Atal Bihari Vajpayee Indian Institute of Information Technology & Management, Gwalior

IT305: Optimization Techniques

Major Examination (Session 2024–25)

Maximum Time: 3 Hours **Max Marks: 50**

Note: Attempt any five questions. Support your answers with suitable diagrams.

1. (a) Derive the simplex method step by step. (b) Apply simplex to solve: Maximize $Z = 4x_1 + 3x_2$ subject to $2x_1 + x_2 \leq 8,\ x_1 + 2x_2 \leq 6,\ x_1, x_2 \geq 0$. (10 Marks)

2. (a) Explain duality in linear programming. (b) Construct the dual for the above problem. (8 Marks)

3. (a) Describe the Hungarian method for solving an assignment problem. (b) Solve the following assignment problem:

   911141161513131213681191012

   (9 Marks)

4. What is dynamic programming? Use it to solve the shortest path problem with suitable example. (8 Marks)

5. (a) Explain the Kuhn–Tucker (KKT) conditions for nonlinear programming. (b) Illustrate with a constrained optimization problem. (7 Marks)

6. Write short notes on any two: (i) Integer programming (ii) Goal programming (iii) Queueing models (8 Marks)