JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION - 2024

B.Tech-VI Semester (CSE/IT)

COURSE CODE (CREDITS): 20B1WCI732 (2) MAX. MARKS: 25

COURSE NAME: From Graph to Knowledge Graph

COURSE INSTRUCTOR: Ravindara Bhatt MAX. TIME: 1 Hour 30 Minutes

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

1. **[2.5 + 2.5 = 5 Marks] [CO2]**

a.

i. What is the size of the largest independent set in Figure A?

ii. What is the size of the largest CLIQUE in Figure A?

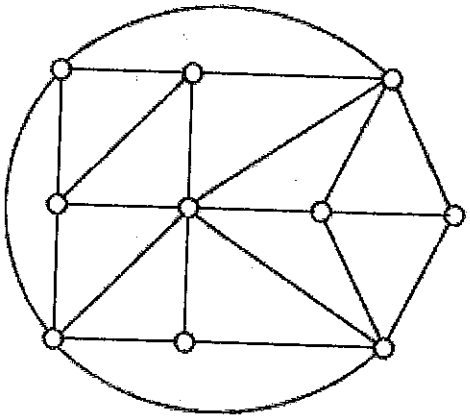

Figure A

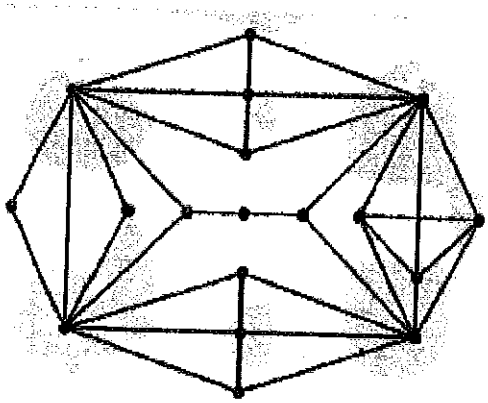

Figure B

b. Let M be a matching in a graph G, and let u be an M-unsaturated vertex. Prove that if G has no M-augmenting path that starts at u, then u is unsaturated in some maximum matching in G.

OR

Exhibit a maximum matching in the graph shown in Figure B.

2. **[2.5 + 2.5 = 5 Marks] [CO2]**

a. Give an efficient algorithm to solve the independent-set problem when each vertex in G has degree 2. Analyze the running time, and prove that your algorithm works correctly.

b. Give an example of the stable matching problem with two men and two women in which there is more than one stable matching.

3. **[2.5 + 2.5 = 5 Marks] [CO3]**

a. List and explain the challenges of natural language processing.

b. Compare and contrast Resource Description Framework (RDF) and Property Graph.

4. **[2.5 + 2.5 = 5 Marks] [CO3]**

a. Briefly describe three approaches for named entity recognitions.

b. Describe the following terms: Best fit crawlers, Semantic crawlers, and Learning crawlers.

5. **[2.5 + 2.5 = 5 Marks] [CO2]**

a. An *independent set* of a graph G = (V, E) is a subset $V' \subseteq V$ of vertices such that each edge in E is incident on at most one vertex in V'. The *independent-set problem* is to find a maximum-size independent set in G. Formulate a related decision problem for the independent-set problem, and prove that it is NP-complete.

b. Machineco has four machines and four jobs to be completed. Each machine must be assigned to complete one job. The time required to set up each machine for completing each job is shown in Table A. Machineco wants to minimize the total setup time needed to complete the four jobs. Use Hungarian algorithm to solve this problem.

Table A

Time (Hours)				
Machine	**Job 1**	**Job 2**	**Job 3**	**Job 4**
1	14	5	8	7
2	2	12	6	5
3	7	8	3	9
4	2	4	6	10