path with cost [50 min]

Pseudocode:-

① Define function [def astar (start, end, graph)]

CODE:-

Define the graph with nodes

```
graph = {  
    'A': {'B': 2, 'E': 3},  
    'B': {'C': 1, 'G': 9, 'A': 2},  
    'E': {'A': 3, 'D': 6},  
    'C': {'B': 1},  
    'D': {'E': 6, 'G': 1},  
    'G': {'B': 9, 'D': 1}  
}
```

Define the heuristic values

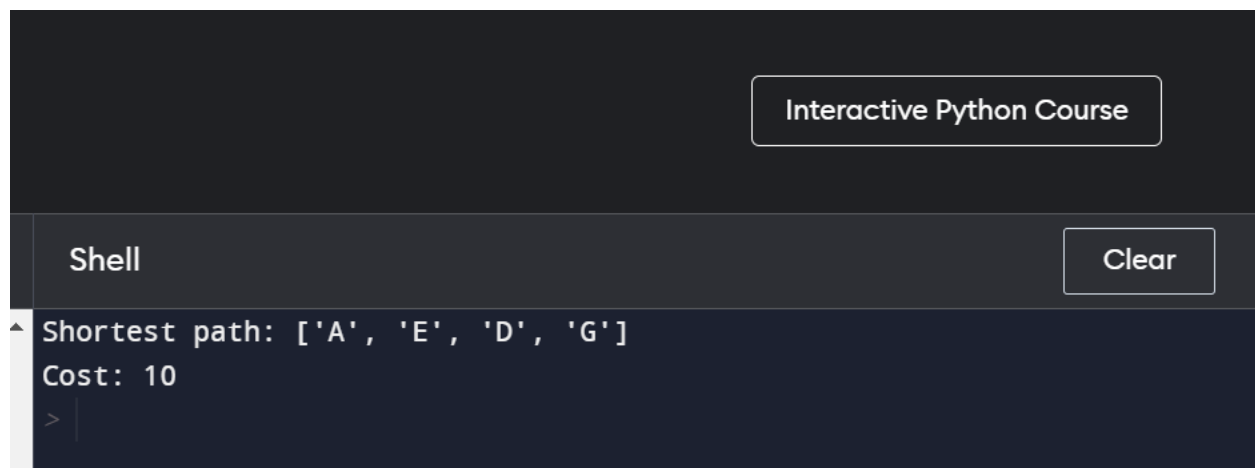
```
heuristic = {  
    'A': 10,  
    'B': 6,  
    'C': 99,  
    'D': 1,  
    'E': 7,  
    'G': 0  
}
```

Define the A* algo

```
def astar(graph, start, goal, heuristic):  
    open_list = [(0, start)]  
    closed_list = set()  
    distances = {node: float('inf') for node in graph}  
    distances[start] = 0  
    paths = {start: []}  
    while open_list:  
        current_cost, current_node = min(open_list)  
        if current_node == goal:  
            return paths[current_node] + [current_node], distances[current_node]  
        closed_list.add(current_node)  
        open_list.remove((current_cost, current_node))  
        for neighbor, cost in graph[current_node].items():
```

```
    if neighbor in closed_list:
        continue
    tentative_distance = distances[current_node] + cost
    if tentative_distance < distances[neighbor]:
        distances[neighbor] = tentative_distance
        paths[neighbor] = paths[current_node] + [current_node]
        fx = tentative_distance + heuristic[neighbor]
        open_list.append((fx, neighbor))
    return None, None
path, cost = astar(graph, 'A', 'G', heuristic)
if path is None:
    print("Erro! No path found")
else:
    print("Shortest path:", path)
    print("Cost:", cost)
```

OUTPUT:-



The screenshot shows a dark-themed interface for an "Interactive Python Course". At the top right is a button labeled "Interactive Python Course". Below this is a header bar with the word "Shell" on the left and a "Clear" button on the right. The main area is a terminal window with a light blue border. It displays the output of the Python code: "Shortest path: ['A', 'E', 'D', 'G']" and "Cost: 10". A prompt character ">" is visible on the line below the output.

```
Interactive Python Course
```

```
Shell Clear
```

```
Shortest path: ['A', 'E', 'D', 'G']
Cost: 10
>
```