M.Sc. (Mathematics) (CBCS / NEW CBCS Pattern) Sem-III

PSCMTH15 (A) / PSCMTHT15-1 - Optional : Operations Research -I

P. Pages : 4 **GUG/W/22/13763**

Time : Three Hours * 3 4 6 7 * Max. Marks : 100

Notes : 1. Solve all the **five** questions.
2. Each question carry equal marks.

UNIT – I

1. a) Use simplex method to solve **10**

Max. $Z = 4x_1 + 10x_2$

Subject to the constraints

$2x_1 + x_2 \leq 50,$

$2x_1 + 5x_2 \leq 100$

$2x_1 + 3x_2 \leq 90$

$x_1, x_2 \geq 0$

b) Use two phase simplex method to solve **10**

Max $Z = 3x_1 + 2x_2$

Subject to constraints

$2x_1 + x_2 \leq 2$

$3x_1 + 4x_2 \geq 12$

$x_1, x_2 \geq 0$

OR

c) Use duality to solve the L.P.P. **10**

Minimize $Z = 2x_1 + x_2$

Subject to the constraints

$x_1 + 2x_2 \leq 10$

$x_1 + x_2 \leq 6$

$x_1 - x_2 \leq 2$

$x_1 - 2x_2 \leq 1$

$x_1, x_2 \geq 0$

d) Obtain the dual of LPP & Solve: **10**

Minimize $Z = 15x_1 + 10x_2$

Subject to the constraints

$3x_1 + 5x_2 \geq 5$

$5x_1 + 2x_2 \geq 3$

$x_1, x_2 \geq 0$

UNIT – II

2. a) Determine an Initial basic feasible solution to the following T.P. by using N – W corner rule. **10**

	D_1	D_2	D_3	D_4	Availability
O_1	5	3	6	2	19
O_2	4	7	9	1	37
O_3	3	4	7	5	34
Demand	16	18	31	25	

b) Consider the problem of Assignment jobs to five person. **10**
The assignment costs are given as follows

		Jobs				
		1	2	3	4	5
Person	A	8	4	2	6	1
	B	0	9	5	5	4
	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

OR

c) Obtain an initial basic feasible solution to the following T.P. using the Vogel's Approximation method. **10**

		I	II	III	IV	
Ware house	A	5	1	3	3	34
	B	3	3	5	4	15
	C	6	4	4	3	12
	D	4	-1	4	2	19
		21	25	17	17	80

Availability

Requirement

d) Determine an initial basic feasible solution to the following T.P. using the column minima method. **10**

		To			
From		16	19	12	14
		22	13	19	16
		14	28	8	12
		10	15	17	

Availability

Requirement

UNIT – III

3. a) Use dynamic programming to solve the following L.P.P. **10**

Minimize $Z = 3x_1 + 5x_2$

Subject to the constraints

$x_1 \le 4, x_2 \le 6$

$3x_1 + 2x_2 \le 18$

$x_1, x_2 \ge 0$

b) Write the characteristics of Dynamic programming. **10**

OR

c) Use the dynamic programming to show that **10**

$Z = P_1 \log P_1 + P_2 \log P_2 + ... + P_n \log P_n$

Subject to the constraints

$P_1 + P_2 + ... + P_n = 1$ and $P_i \ge 0$ $(i = 1, 2, ..., n)$

is minimum when $P_1 = P_2 = ... = P_n = \frac{1}{n}$

d) Use dynamic programming to solve the LPP: **10**

Maximize: $Z = x_1 + 9x_2$

Subject to constraints

$2x_1 + x_2 \le 25$

$x_2 \le 11$

$x_1, x_2 \ge 0$

UNIT – IV

4. a) Solve the following 2×2 game graphically. **10**

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	2	1	0	–2
	A_2	1	0	3	2

b) Solve the following game whose pay off matrix is given by **10**

		Player B	
		H	T
Player A	H	8	-3
	T	-3	1

OR

c) For what values of the game with following payoff matrix is strictly determinable? **10**

		B_1	B_2	B_3
Player A	A_1	μ	6	2
	A_2	1	μ	-7
	A_3	-2	4	μ

d) Solve the following 2 x 4 game graphically. **10**

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	2	1	0	-2
	A_2	1	0	3	2

5. a) Formulate the dual of the LPP: **5**

Maximize $Z = 5x_1 + 3x_2$

Subject to

$3x_1 + 5x_2 \leq 15$

$5x_1 + 2x_2 \leq 10$

$x_1, x_2 \geq 0$

b) Define assignment problem. **5**

c) Write the dynamic programming algorithm. **5**

d) What is game theory? What are the various types of games? **5**

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