



Institute of Management
JK Lakshmipat University
Jaipur

END TERM EXAMINATION 2017

Programme: MBA Sem- I
MM: 50 Marks

Sub: Operations Research
Time: 3 Hours
Subject code: QT02

Instructions: Attempt any three questions from Section A. Section B is compulsory. Graph Paper will be provided.

Section A

Q1. The manager of an oil refinery must decide on the optimal mix of two possible blending processes of which the input and output per production run are given as follows:

Process (units)	Input (units)		Output	
	Crude A	Crude B	Gasoline X	Gasoline Y
1	5	3	5	8
2	4	5	4	4

The maximum available amount of crude A and B are 200 units and 150 units, respectively. Market requirements show that at least 100 units of gasoline X and 80 units of gasoline Y must be produced. The profit per production run from process 1 and process 2 are Rs. 300 and Rs. 400, respectively. Formulate this problem as an LP model to maximize profit.

(10)

Q2. Solve this problem by using LP problem

$$\text{Minimize } Z = 2X_1 + X_2$$

Subject to constraint

$$3X_1 + X_2 = 3$$

$$4X_1 + 3X_2 \geq 6$$

$$X_1 + 2X_2 \leq 4$$

$$X_1, X_2 \geq 0$$

(10)

Q3. A manufacturing firm produces two types of product A and B. The unit profit from the product A is Rs. 100 and that of product B is Rs. 50. The first goal of the firm is to earn a total profit of exactly Rs. 700 in the next week and the second goal is to achieve a sales volume for products A and B close to 5 and 4 respectively. Formulate the Goal programming model.

(10)

Q4. (a) What is the difference between Goal Programming and Linear Programming Approach? What do you mean by Goals and Objectives?

(b) Define Alternate optimum and Degeneracy in Linear Programming (5+5)

Q5. JOBCO manufactures two products on two machines. A unit of product 1 requires 2 hours on machine 1 and 1 hour on machine 2. For product 2, one unit requires 1 hour on machine 1 and 3 hours on machine 2. The revenue per unit of products 1 and 2 are \$30 and \$20 respectively. The total daily processing time available for each machine is 8 hours.

- (i) Find the optimal Solution by using graphical Method?
- (ii) If the daily capacity of the machine 1 is increased from 8 hours to 9 hours then find the new solution?
- (iii) If JOBCO can increase the capacity of both machines, which machine should receive priority? (3+3+4)

Section B

Q6. (a) Five Workers are available to work with the machines and the respective costs (in rupees) associated with worker-machine assignment are given below. A sixth machine is available to replace one of the existing ones and the associated of that machine costs are also given below

		Machines					
Workers		M1	M2	M3	M4	M5	M6
	W1	12	3	6	-	5	9
	W2	4	11	-	5	-	8
	W3	8	2	10	9	7	5
	W4	-	7	8	6	12	10
	W5	5	8	9	4	6	1

- (i) Determine whether the new machine can be accepted.
- (ii) Also, determines the optimal assignment and the associated saving in cost (8)

(b) A steel company has three open hearth furnaces and five rolling mills. The transportation costs (rupees per quintal) for shipping steel from furnaces to rolling mills are given in the following table

	M1	M2	M3	M4	M5	Supply
F1	4	2	3	2	6	8
F2	5	4	5	2	1	12
F3	6	5	4	7	7	14
Demand	4	4	6	8	8	

What is the optimal shipping schedule?

(12)