MS-51

MANAGEMENT PROGRAMME

Term-End Examination   03179
December, 2011

MS-51 : OPERATIONS RESEARCH

Time : 3 hours   *Maximum Marks : 100*
                                    (Weightage 70%)

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

•1.   (a) A company produces two products A and B, each of which requires three types of processing. -The length of time for processing each unit and the profit per unit are given in the following table :

Process ↓	Product A (hr/unit)	Product B (hr/unit)	Available capacity per day (hr)
Process I	120	120	8,400
Process II	30	60	3,000
Process III	80	40	4,800
Profit per unit (Rs)	50	70	

How many units of each product should the company produce per day in order to maximize the profit ? (Use simplex method to solve the problem)

(b) What is the concept of Operations Research ? "Operations Research (OR) is useful only if applied with Information Technology". Comment.

2. (a) What functions does inventory perform ? State the two basic inventory decisions management must make in order to accomplish the functions of inventory just describe by you.

(b) A repair and maintenance company is engaged in providing service to a particular brand of popular vehicle. It uses 8000 units of a moving parts per year as replacements of the old parts. Each part costs Rs. 250/-. The setup costs are estimated at Rs. 100 and the inventory carrying cost is the average of such inventory at 20% of the price. Supply of the part is at the rate of 80 per day. Calculate the following :

(i) Optimal order quantity

(ii) Optimal number of set ups,

(iii) Total variable costs based on optimal policy.

Assume 310 working days in a year.

3. (a) Discuss various steps of Goal Programming model formulation. How does GP help in decision making ?

(b) A repair shop attended by a single machine has an average of four customers an hour who bring small appliances for repair. The mechanic inspects them for defects and quite often can fix them right away or otherwise render a diagnosis. This takes him six minutes, an average. Arrivals are Poisson and service time has exponential distribution. Determine

(i) the portion of time during which the shop is empty.

(ii) the probability of finding at least 1 customer in the shop.

(iii) the average number of customers in the system.

(iv) the average time spent, including service.

4. (a) What is a transportation problem ? How is it useful in business and industry ? Explain the differences and similarities between MODI method and stepping stone method used for solving transportation problem.

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(b) A department head has four subordinates and four tasks to be performed. Subordinates differ-in efficiency and tasks differ in their intrinsic difficulty. His estimate of time each man would take to perform each task is given in the matrix below :

	SUBORDINATE			
TASKS	1	2	3	4
A	8	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

How should the tasks be allotted, one to a man, so as to minimize the total manhours ?

5. (a) What do you understand by simulation ? How is a simulation technique better than mathematical models in solving problems of business and industry ? Discuss taking suitable examples.

(b) Solve the following game by using the dominance method.

PLAYER **B**

		B1	B2	B3
PLAYER A	A₁	3	6	8
	A2	—3	3	8
	A3	4	3	6

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

(a) A B C Analysis

(b) Dual of an LPP

(c) Saddle point in Game Theory

(d) Degeneracy in LP problem

(e) Periodic Review System

(f) Dynamic Programming

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