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Roll No. – 31

Class – A4/B2

Practical-8

CODE:-

```
import java.util.*;

public class GraphColoring {
   static int V;

   static boolean isSafe(int v, int[][] graph, int[] color, int c) {
      for (int i = 0; i < V; i++) {
         if (graph[v][i] == 1 && color[i] == c)
            return false;
      }
      return true;
   }

   static boolean graphColoringUtil(int[][] graph, int m, int[] color, int v) {
      if (v == V)
         return true;
      for (int c = 1; c <= m; c++) {
         if (isSafe(v, graph, color, c)) {
            color[v] = c;
            if (graphColoringUtil(graph, m, color, v + 1))
               return true;
            color[v] = 0;
         }
      }
      return false;
   }

   static boolean graphColoring(int[][] graph, int m) {
      int[] color = new int[V];
      Arrays.fill(color, 0);
      if (!graphColoringUtil(graph, m, color, 0)) {
         System.out.println("No solution exists");
```

```
            return false;
        }
        System.out.println("Color assignment to vertices:");
        for (int i = 0; i < V; i++)
            System.out.println("Vertex " + (i + 1) + " --->  Color " + color[i]);
        return true;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter number of vertices: ");
        V = sc.nextInt();
        int[][] graph = new int[V][V];
        System.out.println("Enter adjacency matrix:");
        for (int i = 0; i < V; i++)
            for (int j = 0; j < V; j++)
                graph[i][j] = sc.nextInt();
        System.out.print("Enter number of colors (frequencies): ");
        int m = sc.nextInt();
        graphColoring(graph, m);
        sc.close();
    }
}
```

OUTPUT:-

Output

```
Enter number of vertices: 4
Enter adjacency matrix:
0 1 1 1
1 0 1 0
1 1 0 1
1 0 1 0
Enter number of colors (frequencies): 3
Color assignment to vertices:
Vertex 1 --->  Color 1
Vertex 2 --->  Color 2
Vertex 3 --->  Color 3
Vertex 4 --->  Color 2

=== Code Execution Successful ===
```