CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: MATHEMATICS

Chapter Name : Linear Programming Problems (Chap : 12)

Total : 12 Marks (expected) [MCQ(1)-2 Mark, VSA-(2)-2 Marks, SA-(1)-3 Marks, LA(1)-5 Marks]

Level - 1 & 2 (Higher Order)

Section - A

MCQ Type :

1. A general linear programming problem is to maximize or minimize a function $f = px + qy$, $p^2 + q^2 \neq 0$ subject to (i) $x \geq 0, y \geq 0$. (ii) $a_1x + b_1y \geq C_1$ (iii) $a_2x + b_2y \leq C_2$ etc, then f and (i), (ii), (iii) etc. are defined as –

   Ⓐ objective function Ⓑ non negative constraints
   Ⓒ A and B Ⓓ production function

2. Let we have a system of linear inequations in two variables, if the set of points (x, y) for which all the inequations of the system hold true, then the systems are either empty or ________ . Choose the correct answers.

   Ⓐ non-empty Ⓑ empty Ⓒ feasible region Ⓓ a convex region

3. Solution set of the inequality $x \geq 0$ is

   Ⓐ half plane on the left of y-axis.
   Ⓑ half plane on the right of y-axis including the points on y axis
   Ⓒ half plane on the left of y axis including the points on y axis
   Ⓓ none of this

4. if $X_1 = (x_1, y_1)$ and $X_2 = (x_2, y_2)$ are two optimal solutions of a L.P.P then

   Ⓐ $\lambda x_1 + (1 - \lambda) x_2, \lambda \in R$ is also an optimal solution
   Ⓑ $\lambda x_1 + (1 - \lambda) x_2, \lambda \in R$ $0 \leq \lambda \leq 1$ is also an optimal solution
   Ⓒ if an L.P.P has two optimal solutions then it has infinitely many solutions.
   Ⓓ (B) & (C)

5. The corner points of the feasible region determined by the following system of linear inequalities.

   $2x + y \leq 10$, $x + 3y \leq 15$, $x, y \geq 0$ are (0, 0), (5, 0), (3, 4) and (0, 5). Let $z = px + qy$ where $p, q > 0$ and $q = 3p$, then the points are

   Ⓐ (0, 0) Ⓑ (5, 0) Ⓒ (3, 4) Ⓓ none of these

6. In an LPP, the decision variables can take

   Ⓐ any real values Ⓑ integer values only
   Ⓒ any non negative real values Ⓓ non negative integer values only

7. Which of the following is true in a linear programming problem ?

   Ⓐ Min z = – Max (–z) Ⓑ Min z = – Max z Ⓒ Min z = Max (–z) Ⓓ none of these

Section - B

Very Short answer type questions (VSA) :

1. State two limitations of an L.P.P .

2. What is linear programming ? Explain with an example.

3. Given the LPP, Max $z = 3x_1 + 2x_2$

Subject to the constraints, $2x_1 + x_2 \le 2$

$3x_1 + 4x_2 \ge 12$

$x_1 \ge 0, \; x_2 \ge 0$.

Show that the LPP, has no feasible solution.

4. Given the LPP, Max $Z = 2x + 3y$

Subject to the constraints $3x + y \le 3$

$x \ge 0, y \ge 0$

Show that the corner points on the LPP are (0, 0), (1, 0) and (0, 3).

5. Find graphically the feasible region (if any exists).

$x + y \ge 2, \; x + y \le 1, \; x \ge 0, y \ge 0$

6. Show geometrically that the set $S = \{(x, y) : x^2 + y^2 \le 4\}$ is a convex set .

7. $S_1 = \{(x, y) : x = 0, \; y \ge 0\}$ and $S_2 = \{(x, y) : x \ge 0, \; y \ge 0\}$ is not a convex set.

Section - C

Short Answer Type Question (SA) :

1. Solve graphically :

Max $Z = 2x + 3y$

S.t, $x + y \ge 1$

$2x + y \le 0$

$x \ge 0, y \ge 0$

2. Solve graphically :

Min z - $2x + 3y$

S.t, $x + 2y \le 4$

$x + 2y \ge 6$

$x \ge 0, y \ge 0$

3. Show that the LPP, Max $z = 3x + 4y$

S. t, $x - y \ge 0$

$-x + 3y \le 3$ and $x, y \ge 0$ has unbounded solution.

4. Food F_1 contains 5 units of vitamin A and 6 units of vitamin B per gram and costs 20 p/gm. Food F_2 contains 8 units of vitamin A and 10 units of vitamin B per gram and costs 30 p/gm. The daily requirements of A and B are at least 80 and 100 units respectively. Formulate the problem as a LPP.

