ASSIGNMENT - I

① Let x_1, x_2 and x_3 be number of units of products A, B and C to be produced respectively.

The LP Model is:

Maximize (total profit) $Z = 12x_1 + 20x_2 + 45x_3$

(1 MARK)

Subject to constraints:

(i) Labour and material

(a) $0.8x_1 + 1.7x_2 + 2.5x_3 \leq 100$ (1 MARK)

(b) $x_1 \leq 50$

(c) $x_2 \leq 25$

(d) $x_3 \leq 30$

(1 MARK)

(ii) Order commitment.

(a) $x_1 \geq 20$

(b) $x_2 + x_3 \geq 15$

(1 MARK).

(iii) $x_1, x_2, x_3 \geq 0$ (1 MARK)

5 MARKS

Q2) Let

x_1, x_2 ⇒ quantity of product A (in 1000 gallons) to be produced in plants 1 and 2

x_3, x_4 ⇒ quantity of product B (in quintals) to be produced in plant 1 and 2.

The L.P model is.

Minimize (Total cost)

$Z = 15,000 x_1 + 18,000 x_2 + 28,000 x_3 + 26,000 x_4$ (2 MARKS)

Subject to constraints:

(i) Preparation time

(a) $3x_1 + x_3 \leq 16$ (1 MARK)

(b) $2x_2 + 1.5x_4 \leq 16$

(ii) Minimum daily production requirement

(a) $x_1 + x_2 \geq 10$ (1 MARK)

(b) $x_3 + x_4 \geq 8$

(iii) $x_1, x_2, x_3 \geq 0$ (1 MARK)

5 MARKS

Q3) Let x_1 and x_2 number of units of components C_1 and C_2 to be produced, respectively.

The LP model is

Maximize (total profit)

Z = Selling price − Cost price (2 MARKS)

$= (30-10)x_1 + (70-40)x_2$

$= 20x_1 + 30x_2$

Subject to the constraints

(i) The total budget available (1 MARKS).

$10x_1 + 40x_2 \leq 4{,}000$

(ii) Production time

(a) $3x_1 + 2x_2 \leq 2{,}000$ (1 MARKS).

(b) $2x_1 + 3x_2 \leq 1{,}400$

(iii) $x_1, x_2 \geq 0$ (1 MARKS).

5 MARKS

(Q4) Let x_1 and x_2 be number of class A and B truck to be dispatched. respectively.

The L.P model is.

Minimize (Total operating cost).

$$Z = 3x_1 + 4x_2 \qquad (2 \text{ MARKS})$$

Subject to constraints.

(i) $15x_1 + 10x_2 \leq 3{,}000$ (1 MARK)

(ii) $x_1 \leq 149$ (1 MARK)

$x_2 \leq 98$

(iii) $2(150 - x_1) - (100 - x_2) >= 0$

(0.5 MARK)

(iv) $x_1, x_2 \geq 0$ (0.5 MARK)

5 MARKS