

THE LNM INSTITUTE OF INFORMATION TECHNOLOGY
 DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

 Optimization Techniques and Applications
 Mid-Term Examination

Time: 90 minutes (2.30 – 4.00 PM)

Date: 01/10/2018

Maximum Marks: 30

Answer all questions

Inst: Calculator may be used for simple mathematical computations.

PART-A

- ✓ 1. Solve the following LP Problem by using Simplex method.

Maximize $Z = 4x_1 + 3x_2$

subject to the constraints

300 400

- $2x_1 + x_2 \leq 1,000$
- $x_1 + x_2 \leq 800$
- $x_1 \leq 400$
- $x_2 \leq 700$

and $x_1, x_2 \geq 0$

[6]

- ✓ 2. Solve the following LP Problem by using Big-M method.

Maximize $Z = 2x_1 + 3x_2 + 4x_3$

Subject to constraints

0 60 120

- $3x_1 + x_2 + 4x_3 \leq 600$
- $2x_1 + 4x_2 + 2x_3 \geq 480$
- $2x_1 + 3x_2 + 3x_3 = 540$

and $x_1, x_2, x_3 \geq 0$

[6]

- ✓ 3. Solve the following LP Problem by using Dual Simplex method.

Maximize $Z = -2x_1 - 2x_2 - 4x_3$

Subject to constraints

- $2x_1 + 3x_2 + 5x_3 \geq 2$
- $3x_1 + x_2 + 7x_3 \leq 3$
- $x_1 + 4x_2 + 6x_3 \leq 5$

0 2 3 0

2 5 6
7 7 1and $x_1, x_2, x_3 \geq 0$

[6]

Please turn →

PART-B

4. A manufacturing firm has discontinued the production of a certain unprofitable product line. This has created considerable excess production capability. Management is considering to devoting this excess capacity to one or more of three products call them product 1, 2 and 3. The availability capacity on the machines that might limit output is summarized in the following table :

Machine Type	Available Time (in Machine-hours per weeks)
Milling Machine	165
Lathe	150
Grinder	50

The number of machine hours required for each unit of respective product is as follows:

Machine Type	Productivity (in Machine per unit)		
	Product-1	Product-2	Product-3
Milling Machine	8	2	3
Lathe	4	3	0
Grinder	2	—	1

The profit per unit would be Rs 20, Rs 6 and Rs 8 respectively for product 1, 2 and 3. Formulate into LP model to find how much of each product the firm should produce in order to maximize its profit. [4]

5. Obtain the dual problem of the following LP problem:

Minimize $Z = x_1 + 3x_2 + 2x_3$
subject to the constraint

- $2x_1 + 4x_2 + x_3 \leq 5$
- $x_1 - x_2 + 3x_3 = 7$
- $x_1 + x_2 \geq 6$

and $x_1, x_2, x_3 \geq 0$

[4]

6. Obtain the solution of the following Nonlinear Programming problem using **Direct substitution method** and test the extreme point whether that maximize or minimize of the given objective function.

$\frac{e}{m} \frac{b}{2} \frac{b}{7}$
Min

Optimize $Z = 3x_1^2 + x_2^2 + x_3^2$
Subject to $x_1 + x_2 + x_3 = 2$

and $x_1, x_2, x_3 \geq 0$

[4]

****END****