PENALTY & DUALITY

Important Question Bank

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Important Questions

1) Use penalty method to solve the following LPP.

Minimise: $Z = 2x_1 + 3x_2$

Sub. to: $x_1 + x_2 \geq 5$,

$x_1 + 2x_2 \geq 6$,

$x_1, x_2 \geq 0$

2) Using penalty or Big-M method solve the following LPP.

Maximise: $Z = 3x_1 - x_2$

Sub. to: $2x_1 + x_2 \leq 2$,

$x_1 + 3x_2 \geq 3$,

$x_2 \leq 4$,

$x_1, x_2 \geq 0$.

3) Using Penalty (Big M) method, solve the following LPP.

Minimise: $Z = 2x_1 + x_2$,

Sub. to: $3x_1 + x_2 = 3$,

$4x_1 + 3x_2 \geq 6$,

$x_1 + 2x_2 \leq 3$,

$x_1, x_2 \geq 0$.

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4) Using Penalty method, Solve the following LPP.

Maximise: $Z = 4x_1 + 5x_2 + 2x_3$,

Sub. to: $2x_1 + x_2 + x_3 \leq 10$,

$x_1 + 3x_2 + x_3 \leq 12$,

$x_1 + x_2 + x_3 = 6$,

$x_1, x_2, x_3 \geq 0$.

5) Find the dual of following LPP.

Maximise: $Z = 2x_1 - x_2 + 3x_3$

Sub. to: $x_1 - 2x_2 + x_3 \geq 4$,

$2x_1 + x_3 \leq 10$,

$x_1 + x_2 + 3x_3 = 20$,

$x_1, x_3 \leq 0$, x_2 unrestricted.

6) Find the Duals of following LPP.

Maximise: $Z = 3x_1 + 5x_2$,

Sub. to: $2x_1 + 6x_2 \leq 50$,

$3x_1 + 2x_2 \leq 35$,

$5x_1 - 3x_2 \leq 10$,

$x_2 \leq 20$,

$x_1 \geq 0$.

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7) Using Duality Solve the following LPP.

Minimise : $z = 430x_1 + 460x_2 + 420x_3$

Sub. to : $x_1 + 3x_2 + x_3 \geq 3,$

$2x_1 + 4x_3 \geq 2,$

$x_1 + 2x_2 \geq 5,$

$x_1, x_2, x_3 \geq 0.$

8) Using the principle of Duality solve the following LPP.

Minimise : $z = 4x_1 + 14x_2 + 3x_3,$

Sub. to : $-x_1 + 3x_2 + x_3 \geq 3,$

$2x_1 + 2x_2 - x_3 \geq 2,$

$x_1, x_2, x_3 \geq 0.$

9) Use the dual simplex method to solve following LPP.

Minimise : $z = 2x_1 + 2x_2 + 4x_3$

Sub. to : $2x_1 + 3x_2 + 5x_3 \geq 2,$

$3x_1 + x_2 + 7x_3 \leq 3,$

$x_1 + 4x_2 + 6x_3 \leq 5,$

$x_1, x_2, x_3 \geq 0.$

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10) Use the Dual Simplex Method to solve the following LPP.

Maximise : $z = -3x_1 - 2x_2$

Sub. to : $x_1 + x_2 \geq 1,$

$x_1 + x_2 \leq 7,$

$x_1 + 2x_2 \leq 10,$

$x_2 \leq 3, \quad x_1, x_2 \geq 0.$

11) Use Dual Simplex method to solve the following LPP.

minimise: $z = 20x_1 + 16x_2$

Sub. to : $x_1 + x_2 \geq 12$,

$2x_1 + x_2 \geq 17$,

$x_1 \geq 2.5$

$x_2 \geq 6$, $x_1, x_2 \geq 0$

12) Use Dual Simplex method to solve the following LPP.

minimise: $z = x_1 + x_2$,

Sub. to : $2x_1 + x_2 \geq 2$,

$-x_1 - x_2 \geq 1$,

$x_1, x_2 \geq 0$.

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