ABV- Indian Institute of Information Technology & Management, Gwalior

IT209: Graph Theory

Major Examination (Session 2023–24)

Maximum Time: 3 Hours   **Max Marks: 45**

Note: Attempt all questions. Justify your steps clearly to secure full marks.

1. (a) Define isomorphic graphs. Give necessary conditions for two graphs to be isomorphic. (b) Show with an example that isomorphism is an equivalence relation. (8 Marks)

2. (a) State and prove Euler's formula for planar graphs. (b) Verify Euler's formula for a cube graph. (8 Marks)

3. (a) Explain Kruskal's Algorithm for finding a Minimum Spanning Tree (MST). (b) Apply Kruskal's Algorithm on the given weighted graph (diagram to be provided). (8 Marks)

4. (a) Define chromatic number of a graph. (b) Find the chromatic number of C_5 and K_4. (7 Marks)

5. (a) Write Prim's Algorithm for MST and apply it to an example. (b) Compare Prim's and Kruskal's algorithms. (7 Marks)

6. Write short notes on any two: (i) Dijkstra's Algorithm (ii) Hamiltonian Graphs (iii) Applications of Graph Theory in Computer Science. (7 Marks)