**Algorithms and Problem-Solving Lab (15B17CI471)**

**EVEN 2023**

**Week -7 (27 Feb – 4 Mar 2023)**

Q1. A [Hamiltonian path](https://en.wikipedia.org/wiki/Hamiltonian_path), is a path in an undirected or directed graph that visits each vertex exactly once. Given an undirected graph the task is to check if a Hamiltonian path is present in it or not.

**Example 1:**

**Input:**

N = 4, M = 4

Edges[][]= { {1,2}, {2,3}, {3,4}, {2,4} }

**Output:**

1

**Explanation:**

There is a hamiltonian path:

1 -> 2 -> 3 -> 4

**Example 2:**

**Input:**

N = 4, M = 3

Edges[][] = { {1,2}, {2,3}, {2,4} }

**Output:**

0

**Explanation:**

It can be proved that there is no

hamiltonian path in the given graph

Q2. Given a dictionary of distinct **words** and an **M x N** board where every cell has one character. Find all possible words from the dictionary that can be formed by a sequence of adjacent characters on the board. We can move to any of 8 adjacent characters

**Note:** While forming a word we can move to any of the 8 adjacent cells. A cell can be used only once in one word.

**Example 1:**

**Input:**

N = 1

dictionary = {"CAT"}

R = 3, C = 3

board = {{C,A,P},{A,N,D},{T,I,E}}

**Output:**

CAT

**Explanation**:

C A P

A N D

T I E

Words we got is denoted using same color.

**Example 2:**

**Input:**

N = 4

dictionary = {"GEEKS","FOR","QUIZ","GO"}

R = 3, C = 3

board = {{G,I,Z},{U,E,K},{Q,S,E}}

**Output:**

GEEKS QUIZ

**Explanation**:

G I Z

U E K

Q S E

Words we got is denoted using same color.

Q4. Given an undirected graph and an integer **M**. The task is to determine if the graph can be colored with at most M colors such that no two adjacent vertices of the graph are colored with the same color. Here coloring of a graph means the assignment of colors to all vertices. Print 1 if it is possible to colour vertices and 0 otherwise.

**Example 1:**

**Input:**

N = 4

M = 3

E = 5

Edges[] = {(0,1),(1,2),(2,3),(3,0),(0,2)}

**Output:** 1

**Explanation:** It is possible to colour the

given graph using 3 colours.

**Example 2:**

**Input:**

N = 3

M = 2

E = 3

Edges[] = {(0,1),(1,2),(0,2)}

**Output:** 0