

Duration: 3 Hrs

Total Marks: 80

Please check whether you have got the right question paper

N.B: (1) Question 1 is **compulsory**.

(2) Attempt any **Three questions** out of remaining **Five questions**.

(3) Assume any **necessary data**, if required, but **justify the same**.

(4) **Figures** to the **right** indicate **full marks** for that question.

(5) Use of Scientific **calculator** is **allowed**.

Q.1 A) Solve the following LPP using Graphical Method [05]

Maximize $Z = x + y$

Subject to $x + 2y \leq 8$

$3x + 2y \leq 12$

$x, y \geq 0$

B) What is simulation? Write steps of Simulation. [05]

C) Solve the following assignment problem and find the optimum assignment that will result in minimum cost. [05]

		Workers		
		A	B	C
Jobs	1	120	100	80
	2	80	90	110
	3	110	140	120

D) Determine the optimum strategies for the players and the value of the game. [05]

		Player B			
		B1	B2	B3	B4
Player A	A1	1	7	3	4
	A2	5	6	4	5
	A3	7	2	0	3

Q.2 A) Find initial basic feasible solution for the following transportation problem [10]
by using

i) North West Corner Method

ii) Least Cost Method

	B1	B2	B3	Supply
A1	26	23	10	61
A2	14	13	21	49
A3	16	17	29	90
Demand	52	68	80	

- B) The Strategies and events of milk products company are as follows: [10]

		Events		
		E1	E2	E3
Strategy	S1	80	40	25
	S2	60	55	10
	S3	40	50	40

Which strategy should the concerned executive choose on the basis of

- Maximin criterion
- Maximax criterion
- Hurwicz criterion ($\alpha = 0.5$)
- Laplace criterion

- Q.3 A) Solve the following LPP by using Simplex Method [10]

Maximize $Z = 3x + 2y$

Subject to $x - y \leq 1$

$3x - 2y \leq 6$

$x, y \geq 0$

- B) Find the optimum strategies and value of the game where pay-off matrix of the two player is given by [10]

		Player B		
		B1	B2	B3
Player A	A1	7	3	1
	A2	1	7	3
	A3	0	1	7

- Q.4 A) Solve the following LPP by using Big M Method [10]

Minimize $Z = 4x_1 + x_2$

Subject to $3x_1 + 4x_2 \geq 20$

$x_1 + 5x_2 \geq 15$

$x_1, x_2 \geq 0$

- B) Find optimum solution for the following transportation problem by using MODI method. [10]

	D1	D2	D3	Supply
S1	26	23	10	61
S2	14	13	21	49
S3	16	17	29	90
Demand	52	68	80	

- Q.5 A) A salesman wants to visit cities A, B, C and D. He does not want to visit any city twice before completing the tour of all the cities and wishes to return to his home city, the starting station. Cost of going from one city to another in rupees is given in the table. Find the route with minimum cost. [10]

		To city			
		A	B	C	D
From city	A	0	48	18	42
	B	43	0	52	42
	C	84	34	0	62
	D	43	43	39	0

- B) Solve the following LPP by using Two Phase Method [10]
 Maximize $Z = 5x_1 - 4x_2 + 3x_3$
 Subject to $2x_1 + x_2 - 6x_3 = 20$
 $6x_1 + 5x_2 + 10x_3 \leq 76$
 $8x_1 - 3x_2 + 6x_3 \leq 50$
 $x_1, x_2, x_3 \geq 0$

- Q.6 A) A perfume shop keeps stock of a popular brand of perfumes. Previous experience shows the daily demand for the shirt with associated probabilities as given below: [10]

Daily Demand	0	10	20	30	40	50
Probabilities	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random numbers to simulate the demand for next 10 days.

Random Numbers: 26, 40, 66, 77, 13, 09, 74, 90, 18, 48.

Also estimate the daily average demand for the perfume on the basis of the simulated data. Use Monte-Carlo method.

- B) In a bank, 20 customers on the average are served by a cashier in an hour. If the service time has exponential distribution, what is the probability that [10]
 a) It will take more than 10 minutes to serve a customer?
 b) A customer shall be free within 4 minutes?
