Practical 8

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CODE:-

```
def safe(node, graph, color, c):
    for i in range(len(graph)):
        if graph[node][i] == 1 and color[i] == c:
            return False
    return True

def solve(graph, m, color, node):
    if node == len(graph):
        return True
    for c in range(1, m + 1):
        if safe(node, graph, color, c):
            color[node] = c
            if solve(graph, m, color, node + 1):
                return True
            color[node] = 0
    return False

def graphcoloring(graph, m, labels):
    color = [0] * len(graph)
    if not solve(graph, m, color, 0):
        print("No solution exists")
    else:
        print("Color assigned to each vertex:")
        for i in range(len(graph)):
            print(labels[i], ":", "Color", color[i])

def main():
    print("Choose a graph to color:")
    print("1. Graph 1 (Hexagonal-like shape)")
    print("2. Graph 2 (Complete Graph of 5 vertices)")
```

```
    choice = int(input("Enter your choice (1 or 2): "))

    if choice == 1:
        graph = [
            [0, 1, 0, 1, 1],
            [1, 0, 1, 0, 1],
            [0, 1, 0, 1, 0],
            [1, 0, 1, 0, 1],
            [1, 1, 0, 1, 0]
        ]
        labels = ['A', 'B', 'C', 'D', 'E']
        m = 3
        print("\nGraph 1 selected\n")
        graphcoloring(graph, m, labels)

    elif choice == 2:
        graph = [
            [0, 1, 1, 1, 1],
            [1, 0, 1, 1, 1],
            [1, 1, 0, 1, 1],
            [1, 1, 1, 0, 1],
            [1, 1, 1, 1, 0]
        ]
        labels = ['P', 'Q', 'R', 'S', 'T']
        m = 5
        print("\nGraph 2 selected\n")
        graphcoloring(graph, m, labels)

    else:
        print("Invalid choice")

main()
```

OUTPUT:-

```
Choose a graph to color:
1. Graph 1 (Hexagonal-like shape)
2. Graph 2 (Complete Graph of 5 vertices)
Enter your choice (1 or 2): 1

Graph 1 selected

Color assigned to each vertex:
A : Color 1
B : Color 2
C : Color 1
D : Color 2
E : Color 3
```

```
Choose a graph to color:
1. Graph 1 (Hexagonal-like shape)
2. Graph 2 (Complete Graph of 5 vertices)
Enter your choice (1 or 2): 2

Graph 2 selected

Color assigned to each vertex:
P : Color 1
Q : Color 2
R : Color 3
S : Color 4
T : Color 5
```