

- Q. 1. (a)
- (i) — (d) all of the above
 - (ii) — (b) canonical form of LPP
 - (iii) — (a) feasible region
 - (iv) — (d) all of the above
 - (v) — (b) each row and column has at least one zero element.
 - (vi) — (b) a travelling salesman problem
 - (vii) — (c) idle time for machine M_1

Q. 2 (b)

(1) Let y_1, y_2, y_3 be the dual variables
Dual of the problem is -

minimize $z = 90y_1 + 60y_2 + 80y_3$
subject to the constraints,

$$y_1 + 2y_2 + 3y_3 \geq 3$$

$$2y_1 + y_2 + y_3 \geq 4$$

$$3y_1 + y_2 + 2y_3 \geq 1$$

$$y_1, y_2, y_3 \geq 0$$

(c) minimize $z = 4x_1 + 3x_2$
Subject to,

$$200x_1 + 100x_2 \geq 4000$$

$$x_1 + 2x_2 \geq 50$$

$$40x_1 + 40x_2 \geq 1400$$

$$x_1, x_2 \geq 0$$

$$\text{minimum } z = 110 \quad , \quad x_1 = 5, \quad x_2 = 30$$

(a) Transportation table -

| From | To | | | | Supply |
|--------|-------------------|-------------------|--------------------|--------------------|--------|
| | w_1 | w_2 | w_3 | w_4 | |
| F_1 | 42 | 32 | 50 | 26 ⁽¹¹⁾ | 11 |
| F_2 | 34 ⁽⁶⁾ | 36 ⁽³⁾ | 28 | 46 ⁽⁴⁾ | 13 |
| F_3 | 64 | 54 ⁽⁷⁾ | 36 ⁽¹²⁾ | 82 | 19 |
| Demand | 6 | 10 | 12 | 15 | |

IFS by VAM = Rs. 1592000/-

The solution is non-degenerate.

For empty cells $\Delta = c_{ij} - (u_i + v_j)$ all are +ve

The solution is optimal.

\therefore optimal cost = Rs. 1592000/-

(b)

(i) Initial basic feasible solution by North West corner rule -

A - P 5 units

A - Q 2 units

B - Q 6 units

B - R 4 units

C - R 3 units

C - S 15 units

Cost = Rs. 1950

Least cost method -

C - Q 9 units

A - S 7 units

C - S 8 units

B - R 7 units

B - P 3 units

C - P 2 units

Cost = Rs. 1788

Q. 4. (b)

(i) Assignment schedule

A — III

B — II

C — I

D — IV

Total cost = 49 + 34 + 37 + 55 = ₹. 175

(ii) S₁ — T₁

S₂ — T₂

S₃ — T₅

S₄ — T₄

S₅ — T₃

max. sales = 26 + 27 + 30 + 30 + 25 = 138

Q. 4. (c)

(i) Optimal sequence

D — G — F — B — C — E

Elapsed time 59 hrs.

idle time 13 hrs for M₁

37 hrs for M₂

7 hrs for M₃

Q. 5. (a)

(i) Optimal solution x₁ = 5

x₂ = 4 max z = 31

(c)

(ii) Optimum sequence

6 — 1 — 4 — 5 — 3 — 2 — 7

| Book | Time in | Time out | idle time | Printing Time in | Printing Time out | idle time |
|------|---------|----------|-----------|------------------|-------------------|-----------|
|------|---------|----------|-----------|------------------|-------------------|-----------|

| | | | | | | |
|---|---|----|---|----|----|----|
| 6 | 0 | 15 | - | 15 | 50 | 15 |
|---|---|----|---|----|----|----|

| | | | | | | |
|---|----|----|---|----|----|----|
| 1 | 15 | 35 | - | 50 | 75 | 15 |
|---|----|----|---|----|----|----|

| | | | | | | |
|---|----|----|---|----|-----|----|
| 4 | 35 | 55 | - | 75 | 105 | 15 |
|---|----|----|---|----|-----|----|

