PRACTICE PAPER 15
CHAPTER 12 LINEAR PROGRAMMING

SUBJECT: MATHEMATICS | **MAX. MARKS : 40**
CLASS : XII | **DURATION : 1½ hrs**

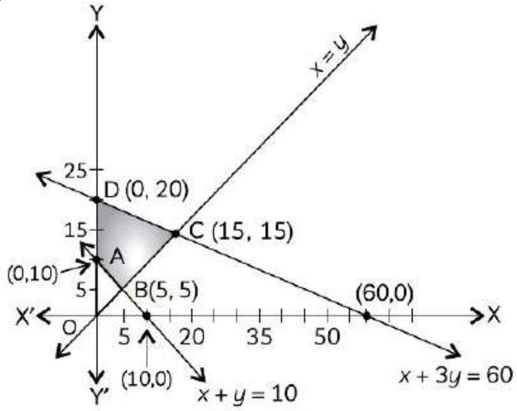
General Instructions:

(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

SECTION – A

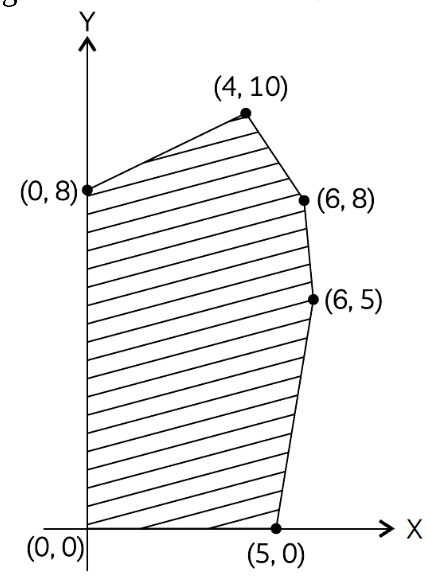
Questions 1 to 10 carry 1 mark each.

1. Based on the given shaded region as the feasible region in the graph, at which point(s) is the objective function Z = 3x + 9y maximum?



(a) Point B (b) Point C (c) Point D (d) Every point on the line segment CD

2. In the given graph, the feasible region for a LPP is shaded.



The objective function Z = 2x – 3y will be minimum at:

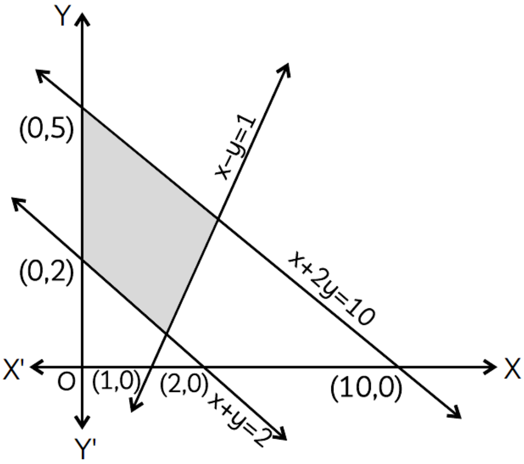
(a) (4, 10) (b) (6, 8) (c) (0, 8) (d) (6, 5)

3. In a linear programming problem, the constraints on the decision variables x and y are $x - 3y \geq 0$, $y \geq 0$, $0 \leq x \leq 3$. The feasible region:

(a) is not in the first quadrant.

(b) is bounded in the first quadrant.
(c) is unbounded in the first quadrant.
(d) does not exist.

4. The feasible region corresponding to the linear constraints of a linear programming problem is shown in figure.



Which of the following is not a constraint to the given linear programming problem?
(a) $x + y \geq 2$ (b) $x + 2y \leq 10$ (c) $x - y \geq 1$ (d) $x - y \leq 1$

5. The solution set of the inequality $3x + 5y < 4$ is:
(a) an open half-plane not containing the origin.
(b) an open half-plane containing the origin.
(c) the whole XY-plane not containing the line $3x + 5y = 4$.
(d) a closed half plane containing the origin.

