Assignment No. – 01

Topic – Simplex Method

Date of Submission – 27/03/2025

Instructions:

1. **Write the assignment on two sided ruled sheets.**
2. **For every problem, follow the same approach as done during the lecture.**
3. **Complete simplex table is expected on a whole page.**

Questions:

1. Solve the following L.P.P. by simplex method.

   a. Maximize $z = 4x_1 + 10x_2$
   Subject to,

   $$2x_1 + x_2 \leq 50$$
   $$2x_1 + 5x_2 \leq 100$$
   $$2x_1 + 3x_2 \leq 90$$
   $$x_1, x_2 \geq 0$$

   b. Maximize $z = x_1 + 3x_2$
   Subject to,

   $$x_1 + 2x_2 \leq 10$$
   $$0 \leq x_1 \leq 5$$
   $$0 \leq x_2 \leq 4$$

2. Find all basic feasible solution. Also indicate those which are degenerate solutions.

   a. $2x_1 + x_2 + x_3 = 2$ and $3x_1 + x_2 - x_3 = 3$

   b. $x_1 + 2x_2 + 3x_3 = 7$ and $3x_1 + 4x_2 + 6x_3 = 15$

3. Convert the following problems to standard form:

a. Minimize $z = 3x_1 + 2x_2 - x_3$
Subject to,

$$2x_1 + 4x_2 \leq 10$$
$$3x_1 + 4x_2 \geq 7$$
$$4x_1 + 6x_2 + 3x_3 \leq 12$$
$$x_1, x_3 \geq 0$$
$$x_2 \; unrestricted$$

b. Minimize $z = x_1 + 2x_2 + 3x_3$
Subject to,

$$3x_1 + 4x_2 \leq 5$$
$$5x_1 + x_2 + 6x_3 = 7$$
$$8x_1 + 9x_2 \leq 9$$
$$x_1, x_2, x_3 \geq 0$$