

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2023

B.Tech-VI Semester (CSE/IT)

COURSE CODE(CREDITS): 20B1WCI732

MAX. MARKS: 15

COURSE NAME: From Graph to Knowledge Graph

COURSE INSTRUCTORS: Ravindara Bhatt

MAX. TIME: 1 Hours

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

1.
 - a. Determine the maximum size of a clique and the maximum size of an independent set in the Figure 1. [1.5 Marks] [CO 1]
 - b) Develop a fast algorithm to test whether a graph is bipartite. The graph is given by its adjacency matrix or by lists of vertices and their neighbors. The algorithm should not need to consider an edge more than twice. [1.5 Marks] [CO 1]
2. Determine whether the graphs in Figure 2 are isomorphic. [3 Marks] [CO 1]

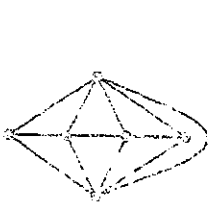


Figure 1

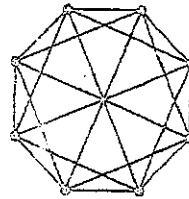
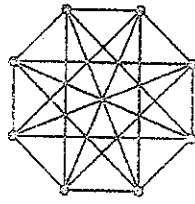


Figure 2

3. Prove or disprove: [3 Marks] [CO 1]
 - a) Every Eulerian bipartite graph has an even number of edges.
 - b) Every Eulerian simple graph with an even number of vertices has an even number of edges.
 - c) Show a tree in which its diameter is not equal to twice the radius. Under what condition does this inequality hold? Elaborate.
4. There are five cities in a network. The cost of building a road directly between i and j is the entry at j in the matrix below. An infinite entry indicates that there is a mountain in the way and the road cannot be built. Determine the least cost of making all the cities reachable from each other. [3 Marks] [CO 1]

$$\begin{pmatrix} 0 & 3 & 5 & 11 & 9 \\ 3 & 0 & 8 & 9 & 8 \\ 5 & 8 & 0 & \infty & 10 \\ 11 & 9 & \infty & 0 & 7 \\ 9 & 8 & 10 & 7 & 0 \end{pmatrix}$$

5. What do you mean by knowledge graphs? What are the applications of knowledge graphs? [3 Marks] [CO 2]