MANAGEMENT PROGRAMME

Term-End Examination

June, 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)   Discuss the historical background of Operations Research (O.R). Explain its significance and scope in Management Descision Making. Enumerate the limitations of O.R.

     (b)   Solve the following Linear Programming Problem graphically.

           Maximize $Z = 4x_1 + 6x_2$

           Subject to constraints

           $x_1 + x_2 = 5$

           $x_1 \geq 2$

           $x_2 \leq 4$

           $x_1, x_2 \geq 0$

2. (a) Derive the equation for Economic Batch Quantity (EBQ) for simultaneous production and consumption.

(b) The annual demand for an item is 3200 units. The unit cost is Rs 6/- and inventory carrying cost is 25% per annum. If the cost of one procurement is Rs 150/-, find out

(i) Economic Order Quantity

(ii) No. of orders per year

(iii) Time between two consecutive orders

(iv) The optimal cost

Mention assumptions made, if any.

3. (a) Discuss the application of dynamic programming in decision making. How is this different from linear programming ?

(b) An organization has three consultants. Each consultant can work upto 160 hours during next month during which three projects must be completed. Project 1 will take 130 hours, Project 2 will take 140 hours and Project 3 will take 160 hours. The amount (Rs.) per hour that can be billed for assigning each consultant to each project is given below :

Consultant	Project		
	1	2	3
1	1200	1500	1900
2	1400	1300	1200
3	1600	1400	1500

Formulate this as a transportation problem and find the optimal solution. What is the maximum total billing for next month ?

4. (a) Explain the meaning of Dominance Principle in Game Theory. Illustrate with a small example.

   (b) A bakery keeps stock of a popular brand of cakes. Previous experience shows the daily pattern for the item with associated probabilities as given :

Daily Demand (Nos)	0	10	20	30	40	50
Probability	0.1	0.2	0.15	0.5	0.02	0.03

   Use the following sequence of random numbers to simulate the demand for next 10 days. Also find the average demand per day. Random Nos. 25, 39, 65, 76, 12, 05, 73, 89, 19, 49.

5. (a) Discuss the parameters of Queuing Problem.

   (b) A self - service store employs one cashier at its counter. Nine customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service rate, find

(i) Average number of customers in the system.

(ii) Average number of customers in queue or average queue length.

(iii) Average time a customer spends in the system.

(iv) Average time a customer waits before being served.

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

(a) Branch and bound algorithm

(b) Goal Programming

(c) Non - linear Programming

(d) Assignment Problem

(e) Dual Linear Programming Problem

(f) Travelling salesman problem

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