JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION-2024

B.Tech-VI Semester (CSE/IT)

COURSE CODE (CREDITS): 20B1WCI732 (2) MAX. MARKS: 15

COURSE NAME: From Graph to Knowledge Graph

COURSE INSTRUCTOR: Ravindara Bhatt MAX. TIME: 1 Hour

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

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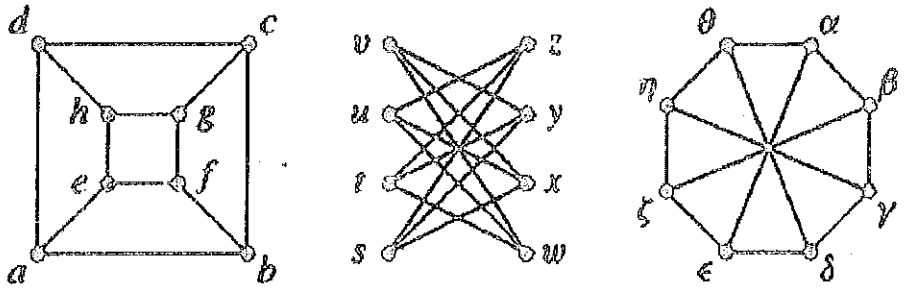
1. **[1.5 + 1.5 = 3 Marks] [CO1]**
   a. Which of the following are graphic sequences? Provide a construction or proof of impossibility for each of the following: i. (5, 5, 4, 4, 2, 2, 1, 1) ii. (5, 5, 5, 4, 2, 1, 1, 1)
   b. Prove that there is an n-vertex tournament with indegree equal to outdegree at every vertex if and only if n is odd.
2. **[3 Marks] [CO1]**
   Determine which pairs of graphs below are isomorphic (Figure 1).



a) b) c)

Figure 1

3. **[1.5 + 1.5 = 3 Marks] [CO1]**
   Let G be a graph with at least two vertices. Prove or disprove:
   a. Deleting a vertex of maximum degree cannot increase the average degree.
   b. Deleting a vertex of minimum degree cannot reduce the average degree.
4. **[1.5 + 1.5 = 3 Marks] [CO1]**
   a. Show how to find the maximum spanning tree of a graph, that is, the spanning tree of largest total weight.
   b. Design algorithm which, given an undirected graph G and a particular edge *e* in it, determines whether G has a cycle containing *e*.
5. **[1 + 1+ 1 = 3 Marks] [CO4]**
   a. Determine whether the following statement is true or false: 'A knowledge graph must always have an accompanying ontology that has been developed outright'.
   b. How can you merge nodes and create a relationship between them in Cypher?
   c. Write Cypher query to find all pairs of people who are exactly 2 hops away from each other in the Movie graph.