



Second Semester MCA Degree Examination, December 2011
Operations Research

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. Define OR. Explain the characteristics of OR models. (06 Marks)
 b. A manufacturer produces three models A, B and C of a certain product. He uses two types of raw materials M and N, of which, 6000 and 9000 units are available respectively. The raw material requirement per unit of the three models are given in the below table.

Raw material	Requirement per unit of model		
	A	B	C
M	2	3	5
N	4	2	7

The labour time for each unit of the model A is twice that of model B and thrice that of model C. The entire labour force of the factory can produce the equivalent of 1500 units of model A. The market survey indicates that the minimum demand of the three models is 200, 200 and 150 respectively. However, the ratios of the number of units produced must be equal 3:2:5. Assume that the profit/unit of models A, B and C are Rs. 30, Rs.20 and Rs. 50 respectively. Formulate the problem as an LPP. (14 Marks)

- 2 a. What are the limitations of graphical method is solving an LPP? (04 Marks)
 b. Asian Paints produces both interior and exterior house paints. The maximum availability of raw material, the requirement of raw materials per ton of each, type of paint and the wholesale price per ton are given in the following table:

Raw material	Tons of raw material / ton of paint		
	Exterior	Interior	Max. availability/day in tons
A	1	2	6
B	2	1	8
Wholesale price / ton in Rs.	4500	3000	

A market survey has established that the daily demand for interior paint cannot exceed that for exterior paint by more than one ton. The survey also reveals that maximum demand for interior paint is limited to two tons every day. Formulate the problem as an LPP and solve graphically. (16 Marks)

- 3 a. How are the following detected in simplex method?
 i) Infeasible solution ii) Unique optimal solution. (04 Marks)
 b. Solve the LPP. Minimize $Z = x_1 - x_2 + x_3 + x_4 + x_5 + x_6$
 Subject to $x_1 + x_4 + 6x_6 = 9$
 $3x_1 + x_2 - 4x_3 + 2x_6 = 2$
 $x_1 + 2x_2 + x_5 + 2x_6 = 6$
 $x_i \geq 0 \quad i = 1 \text{ to } 6.$ (16 Marks)

- 4 Consider the LPP. Maximize $Z = 15x_1 + 12x_2$
 Subject to $2x_1 + 6x_2 \leq 4$
 $4x_1 + x_2 \leq 3$
 $6x_1 + 6x_2 \leq 9$
 $x_1, x_2 \geq 0.$

- a. Write the dual of the above problem.
 b. Solve the dual problem by Big – M method.
 c. Read the solution of both primal and dual solutions. (20 Marks)