

GUJARAT TECHNOLOGICAL UNIVERSITY
MBA-SEMESTER-III-EXAMINATION-SUMMER-2025

Subject Code: 4539271**Date: 02/06/2025****Subject Name: Operations Research****Time: 02:30 PM TO 05:30 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of simple calculators and non-programmable scientific calculators are permitted.

- Q.1** Answer the following briefly: **14**
- a) Pure strategies in game theory
 - b) Steps of simulation
 - c) Characteristics of queueing system
 - d) Binding constraints in LPP
 - e) Steady-state equilibrium in Markov chain
 - f) Degeneracy in transportation model
 - g) Methodology of Operations Research

- Q.2 (a)** Discuss various methods used in transportation model for obtaining the initial basic feasible solution. **07**

- (b)** Solve the following LPP using graphical method: **07**

$$\begin{aligned} \text{Maximize } Z &= 100X + 150Y \\ \text{STC} \quad 5X + 2Y &\leq 180 \\ 3X + 3Y &\leq 135 \\ 2X - Y &\geq 0 \end{aligned}$$

Where $X, Y \geq 0$.

OR

- (b)** Develop the Dual for the following LPP: **07**

$$\begin{aligned} \text{Minimize } Z &= 10X + 20Y \\ \text{STC} \quad 3X + 2Y &\geq 18 \\ X + 3Y &\geq 8 \\ 2X - Y &\leq 6 \end{aligned}$$

Where $X, Y \geq 0$

- Q.3 (a)** Gujarat electric produces and sell two models of lamps L1 and L2 with per unit profit of Rs. 15 and Rs. 10 respectively. The process involves two workers W1 and W2, who are available for this kind of work with maximum 100 and 80 hours per month respectively. W1 assembles L1 in 20 minutes and L2 in 30 minutes. W2 paints L1 in 20 minutes and L2 in 10 minutes. Formulates this as LPP to maximize the profit for Gujarat electric. **07**

- (b)** What do you understand by waiting line theory? Discuss the probability distributions in waiting line system. **07**

OR

- Q.3 (a)** Explain the structure of linear programming model. **07**

- (b)** What is the advantage of simplex method over graphical method? Explain the **07**

process of simplex method in case of minimization problem.

- Q.4 (a)** Explain Monte-Karlo simulations. **07**
(b) Discuss the importance of TORA in OR. **07**

OR

- Q.4 (a)** Depict your understanding for degeneracy in LPP. **07**
(b) Write a note on sensitivity analysis. **07**

- Q.5** A Construction company needs 300,600,700 and 400 million cubic feet of fill at four earthen dam sites in Gujarat. It can transfer the fill from three mound A, B and C with the capacity of 700, 400, and 800. The per unit cost of transportation million cubic feet of fill from mound to the four sites in lakhs are given below: **14**

Particulars	I	II	III	IV
A	5	7	13	10
B	8	6	14	13
C	12	10	9	11

Answer the following:

- a) Is this the balanced transportation problem? Develop the transportation model of this data.
b) Find the initial solution by VAM.

OR

- a) Formulate the problem as Transportation model.
b) Find the optimal solution by MODI method to minimize the cost.