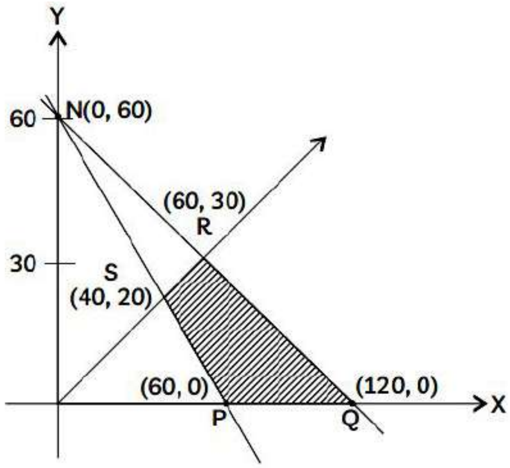
6. The optimal value of the objective function is attained at the points
(a) given by intersection of inequation with y-axis only.
(b) given by intersection of inequation with x-axis only.
(c) given by corner points of the feasible region.
(d) none of these

7. The objective function $Z = ax + by$ of an LPP has maximum value 42 at (4, 6) and minimum value 19 at (3, 2). Which of the following is true?
(a) $a = 9, b = 1$ (b) $a = 5, b = 2$ (c) $a = 3, b = 5$ (d) $a = 5, b = 3$

8. The corner points of the feasible region of a linear programming problem are (0, 4), (8, 0) and $\left(\frac{20}{3}, \frac{4}{3}\right)$. If $Z = 30x + 24y$ is the objective function, then (maximum value of Z – minimum value of Z) is equal to:
(a) 40 (b) 96 (c) 136 (d) 144

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:
(a) Both Assertion (A) and Reason (R) are true and Reason(R) is the correct explanation of assertion (A).
(b) Both Assertion (A) and Reason (R) are true but Reason(R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

9. **Assertion (A):** The corner points of the bounded feasible region of a LPP are shown below. The maximum value of $Z = x + 2y$ occurs at infinite points.



Reason (R): The optimal solution of a LPP having bounded feasible region must occur at corner points.

10. Assertion (A): Maximum value of Z = 3x +2y, subject to the constraints $x + 2y \leq 2$; $x \geq 0$; $y \geq 0$ will be obtained at point (2, 0).
Reason (R): In a bounded feasible region, it always exist a maximum and minimum value.

SECTION – B

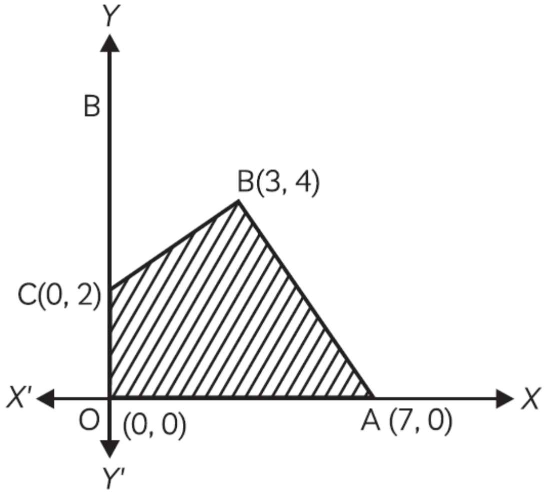
Questions 11 to 14 carry 2 marks each.

11. One kind of cake requires 200 g of flour and 25 g of fat and another kind of cake requires 100 g of flour and 50 g of fat, 5 kg of flour and 1 kg of fat is available, formulate the problem to find the maximum number of cakes which can be made, assuming that there is no shortage of the other ingredients used in making the cakes.

OR

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 $p, q > 0$. What is the condition on p, q. that maximum Z occurs at both (3, 4) and (0, 5)?

12. Feasible region (shaded) for a LPP is shown in the figure below. Maximise Z = 5x + 7y.



13. Solve the following problem graphically: Minimise $Z = 3x + 2y$ subject to the constraints: $x + y \geq 8$, $3x + 5y \leq 15$, $x \geq 0$, $y \geq 0$

14. A firm has to transport atleast 1200 packages daily using large vans which carry 200 packages each and small vans which can take 80 packages each. The cost for engaging each large van is ₹400 and each small van is ₹200. Not more than ₹3,000 is to be spent daily on the job and the number of large vans cannot exceed the number of small vans. Formulate this problem as a LPP given that the objective is to minimize cost.

OR

A company produces two types of goods A and B, that require gold and silver. Each unit of type A requires 3 g of silver and 1 g of gold while that of type B requires 1 g of silver and 2 g of gold. The company can produce a maximum of 9 g of silver and 8 g of gold. If each unit of type A brings a profit of ₹40 and that of type B ₹50, formulate LPP to maximize profit.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Find graphically, the maximum value of $Z = 2x + 5y$, subject to constraints given below: $2x + 4y \le 8$; $3x + y \le 6$; $x + y \le 4$; $x \ge 0, y \ge 0$

16. Minimise and Maximise $Z = 5x + 2y$ subject to the following constraints:
$x - 2y \le 2$, $3x + 2y \le 12$, $-3x + 2y \le 3$ and $x \ge 0, y \ge 0$

17. Solve graphically: Maximise $Z = 2.5x + y$
subject to constraints: $x + 3y \le 12$, $3x + y \le 12$, $x, y \ge 0$

OR

Maximise $Z = 3x + 4y$, subject to the constraints: $x + y \le 1$, $x \ge 0$, $y \ge 0$.

