Algorithms and Problem-Solving Lab (15B17CI471)
EVEN 2023
Week -4 (06 Feb – 11 Feb 2023)
Backtracking

Q1. A 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

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 are 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 color 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 color the given graph using 3 colors.

Example 2:

Input:

N = 3

M = 2

E = 3

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

Output: 0