

THE LNM INSTITUTE OF INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Optimization Techniques and Applications(CSE 228)
Mid-Term Examination

Time: 90 minutes (02:00-03:30PM)
Date: 03/10/2019

Maximum Marks: 30

Instructions: Answer must be in brief and to the point. No query will be handled during exam. Though careful proof reading has been done, even then if you have any doubt/confusion regarding the question you can make your assumptions. You must write your assumptions clearly before you start attempting that question. If instructor thinks that your doubt/confusion/assumption is genuine, then it will be entertained.

Answer all questions

1. A Company is making a single product whose estimated demand for the next four months are 1000, 800, 1200 and 900 respectively. The company has a regular time capacity of 800 per month and over time capacity of 200 per month. The cost of the regular time production is 20 Rupees per unit and the cost of overtime is 25 Rupees per unit. The Company can carry inventory to the next month and the cost is 3 Rupees per unit per month. Formulate a linear programming problem to meet the demand every month with minimum cost. [5]

2. Solve the following Linear Programming Problem(LPP) by using Simplex Method [5]

Maximize $Z = x_1 + 2x_2$

Subject to

$$x_1 + 4x_2 \leq 8$$

$$x_1 + 2x_2 \leq 4, x_1, x_2 \geq 0$$

3. (a) Convert the following Linear Programming Problem from Primal to Dual.

$$\text{Maximize } Z = 4x_1 + 3x_2$$

Subject to

$$x_1 + x_2 \leq 1$$

$$x_1 + 2x_2 \leq 4, x_1, x_2 \geq 0.$$

- (b) Further analyze the relationship of their solutions using graphical method. [4]

4. Solve the following Linear Programming Problem using two-phase method. [1]

$$\text{Minimize } Z = x_1 + x_2$$

subject to

$$2x_1 + x_2 \geq 4$$

$$x_1 + 7x_2 \geq 7$$

** PTO **

5. Solve the following LP Problem by using Big-M method. [5]

$$\text{Minimize } Z = 5x_1 + 3x_2$$

subject to the constraints

$$2x_1 + 4x_2 \leq 12$$

$$2x_1 + 2x_2 = 10$$

$$5x_1 + 2x_2 \geq 10$$

$$x_1, x_2 \geq 0$$

6. Use Dual Simplex Method solve the following LP Problem. [5]

$$\text{Maximize } Z = -2x_1 - x_3$$

Subject to the constraints

$$x_1 + x_2 - x_3 \geq 5$$

$$x_1 - 2x_2 + 4x_3 \geq 8,$$

$$x_1, x_2, x_3 \geq 0$$

****END****