M.Sc. - II (Mathematics) (New CBCS Pattern) Semester-III

PSCMTH15A - Optional - Operations Research-I

P. Pages : 3 **GUG/S/25/13763**

Time : Three Hours * 2 2 3 8 * Max. Marks : 100

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

UNIT - I

1. a) Use simplex method to solve the following L.P.P.: **10**

Maximize $z = 4x_1 + 10x_2$ subject to the constraints:

$2x_1 + x_2 \le 50,\ 2x_1 + 5x_2 \le 100,\ 2x_1 + 3x_2 \le 90$ and $x_1, x_2 \ge 0$.

b) Use Big-M method to solve- **10**

Maximize $z = 6x_1 + 4x_2$ subject to the constraints:

$2x_1 + 3x_2 \le 30,\ 3x_1 + 2x_2 \le 24,\ x_1 + x_2 \ge 3$ and $x_1, x_2 \ge 0$.

OR

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

Maximize $z = 2x_1 + x_2$ subject to the constraints:

$x_1 + 2x_2 \le 10,\ x_1 + x_2 \le 6,\ x_1 - x_2 \le 2,\ x_1 - 2x_2 \le 1$ & $x_1, x_2 \ge 0$.

d) use dual simplex method to solve the following L.P.P.: **10**

Maximize $z = 3x_1 + x_2$ subject to the constraints:

$x_1 + x_2 \ge 1,\ 2x_1 + 3x_2 \ge 2$ and $x_1, x_2 \ge 0$.

UNIT - II

2. a) Explain - **10**

i) North-West Corner Method

ii) Vogel's Approximation method

b) Consider the problem of assigning five jobs to five persons. The assignment costs are given as follows- **10**

		Jobs				
		1	2	3	4	5
Persons	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

Determine the optimum assignment schedule.

OR

c) Obtain the optimum solution of the TP by Vogel's approximation method. **10**

	D_1	D_2	D_3	D_4	Supply
S_1	3	7	6	4	5
S_2	2	4	3	2	2
S_3	4	3	8	5	3
Demand	3	3	2	2	10

d) Explain the Hungarian method for the solution of the assignment problems. **10**

UNIT - III

3. a) Use dynamic programming to solve: **10**

Minimize $z = x_1^3 + x_2^3 + x_3^3$ subject to the constraints:

$x_1x_2x_3 = 27$ and $x_i \geq 0,\ i = 1,2,3$

b) Explain how to find the solution of L.P.P. by dynamic programming. **10**

OR

c) Maximize $z = y_1y_2y_3...y_n$ subject to the constraints: **10**

$y_1 + y_2 + ... + y_n = c$ and $y_j \geq 0$.

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

Maximize $z = 3x_1 + 5x_2$ subject to the constraints:

$x_1 \leq 4, x_2 \leq 6, 3x_1 + 2x_2 \leq 18$ and $x_1, x_2 \geq 0$.

UNIT - IV

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

		Player B	
Player A	3	-3	4
	-1	1	-3

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

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

OR

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

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

d) Solve the following 2×4 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) Obtain all the basic solutions to the following system of linear equations- **5**

$x_1 + 2x_2 + x_3 = 4$

$2x_1 + x_2 + 5x_3 = 5$

b) Explain the transportation table. **5**

c) State the characteristics of dynamic programming. **5**

d) Define- **5**

i) Pure strategy ii) Mixed strategy

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