



**Shree H.N. Shukla College of Science Rajkot**

**MATHEMATICS**

**T.Y.B.Sc. (Sem. VI) (CBCS)**

**UNIT TEST**

**PAPER- 603**

**Optimization**

**Time: 1 hour]**

**[Total Marks: 30**

**Instruction: (i) All questions are compulsory.**

**(ii) Figures to the right indicate full marks of the question.**

**1. (A) Answer the following: [05]**

- (1) Define: Slack variables
- (2) Define: Basic Feasible Solution
- (3) Graphical method is useful to solve LPP, if the LPP has \_\_\_\_\_ variables.
- (4) Define: Convex sets
- (5) Define: Strictly concave function

**(B) Attempt any one: [02]**

- (1) State the general mathematical form of Linear Programming Problem.
- (2) State the Fundamental theorem of Linear Programming.

**(C) Attempt any one: [03]**

- (1) Explain Graphical method to solve LPP.
- (2) Write the associated dual problem of the following LPP;

$$\text{Maximize } Z = 4x_1 + 2x_2$$

$$\text{Subject to } x_1 + x_2 \geq 3$$

$$x_1 - x_2 \geq 2$$

**(D) Attempt any one: [05]**

- (1) Solve the LPP using Simplex Method

$$\text{Maximize } Z = 2x_1 + 5x_2 + 7x_3$$

$$\text{Subject to the constraints } 3x_1 + 2x_2 + 4x_3 \leq 100$$

$$x_1 + 4x_2 + 2x_3 \leq 100$$

$$x_1 + x_2 + x_3 \leq 100 \text{ and } x_1, x_2, x_3 \geq 0$$

- (2) Explain the steps of BIG-M method to solve the LPP.

**2. (A) Answer the following:****[05]**

- (1) What is the full form of VAM?
- (2) Hungarian method is used to find the optimum solution of \_\_\_\_\_ problem.
- (3) Which three methods are used to obtain an initial solution of transportation problem?
- (4) Define: Optimal solution w.r.t. transportation problem
- (5) What is the full form of the LCM method used to obtain an initial solution of transportation problem?

**(B) Attempt any one:****[02]**

- (1) Write general mathematical form of assignment problem.
- (2) Solve the following Assignment Problem;

		<u>Subordinates</u>			
		I	II	III	IV
<u>Task</u>	A	8	26	17	11
	B	13	28	4	26
	C	38	19	18	15
	D	19	26	24	10

**(C) Attempt any one:****[03]**

- (1) Explain: North West Corner Method
- (2) Obtain the initial solution of given transportation problem using LCM method

		TO				Supply
		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	
FROM	S <sub>1</sub>	19	30	50	10	7
	S <sub>2</sub>	70	30	40	60	9
	S <sub>3</sub>	40	8	70	20	18
Demand		5	8	7	14	34

**(D) Attempt any one:**

**[05]**

- (1) Explain the steps of Hungarian method to solve the assignment problem.
- (2) Solve the following transportation problem using MODI method to find optimum solution;

		TO				Supply
		P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	
FROM	M <sub>1</sub>	19	14	23	11	11
	M <sub>2</sub>	15	16	12	21	13
	M <sub>3</sub>	30	25	16	39	19
Demand		6	10	12	15	43

**\*\*\*\*BEST OF LUCK\*\*\*\***