MANAGEMENT PROGRAMME

Term-End Examination

June, 2010

MS-51 : OPERATIONS RESEARCH

01073

Time : 3 hours   Maximum Marks : 100

(Weightage 70%)

Note :   Answer any **four** questions. All questions carry **equal** marks.

1.   (a)   "Operations Research (OR) is an aid for the executive in making his/her decisions by providing him/her with needed quantitative information based on the scientific method of analysis". Discuss the statement and give atleast two examples to illustrate how operations research is helpful in decision making.

(b)   A manufacturing company is producing two products A and B. Each requires processing on two machines 1 and 2. Product A requires 03 hours of processing on machine 1 and 02 hours on machine 2. Product B requires 2 hours of processing on machine 1 and 6 hours on machine 2. The unit profits for product A and product B

are Rs. 10 and Rs. 20 respectively. The available time in a given quarter on machine 1 and machine 2 are 1200 hrs and 1500 hrs respectively. The market survey has predicted that not more than 400 units of product A and not more than 250 units of product B can be sold in the given quarter. The company wants to determine the product mix to maximize the profits. Formulate the problem as linear programming mathematical model and determine the profit.

2. (a) Why is the simplex method a better technique than a graphical approach for most real cases ?

Construct the dual to the following primal problem :

$$\text{Max } z = 6x_1 + 10x_2$$

Subject to the constraints

$$4x_1 + 12x_2 \leq 100$$

$$6x_1 + 4x_2 \leq 70$$

$$10x_1 - 6x_2 \leq 20$$

$$x_2 \leq 20$$

$$x_1 \geq 0, \; x_2 \geq 0$$

(b)   In a grocery store, the daily demand of bread over a 100 days period has the following frequency distribution :

Daily Demand	0	1	2	3	4	5
Number of Days	5	25	35	20	5	10

Using the above data, and random numbers (27, 13, 80, 10, 54, 60, 49, 78, 66, 44), simulate a 10 - days sequence of the demand of bread.

3.   (a)   Suggest optimum assignment of 4 workers A, B, C and D to 4 Jobs I, II, III, and IV. The time taken by different workers in completing the different jobs is given below :

		JOBS			
		I	II	III	IV
	A	8	10	12	16
WORKERS	B	11	11	15	8
	C	9	6	5	14
	D	15	14	9	7

Also indicate the total time taken in completing the jobs.

(b) Find the initial solution of the following transportation problem by using Vogel Approximation Method :

DESTINATION

		P	Q	R	S	SUPPLY
SOURCE	A	21	16	25	13	11
	B	17	18	14	23	13
	C	32	17	18	41	19
DEMAND		6	10	12	15	

Also find its optimal solution by using MODI method.

4. (a) What are the limitations of Game theory ? Show how a two persons zero - sum game problem can be formulated as a linear programming problem.

(b) For the following game, find the optimal strategies of A and B and the value of the game by using the principle of dominance :

PLAYER B

	B_1	B_2	B_3	B_4
A_1	7	6	8	9
A_2	−4	−3	9	10
A_3	3	0	4	2
A_4	10	5	−2	0

PLAYER A (row labels A_1, A_2, A_3, A_4)

5. (a) "Small variations in optimal order size will not change the total cost appreciably". Do you agree with this statement ? Give Justification in support of your answer.

   (b) A purchase manager places an order each time for a lot of 500 units of product A. From the available data, the following results are obtained :

Inventory carrying cost	= 40% of purchase cost
Ordering cost per order	= Rs.600
Cost per unit	= Rs.50
Annual demand	= 1000

   Find out the loss to the organization due to his ordering policy.

6. Write short notes on *any three* of the following :

   (a) Travelling salesman problem

   (b) ABC Analysis

   (c) Non-linear programming

   (d) Similarities between dynamic programming and linear programming

   (e) Branch and bound method

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