(2063)

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MBA 2nd Semester Examination

Quantitative Methods and Operations Research (N.S.)

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.

(ii) Attempt any four questions from Section-B.

(iii) Attempt any two questions from Section-C.

SECTION - A (Do all parts)

1. (i) Briefly describe advantages and limitations of Operations Research.

(ii) Discuss briefly about the most widely used criterion for evaluating various alternatives in decision making under risk.

(iii) Briefly describe decision Tree Analysis.

(iv) Take a linear programming problem example and write its dual problem.

(v) What are important steps in the application of PERT/CPM?

(vi) What is North West Corner method? Where to we use it?

(vii) What is meant by optimal strategy in game theory?

(viii) In a querring system with Poissonian arrivals and exponential departures and having traffic intensity ρ (<1), what is the probability that there are less than n customers in a single sever system?

(ix) Explain the dominance principle used in the reduction of order of pay-off matrix of a game problem.

(x) What are the various types of inventories? **(2×10=20)**

SECTION - B (Do any four questions)

2. What are the Operations Research models in practice? **(5)**

3. Discuss about various Criteria of decision-making under uncertainty. **(5)**

4. Solve the following problem using graphical method:

   Maximize

   $z = 3x + 2y$

   subject to constraints

   $x - y \leq 2$

   $x + y \leq 4$

   where x_1 $y \geq 0$ **(5)**

5. For the game problem prescribed by pay-off matrix to player A and given by

$$A \begin{matrix} \\ I \\ II \end{matrix} \overset{B}{\begin{bmatrix} I & II \\ 2 & 5 \\ 7 & 3 \end{bmatrix}}$$

   determine the value of the game and optimum strategies for two players. **(5)**

6. Solve the assignment problem prescribed by the cost matrix of person versus jobs.

$$\begin{array}{c} \\ P_1 \\ P_2 \\ P_3 \\ P_4 \end{array}\begin{array}{c} \begin{array}{cccc} J_1 & J_2 & J_3 & J_4 \end{array} \\ \begin{bmatrix} 8 & 26 & 17 & 21 \\ 13 & 28 & 4 & 26 \\ 38 & 19 & 18 & 15 \\ 19 & 26 & 24 & 10 \end{bmatrix} \end{array}$$

to find the minimum cost of assignment. **(5)**

7. The data on the operating cost per year and resale price of a machine having a cost price of Rs. 10,00 are given below :

Year	1	2	3	4	5	6	7
Operating Cost (Rs.)	1500	1990	2300	2900	3600	4500	5500
Resale Value (Rs.)	5000	2500	1250	600	400	400	400

Find the optimum period of replacement. **(5)**

SECTION - C (Do any two questions)

8. Maximize $z = 3x_1 - 2x_2 - x_3$

subject to constraints

$4x_1 - 2x_3 \leq 12$

$3x_1 + 8x_2 - 4x_3 \leq 10$

$-x_1 + 3x_2 + 3x_3 \leq 7$

where $x_1, x_2, x_3 \geq 0$. **(10)**

9. The availability of number of units of a product at factories F_1, F_2, F_3 and F_4 is given; the requirement at warehouse w_1, w_2 and w_3 of that product is also given. The cost matrix giving cost of transportation per unit of product from the factory to warehouse is as given below.

	W_1	W_2	W_3	Availability
F_1	8	4	7	50
F_2	5	7	9	100
F_3	6	9	5	70
F_4	9	5	4	30
Requirement	50	80	100	

Determine the number of units to be allocated along routes from factories to warehouses which gives least cost of transportation. **(10)**

10. At a service station manned by one service provider, arrivals follow Poissonian distribution and departure after service follow exponential distribution. On the average one customers arrives every to minutes and a customer requires on the average 6 minutes to be served. Find out:
    (i) Average no. of customers in the system.
    (ii) Average no. of customers in the queue.
    (iii) Average time spent in the system.
    (iv) Average time spent in the queue.
    (v) Probability that there will be four customers in the system.
    (vi) Probability that the customer in served on arrival.
    (vii) Utilization factor of the service station. **(10)**

11. (a) What in the significance and scope of operation research in modern management? **(5)**
    (b) Explain how and why operation Research methods have been valuable in aiding executive decisions. **(5)**