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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) What are different models used in operations research?
- (ii) Name different criteria of decision making under uncertainty.
- (iii) What are the limitations of graphical method of solution of linear programming problem?
- (iv) Name at least four problems which are special cases of minimum-cost network flow problem.
- (v) Briefly state the steps involved in PERT.
- (vi) When do we use two-phase simplex method in linear programming problems?
- (vii) What are the steps in Himgarian method of solution of assignment problems?
- (viii) What is meant by a two persons zero sum game? Discuss with the help of an example.

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[P.T.O.]

- (ix) What are different queue disciplines in waiting line problems?
- (x) Discuss about the concept of EOQ. (2×10=20)

SECTION - B (Do any four questions)

2. What is the methodology of operations Research?
3. Discuss about the types of decision making environments.
4. Solve the following problem using graphical method:
 Maximize $z = x + 5y$
 subject to the constraints
 $-x + 3y \leq 10$
 $x + y \leq 6$
 $x - y \leq 2$
 where $x, y \geq 0$
5. For the game problem prescribed by pay-off matrix to player A given by

$$A \begin{matrix} I \\ II \end{matrix} \begin{matrix} B \\ I \quad II \end{matrix} \begin{bmatrix} 12 & 15 \\ 14 & 10 \end{bmatrix}$$

Find the value of the game and optimum strategies for the two players.

6. Solve the assignment problem prescribed by the cost matrix for staff versus machine.

		machine			
		M_1	M_2	M_3	M_4
Staff	P_1	14	5	8	7
	P_2	2	12	6	5
	P_3	7	8	3	9
	P_4	2	4	6	10

to find minimum cost of assignment.

7. A machine costs Rs. 20,000 and its year end resale value and operating cost data is given below:

Year	1	2	3	4	5	6
Operating Cost (Rs.)	5000	6000	7500	8000	8500	9500
Resole Value (Rs.)	15000	13000	10000	8000	6000	5000

Determine the optimum period of replacement. **(4×5=20)**

SECTION - C (Do any two questions)

8. Maximize $z = 5x_1 + 4x_2 + 3x_3$

Subject to constraints

$$3x_1 + 2x_3 \leq 8$$

$$2x_1 + 5x_2 \leq 10$$

$$2x_1 + 4x_2 + 3x_3 \leq 15$$

where $x_1, x_2, x_3 \geq 0$

(10)

9. A business organization has production facilities at locations A, B and C and has distribution facilities at locations D, E and F. The cost of transportation per unit from production facility to the distribution facility is given in the following cost matrix. The available stock at production facility and requirement at distribution facility is also given. Determine the number of units to be allocated along the source to destination routes which results in least cost of transportation.

	D	E	F	Availability
A	50	30	220	100
B	90	45	170	300
C	250	200	50	400

Requirement 400 200 200

(10)

[P.T.O.]

10. Arrival rate of customers at an office is Poisson distributed with a mean of 10 customers per hour. Service time is exponentially distributed with average time taken to serve a customer is 4 minutes. Find out the following:
- (i) Average no. of customers in the system and in the queue.
 - (ii) Average waiting time spent in the system and the queue.
 - (iii) Probability that a customer has to wait.
 - (iv) Probability that the customer is served on arrival.
 - (v) Utilization factor of the service station. **(10)**
11. (a) What factors have contributed to the growing popularity of operations research in business? **(5)**
- (b) State the different types of models in operations research. Explain briefly the general methods for solving these operations research models. **(5)**