

GUJARAT TECHNOLOGICAL UNIVERSITY

MBA - SEMESTER - III EXAMINATION - WINTER 2025

Subject Code: 4539271

Date: 17-12-2025

Subject Name: Operations Research

Time: 10:30 AM TO 01:30 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 Discuss the following concepts briefly: **14**

- a) Operations Research
- b) Advantages of model building
- c) Sensitivity analysis in LPP
- d) Unboundedness in LPP
- e) Pure strategies in game theory
- f) North-West corner method in transportation model
- g) Steady-state probability in Markov chain

Q.2 (a) In which situation of LPP, graphical method is used for solving the problem? **07**
Briefly explain graphical method in LPP.

(b) Develop the dual of the following LPP: **07**

$$\begin{aligned} \text{Maximize } Z &= 80X + 110Y \\ \text{STC} \quad 4X + 2Y &\leq 200 \\ 2X + 3Y &\leq 130 \\ 2X - Y &\geq 10 \end{aligned}$$

Where $X, Y \geq 0$.

OR

(b) Depict your understanding for primal and dual in LPP. How dual is different from primal? **07**

Q.3 (a) Discuss game theory with reference to two-person zero sum game. **07**

(b) Explain various application areas of Linear Programming. **07**

OR

Q.3 (a) Food X contains 20 units of vitamin A and 40 units of vitamin B per gram. Food Y contains 30 units of each vitamin A and vitamin B per gram. The daily minimum human requirement of vitamin A and B are 900 units and 1200 units respectively. How many grams of each type of food should be consumed so as to minimize the cost, if food X costs Rs. 6 per gram and food Y costs Rs. 8 per gram. **07**

Formulate this problem as linear programming problem.

(b) Depict your understanding for single server queuing model. **07**

Q.4 (a) Explain the importance of TORA in Operations Research. **07**

(b) Discuss different variations in transportation model. **07**

OR

- Q.4 (a)** What are the Guidelines on linear programming model formulation? Discuss. **07**
- (b)** How the simplex method is useful in solving minimization linear programming problem? **07**

- Q.5** A distribution company have 3 warehouses I, II and III with a demand of 25, 55 and 20 units respectively. It can be transferred from the factories A, B, C with a capacity of 45, 15 and 40 units respectively. The per unit cost of transportation from the factories to the warehouses are given below: **14**

Particulars	I	II	III
A	10	7	8
B	15	12	9
C	7	8	12

Answer the following:

- Develop the transportation model of this data.
- Find the initial solution by VAM and calculate the transportation cost.

OR

- Formulate the problem as Transportation problem.
- Find the optimal solution to minimize the cost and calculate the optimal cost.
