

# MANAGEMENT PROGRAMME

## Term-End Examination

June, 2007

### MS-51 : OPERATIONS RESEARCH

Time : 3 hours

Maximum Marks : 100

(Weightage 70%)

**Note :** Answer any **four** questions.

1. (a) Formulate the transportation problem as generalised linear programming problem.

(b) Find the optimum transportation cost for the following problem. The unit transportation cost is given in the matrix below :

$$10+15=25$$

From \ To	I	II	III	IV	Available
A	15	10	17	18	2
B	16	13	12	13	6
C	12	17	20	11	7
Requirement	3	3	4	5	

2. (a) Discuss the various costs associated with queuing problem. Also explain the concept of optimum service rate and optimum cost.

(b) Given average arrival rate = 8 per hour, average service time = 5 min, calculate the average queue length, waiting time and idle time of facilities.

$$12+13=25$$

3. (a) Explain the various inventory control systems.

(b) A garment manufacturing firm buys 500 boxes which is a 3-months supply. The cost per box is Rs. 125/- and the ordering cost is Rs. 150/-. The inventory carrying cost is estimated at 20% of unit value.

(i) What is the total annual cost of the existing inventory policy ?

(ii) How much money could be saved by employing the economic order quantity ?

$$10+15=25$$

4. (a) Explain MAXIMIN, Saddle point, Pure strategy and Mixed strategy.

(b) Solve the following game whose pay-off matrix is given below.

		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
Firm A	A <sub>1</sub>	35	65	25	5
	A <sub>2</sub>	30	20	15	0
	A <sub>3</sub>	40	50	0	10
	A <sub>4</sub>	55	60	10	15

$$12+13=25$$

5. (a) Write the DUAL of the following PRIMAL problem. Also give the interpretation of both PRIMAL and DUAL problem in general.

$$\text{Minimize } z = 3x_1 + 2.25x_2$$

Subject to

$$2x_1 + 4x_2 \geq 40$$

$$3x_1 + 2x_2 \geq 50$$

$$x_1, x_2 \geq 0$$

- (b) Solve the Dual problem given in 5(a) through Simplex method.

$$12+13=25$$

6. Write short notes on any **four** of the following : 25

- (a) Principle of Modelling in O.R.
- (b) Branch and Bound method for solving Integer Programming Problem
- (c) Sensitivity Analysis of LP-Problem
- (d) Non-Linear Programming
- (e) Simulation

