

2026

Statistics (Core)

Paper Code : ST-CE-6314

Paper Name : Operations Research

Time : 2 hours

Full Marks : 50

The figures in the margin indicate full marks for the questions.

1. Answer the following questions as directed : 1×4=4
- a) The variables in LPP are usually required to be :
- i) Negative
 - ii) Non-negative
 - iii) Complex
 - iv) Imaginary
- (Choose the correct option)
- b) The objective of a transportation problem is to :
- i) Maximize profit only
 - ii) Minimize transportation cost
 - iii) Maximize production
 - iv) Minimize demand
- (Choose the correct option)
- c) The time between placing an order and receiving the goods is called :
- i) Demand time
 - ii) Lead time
 - iii) Waiting time
 - iv) Supply time
- (Choose the correct option)
- d) If maximin equals minimax, the game has a _____ point.
(Fill in the blank)

Contd.

2. Answer the following questions : $2 \times 3 = 6$
- a) State the mathematical formulation of a transportation problem.
 - b) Define Pay off matrix in context with game theory.
 - c) State the main objectives of inventory control.
3. Answer *any two* of the following questions : $5 \times 2 = 10$
- a) Solve graphically :
Maximize $Z = 3x + 2y$
Subject to $x + y \leq 4$
 $x + 2y \leq 6$
 $x, y \geq 0$
 - b) Explain Vogel's Approximation Method (VAM) to obtain an initial basic feasible solution.
 - c) What is ABC analysis ? Classify the items under A, B and C categories.
 - d) Explain the origin and development of Operations Research (OR).
4. Answer *any three* of the following questions : $10 \times 3 = 30$
- a) A company produces two products A and B.
Each unit of A requires 2 units of raw material and 1 hour of labour.
Each unit of B requires 1 unit of raw material and 2 hours of labour.
The company has 100 units of raw material and 80 hours of labour available.
The profit earned is Rs 40 per unit of A and Rs 30 per unit of B.

Formulate the Linear Programming Problem and solve it using the Simplex Method to find the maximum profit. 10

- b) Explain the concept of Economic Order Quantity (EOQ).

A company uses 10,000 units of a particular item per year. The cost of placing one order is Rs 50, and the holding cost per unit per year is Rs 2.

i) Determine the EOQ.

ii) Find the number of orders per year.

iii) Calculate the total annual inventory cost. $4+2+2+2=10$

- c) The cost of transporting a commodity from the three sources S_1, S_2, S_3 to four destinations D_1, D_2, D_3, D_4 is given below:

	D1	D2	D3	D4	Supply
S1	2	3	11	7	6
S2	1	0	6	1	1
S3	5	8	15	9	10
Demand	7	5	3	2	

Find the initial basic feasible solution using the Least Cost Method. 10

- d) Explain the concept of Game Theory. Define the following terms :

Payoff matrix

Saddle point

Pure strategy

Value of the game

Solve the following game and determine the optimal strategies and value of the game.

	B1	B2	B3	
A1	3	2	4	
A2	1	5	0	
A3	2	3	6	$2+4+4=10$

- e) i) What is saddle point ? Explain the method of detecting a saddle point. 5
- ii) Explain zero-sum two person game giving suitable example. 5
- f) Obtain the EOQ of an inventory model where production is instantaneous, shortages are not allowed and rate of demand is different in production cycles. 10

