MANAGEMENT PROGRAMME (MP)

Term-End Examination

June, 2020

MS-51 : OPERATIONS RESEARCH

Time : 3 Hours   *Maximum Marks : 100*

Weightage : 70%

Note : (*i*) *Attempt any four questions.*

(*ii*) *All questions carry equal marks.*

1. (a) "Executive at all levels in business and industry come across the problems of making decisions at every stage in their day-to-day activities. Operations research

provides them with various quantitative techniques for decision-making and enhance their ability to make long range plans and solve everyday problems of running a business and industry with greater efficiency, competence and confidence." Elaborate the statement with suitable examples.

(b) 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.

2. (a) What is goal programming ? Highlight major differences between linear programming and goal programming.

(b) Explain the Branch and Bound method for solving an integer programming problem.

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

(b) A motor company purchases 9000 motor spare parts for its annual requirement, ordering one month usage at a time. Each spare part costs ₹ 20. The ordering cost per order is ₹ 15 and the carrying charges are 15% of the average inventory per year.

You have been asked to suggest more economical purchasing policy for the company. What advice would you offer and how much would it save the company per year ?

4. (a) What do you understand by 'Game' in the context of Game theory ? What is the 'strategy' of a player ?

   (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 time, find :

   (i) Average number of customers in the system,

   (ii) Average number of customers in the queue,

   (iii) Average time a customer spends in the system, and

(iv) Average time a customer waits before

being served.

5. (a) Solve the following Linear Programming

Problem by Graphical method :

$$\text{Min } z = 4x_1 - 2x_2$$

Subject to :

$$x_1 + x_2 \leq 14$$

$$3x_1 + 2x_2 \geq 36$$

$$2x_1 + x_2 \leq 24$$

and $x_1, x_2 \geq 0$.

(b) A company has three plants at A, B and C

which   supply   warehouses   located   at

D_1, D_2, D_3 and D_4. Daily plant capacities

are   11,   13   and   19 · respectively.   Daily

warehouse requirements are 6, 6, 8 and 23

respectively. The unit transportation costs in Rupees are given below :

Warehouse

		D_1	D_2	D_3	D_4
	A	21	16	15	3
Plant	B	17	18	14	23
	C	32	27	18	41

Determine an optimum distribution for the company in order to minimize the total transportation cost by Vogel's approximation method. How much is the cost ?

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

(a) Buffer stock

(b)   Degeneracy in LP problem

(c)   North West Corner rule

(d)   Sensitivity Analysis

(e) $2 \times n$ games

(f)   Unbounded solution