15559

MBA 2nd Semester Examination

Quantitative Methods and Operations Research (NS)

MBA-201

Time : 3 Hours   **Max. Marks : 60**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : (i) Attempt all parts of question in Section-A. Each question carries 2 marks.

(ii) Attempt any four questions from Section-B. Each question carries 5 marks.

(iii) Attempt any two questions from Section-C. Each question carries 10 marks.

SECTION - A
(Do all parts)

1. (i) Differentiate between slack and artificial variable.

(ii) Write the dual of

Min $Z = 3x_1 + 4x_2$

Subject to $4x_1 + x_2 >= 30$

$-x_1 - x_2 <= -18$

$x_1 + 3x_2 >= 28$ where $x_1, x_2 >= 0$

(iii) Is it necessary that the game should always have a saddle point? Illustrate by giving an example.

(iv) Define Trans-shipment Problem.

(v) Explain the terms Free float and Independent float.

[P.T.O.]

(vi) Discuss the similarity and difference in transportation and assignment model.

(vii) Explain the characteristics of queuing system.

(viii) What are the major weaknesses of EOQ model?

(ix) What is the significance of operations research in modern management?

(x) List two uses of replacement model.   (2×10=20)

SECTION - B
(Do any four questions)

2. Solve the following by graphical method

Maximize $z = 16x_1 + 8x_2$

Subject to $6x_1 + 4x_2 >= 24$

$4x_1 + 2x_2 <= 16$

$3.5x_1 + 3x_2 <= 21$ where $x_1 >= 0, x_2 >= 0$ (5)

3. What is decision making under 'risk'? How are decisions made under risky situations?   (5)

4. Determine the optimal assignment schedule.

		Deficit cities				
		I	II	III	IV	V
	A	16	13	17	19	20
	B	13	12	13	16	17
Surplus	C	14	11	15	17	18
Cities	D	5	50	8	8	11
	E	5	35	7	8	10

(5)

5. A firm is using a machine whose purchase price is Rs. 13,000. The installation charges amount to Rs. 3600 and the machine has a scrap value of only Rs. 1600. The maintenance cost in various years is given in the following table.

Year   :   1   2   3   4   5   6   7   8   9

Cost, Rs. :   250 750 1000 1500 2100 2900 4000 4800 6000

The firm wants to determine after how many years the machine should be replaced on economic considerations. Assume that the machine can be replaced only at the year end.   (5)

6. What are the major characteristics of PERT model and CPM model? Which one is better model for decision making?   (5)

7. Use the principle of dominance to solve the game

			Player B		
		I	II	III	IV
	I	3	5	4	2
Player A	II	5	6	2	4
	III	2	1	4	0
	IV	3	3	5	2

(5)

SECTION - C
(Do any two questions)

8. Use simplex method to Maximize $z = 6x_1 + 10x_2 + 2x_3$

subject to constraints $2x_1 + 4x_2 + 3x_3 <= 40$

$$x_1 + x_2 <= 10$$

$$2x_2 + x_3 <= 12 \text{ and } x_1, x_2, x_3 >= 0$$

(10)

[P.T.O.]

9. What are the essential characteristics of operation research? Discuss the role and scope of quantitative methods for scientific decision making in business management.   (10)

10. 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 no. customers in the system.

(ii)   Average no. 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.

(v)   Utilization factor of the service station.   (10)

11. Find the optimal solution to the following transportation problem.

From \ To	Sales office A	Sales office B	Sales office C	Total
Factory - A	1	2	15	100
Factory - B	3	2	1	130
Factory - C	12	5	6	75
Factory - D	3	1	2	95
Total	120	80	200	

(10)