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Question Paper Code :MB2501

MBA DEGREE EXAMINATION APRIL/ MAY 2026

Second Semester

25MBC201- Applied Operations Research

(Regulation: 2025)

Time : 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Define feasible solution.
2. Describe the methods used to solve an LPP involving artificial variables?
3. Describe the difference between transportation and assignment problem.
4. What is an unbalanced assignment problem? How will you make it balanced?
5. What is a two person zero-sum game?
6. Explain dominance rule of the matrices.
7. List any two assumption of Purchasing model with no shortages.
8. List any three types of inventory.
9. Write down the little's formula.
10. Name any two languages using operation research.

Part – B (5 x 13 = 65 marks)

11. a) Solve the following problem by simplex method.

Maximize $Z = 20x_1 + 6x_2 + 8x_3$

Subject to the constraints

$$8x_1 + 2x_2 + 3x_3 \leq 250,$$

$$4x_1 + 3x_2 \leq 150,$$

$$2x_1 + x_3 \leq 50,$$

$$x_1, x_2, x_3 \geq 0$$

OR

b) Use Two phase method to

$$\text{Maximize } Z = 5x_1 + 3x_2$$

Subject to the constraints

$$2x_1 + x_2 \leq 1,$$

$$x_1 + 4x_2 \leq 6,$$

$$x_1, x_2 \geq 0$$

12. a) Find the non-degenerate basic feasible solution for the following transportation problem using least cost method and vogel's approximation method.

	To				Supply
From	10	20	5	7	10
	13	9	12	8	20
	4	5	7	9	30
	14	7	1	0	40
	3	12	5	19	50
Demand	60	60	20	10	

OR

- b) A batch of 4 jobs can be assigned to 5 different machines. The set up time for each job on various machines is given below.

	Machine					
Job		1	2	3	4	5
	1	10	11	4	2	8
	2	7	11	10	14	12
	3	5	6	9	12	14
	4	13	15	11	10	7

From an optimal assignment of jobs to machines which will minimize the total set up time.

13. a) Use graphical method in solving the following game and find the value of the game.

Player A	Player B			
	B1	B2	B3	B4
A1	2	2	3	-2
A2	4	3	2	6

OR

- b) Solve the game $\begin{pmatrix} 1 & -1 & -2 \\ -1 & 1 & 1 \\ 2 & -1 & 0 \end{pmatrix}$ by algebraic method.

14. a) The annual demand of an item is 3200 units. The unit cost is Rs.6 and inventory carrying charges 25% per annum. If the cost of one procurement is Rs.150. Determine
- EOQ
 - No of orders per year
 - Time between two consecutive order
 - the optimal cost.

OR

- b) Demonstrate Individual replacement model with and without time value of money.
15. a) Patients arrive at a clinic according to Poisson distribution at a rate of 30 patients per hour the waiting room does not accommodate more than 14 patients. Examination time per patient is exponential with mean rate of 20 per hour.
- What is the probability that an arriving patient does not have to wait?
 - What is the expected waiting time until a patient is discharged from the clinic?

OR

- b) Customers arrive at a one-man barber shop according to a Poisson distribution with a mean interarrival time of 12 min. Customers spend an average of 10 min in the barber's chair.
- What is the expected no. of customers in the barber shop and in the queue?
 - What is the probability that more than 3 customers are in the system?

PART C (1 X 15 = 15)

16. a) There are 3 typists in an office each typist can type an average of 6 letters/hours. If letters arrive for being typed at the rate of 15 letters/hour.
- (i) What fraction of the time all the typists will be busy?
 - (ii) What is the average no. of letters waiting to be typed?
 - (iii) What is the average time a letter has to spend for waiting and for being typed?
 - (iv) What is the probability that a letter will take longer than 20 mins waiting to be typed and being typed?

OR

- b) Demonstrate emerging trends and tools for Quantitative decision making with example.