GRAPH THEORY AND IT'S APPLICATIONS

ASSIGNMENT – 2

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PROBLEM STATEMENT :

A) Consider the map of a country. Use a graph coloring algorithm to find the minimum number of colors required to color the states and show one such coloring.

ALGORITHM EXPLANATION :

- A utility function is_Safe() is written to check if the specified color assigned is safe for the given vertex v.
- The graph_Colour() is a user defined recursive function to solve coloring problems

CODE :

```
class graphColor():
    def __init__(s, ver):
        s.V = ver
        s.graph = [[0 for column in range(ver)] for row in
range(ver)]

    def isSafe(s, v, clr, c):
        for i in range(s.V):
            if s.graph[v][i] == 1 and clr[i] == c:
                return False
        return True

    def graphColour(s, m, clr, v):
        if v == s.V:
            return True
        for c in range(1, m + 1):
            if s.isSafe(v, clr, c) == True:
                clr[v] = c
                if s.graphColour(m, clr, v + 1) == True:
                    return True
                clr[v] = 0
```

```
    def graphColouring(s, m):
        clr = [0] * s.V
        if s.graphColour(m, clr, 0) == None:
            return False
        print("Solution exists! Colors assigned are:")
        for c in clr:
            print(c, end=' ')
        return True



if __name__ == '__main__':
    g = graphColor(5)
    g.graph = [[0, 1, 1, 1, 1], [1, 0, 0, 1, 0], [1, 0, 0, 0, 0],
[1, 1, 0, 0, 0], [1, 0, 0, 0, 0]]
    m = 3
    g.graphColouring(m)
```