

Subject Name: OPERATION RESEARCH

Subject Number: MA30014

ASSIGNMENT 2

Q.1. Solve the L.P.P.

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

$$\begin{aligned} \text{subject to } & x_1 + 2x_2 - 2x_3 \leq 30 \\ & x_1 + 3x_2 + x_3 \leq 36 \\ & x_1, x_2, x_3 \geq 0. \end{aligned}$$

Q.2. Solve the following L.P.P. by simplex method :

$$\text{Minimize } z = -3x_1 + 2x_2$$

$$\begin{aligned} \text{subject to } & x_1 - 4x_2 \leq -14 \\ & -3x_1 + 2x_2 \leq 6 \\ & x_1, x_2 \geq 0. \end{aligned}$$

Q.3. Solve the following L.P.P. by Big M-method :

$$\text{Maximize } z = 5x_1 + 11x_2$$

$$\begin{aligned} \text{subject to } & 2x_1 + x_2 \leq 4 \\ & 3x_1 + 4x_2 \geq 24 \\ & 2x_1 - 3x_2 \geq 6 \\ & x_1, x_2 \geq 0. \end{aligned}$$

Q.4. Use simplex method to solve the following L.P.P.

$$\text{Maximize } z = 5x_1 + 2x_2$$

$$\begin{aligned} \text{subject to } & 6x_1 + 10x_2 \leq 30 \\ & 10x_1 + 4x_2 \leq 20 \\ & x_1, x_2 \geq 0. \end{aligned}$$

Is the solution unique? If not, write down the convex combination of the alternative optima.

Q.5. Use the simplex method to solve the L.P.P.

$$\text{Maximize } z = 2x_2 + x_3$$

$$\begin{aligned} \text{subject to } & x_1 + x_2 - 2x_3 \leq 7 \\ & -3x_1 + x_2 + 2x_3 \leq 3 \\ & x_1, x_2, x_3 \geq 0. \end{aligned}$$

Q.6. Solve the L.P.P. by simplex method

$$\text{Minimize } z = x_1 - 3x_2 + 2x_3$$

$$\begin{aligned} \text{subject to } & 3x_1 - x_2 + 2x_3 \leq 7 \\ & -2x_1 + 4x_2 \leq 12 \\ & -4x_1 + 3x_2 + 8x_3 \leq 10 \\ & x_1, x_2, x_3 \geq 0. \end{aligned}$$

Q.7. Find $x_j \geq 0$, ($j = 1, 2, 3, 4$)

$$\begin{aligned} \text{subject to } & x_1 + 2x_2 + 3x_3 = 15 \\ & 2x_1 + x_2 + 5x_3 = 20 \\ & x_1 + 2x_2 + x_3 + x_4 = 10 \end{aligned}$$

which will maximize the function

$$x_1 + 2x_2 + 3x_3 - x_4.$$

Q.8. Show that the following L.P.P. admits of an infinite number of solutions :

$$\text{Maximize } z = 4x_1 + 14x_2$$

$$\begin{aligned} \text{subject to } & 2x_1 + 7x_2 \leq 21 \\ & 7x_1 + 2x_2 \leq 21 \\ & x_1, x_2 \geq 0. \end{aligned}$$

NOTE: Please submit the assignment in **loose sheets**