5. A transport company has offices in five localities A, B, C, D and E. Some day the offices located A and B has 8 and 10 spare trucks where as offices at C, D, E required 6, 8 and 4 trucks respectively. The distance in km between the five localities are given below :

To		C	D	E
From	A	2	5	3
	B	4	2	7

Formulate the problem as L.P.P. So, that the total distance travelled by the trucks is minimum.

6. By solving LPP, Max $Z = 9x + 3y$

S.t, $2x + 3y \le 13$

$3x + 2y \le 5$

$x, y \ge 0$

Using graphical method, we get $x = 2, y = k$ and $z = 28$. Find the value of k.

7. Find the minimum value of $Z = 3x_1 + 5x_2$ subject to

$x_2 + 3x_2 \geq 3$ $\quad x_1 + x_2 \geq 2$ $\quad x_1, x_2 \geq 0$

Section - D

Long Answer Type Questions (LA) :

1. A dietician wishes to mix two types of food in such a way that one kg of mixture contains at least 8 units of vitamin A and 10 units of vitamin C. Food I contains 2 units / kg of vitamin A and 1 unit/kg of vitamin C, while Food – II contains 1 unit/kg of vitamin A and 2 units/kg. of vitamin C. It costs Rs 50.00 per kg to purches Food-I and Rs. 70.00 per kg to purchase Food II. Formulate the above as an L.P.P. to minimise the cost of the mixture of food.

2. Maximize the following objective function Z graphically :

$Z = 3x + 5y$

St, $x + 2y \leq 20$

$x + y \leq 15$

$x \leq 6$

$x \geq 0, y \geq 0$.

3. A transport company has offices in five localities A, B, C, D and E. The offices located at A and B had 8 and 10 trucks respectively whereas offices at C, D, E required 6, 8 and 4 trucks respectively. The distances in Kilometres between the five localities are given below :

To		C	D	E
From	A	2	5	3
	B	4	2	7

How the trucks from A and B can be sent to C, D and E. so that the total distance covered by tthe trucks is minimum? Formulate the problem as a linear programming problem and solve it.

4. Minimize the foollowing objective function z graphically

$Z = 3x + 2y$

St, $2x + y \geq 14$

$2x + 3y \geq 22$

$x + y \geq 5$

and $x \geq 0, y \geq 0$.

5. Solve graphically, show that the following LPP has an infinite number of optimal solutions.

Minimize $Z = x + y$

St, $5x + 9y \leq 45$

$x + y \geq 2$

$x \leq 4$

and $x \geq 0, y \geq 0$.

Find also the minimum value of the objective function Z.

6. A Man has ₹1500 to purchase rice and wheat. A bag of rice and a bag of wheat cost ₹180 and ₹120 respectively. He has a storage capacity of 10 bags only. He earns a profit of ₹11 and ₹8 per bag of rice and wheat respectively. How many bags of each must he buy to make maximum profit ?

7. Show graphically that the given LPP has an unbounded solution.

Maximize $Z = 3x + 4y$

Subject to the constraints,

$-2x + 3y < 9$

$x - 5y \geq -20$

and $x \geq 0, y \geq 0$.

Section - A

1. Ⓒ
2. Ⓓ
3. Ⓑ
4. Ⓓ
5. Ⓒ
6. Ⓒ
7. Ⓐ

Section - B

1. (i) In a lot of problems, it is not possible to express both the objective function and constraints in linear form.
(ii) In many LPP which involves many decision variables and constraints, the computational difficulties are enormous. It may even be formidable for a computer.

Section - C

1. No feasible solution.
2. No feasible solution.
4. Min Z = 20x + 30y
St, $5x + 8y \geq 80$
$6x + 10y \geq 100$
$x \geq 0, y \geq 0$
5. Min Z = 2x + 7y + 36
St, $x + y \geq 4$
$x + y \leq 8$
$x \leq 6, \ y \leq 8$
$x \geq 0, \ y \geq 0$
6. k = 6
7. 7

Section -D

1. Min Z = 50x + 70y
St, $2x + y \geq 8$
$x + 2y \geq 10$
$x \geq 0, \ y \geq 0$
2. Max Z = 1000
3. Min Z = 2x + 7y + 36
St, $x + y \geq 4$
$x + y \leq 8$
$x \leq 6, \ y \leq 8$
$x \geq 0, \ y \geq 0$
4. Min Z = 23
Unique solution though unbounded solution.
5. $Z_{min} = 2$
6. 5 bags of each