

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2026

B.Tech-VI Semester (CSE/IT)

COURSE CODE (CREDITS): 20B1WCI732 (2)

MAX. MARKS: 35

COURSE NAME: From Graph to knowledge Graph

COURSE INSTRUCTOR: Ravindara Bhatt

MAX. TIME: 2 Hours

Note: (a) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	a) With the help of a diagram explain the single Graph Neural Network (GNN) layer. b) Give the algorithm steps of TransE learning algorithm for knowledge graph. OR Can we do multi-hop reasoning i.e. answer complex queries on an incomplete, massive Knowledge Graph (KG)?	4	2.5+2.5
Q2	a) If G is a bipartite graph, then the maximum size of a matching in G equals the minimum size of a vertex cover of G. Prove or disprove. b) Illustrate the working of Greedy Bipartite matching with an example.	2	2.5+2.5
Q3	Prove or disprove: The complement of a simple disconnected graph must be connected. OR List three applications of knowledge graphs in practice.	3	5
Q4	Let G be a rooted tree where every vertex has 0 or k children. Given, k for what values of $n(G)$ is this possible? OR Consider the following network in Figure A (the numbers are edge	2	5

	capacities). (i) Find the maximum flow f and a minimum cut. (ii) Draw the residual graph G_f (along with its edge capacities). In this residual network, mark the vertices reachable from S and the vertices from which T is reachable. <pre> graph LR S((S)) -- 7 --> A((A)) S -- 6 --> B((B)) A -- 4 --> C((C)) A -- 2 --> D((D)) B -- 2 --> C B -- 3 --> D C -- 9 --> T((T)) D -- 5 --> T </pre> Figure A: Network with edge capacity		
Q5	Which of the following is/are true? Justify your answer? i) Ontologies are machine-readable and Interoperable ii) Ontologies can be built in a modular fashion iii) node2vec performs better on node classification. (True/ False) OR What are the major steps of an overall process model to build a knowledge graph	3	5
Q6	a. Name five situations that can be represented by means of graphs. Explain what the vertices and the edges denote? b. What is the edge connectivity of the complete graph of n vertices? c. Prove that every connected graph with three or more vertices has at least two vertices which are not cut-vertices. d. Prove that in a tree every vertex of degree greater than one is a cutvertex. e. Can you construct a graph if you are given all its spanning trees? How?	1	$2 * 5 = 10$