SECTION – D

Questions 18 carry 5 marks.

18. Show that the minimum of Z occurs at more than two points. Minimise and Maximise $Z = x + 2y$ subject to $x + 2y \ge 100$, $2x - y \le 0$, $2x + y \le 200$; $x, y \ge 0$.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Case-Study 1: Read the following passage and answer the questions given below.

A firm produces bottles of disinfectant and a bathroom cleaner.

- It can produce maximum of 600 bottles in a day.
- It needs to produce at least 300 bottles everyday.
- It takes 6 hours to produce a bottle of disinfectant and 2 hours for a bottle of bathroom cleaner.
- At least 1200 hours of production time should be used daily.
- Manufacturing cost per bottle of disinfectant is ₹ 50 and ₹ 20 for a bottle of bathroom cleaner.

Based on above, answer the following questions.

(i) What is the objective function and constraints for this LPP keeping manufacturing cost as low as possible? (1)

(ii) Find the number of bottles of disinfectant and bathroom cleaner to be produced per day keeping total cost of manufacturing the lowest. (2)

(iii) If $Z = 50x + 20y$, then find the value of Z at (150, 150). (1)

OR

If $Z = 50x + 20y$, then find the value of Z at (300, 0). (1)

20. Case-Study 2: Read the following passage and answer the questions given below.

Different activities are taken up daily, for its implementation lots of work and calculations are required as we work within limitations. A company is planning some manufacturing activity and based on information available the following data is obtained for some variables x and y related to manufacturing activity.

$Z = 2x + 3y$

$x \geq 0, y \geq 0$

$x + 2y \leq 40$

$2x + y \leq 50$

(i) Find the maximum value of z.

(ii) Find the relation between p and q if the objective function $z = px + qy$, where $p, q > 0$ attains equal values at (3, 4) and (2, 7).

(iii) Check whether the ordered pair (12, 27) lies in the graphical solution of $2x + y \leq 50$.

OR

Check whether the ordered pair (20, 10) lies in the graphical solution of $2x - y \geq 50$.

PRACTICE PAPER 15
CHAPTER 12 LINEAR PROGRAMMING (ANSWERS)

SUBJECT: MATHEMATICS | **MAX. MARKS : 40**
CLASS : XII | **DURATION : 1½ hrs**

General Instructions:

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(iv). There is no overall choice.
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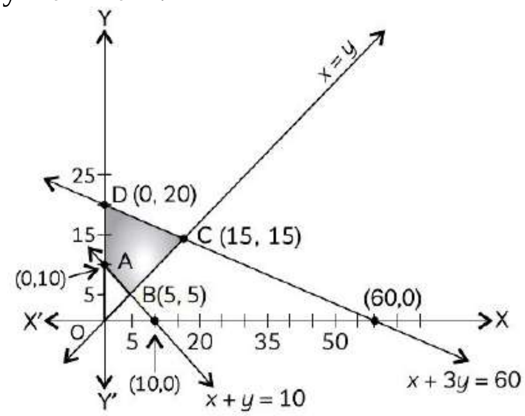
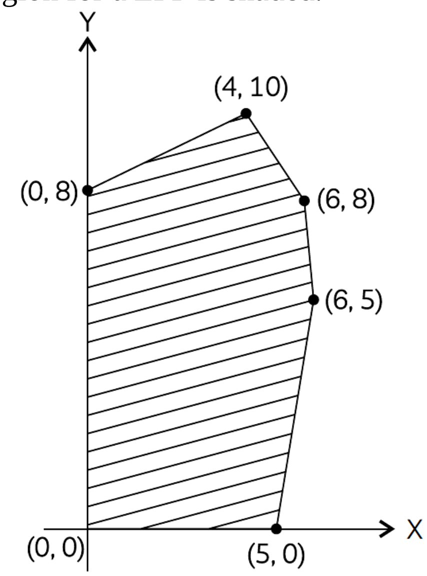
SECTION – A
Questions 1 to 10 carry 1 mark each.

1. Based on the given shaded region as the feasible region in the graph, at which point(s) is the objective function Z = 3x + 9y maximum?



(a) Point B (b) Point C (c) Point D (d) Every point on the line segment CD
Ans. (d) Every point on the line segment CD

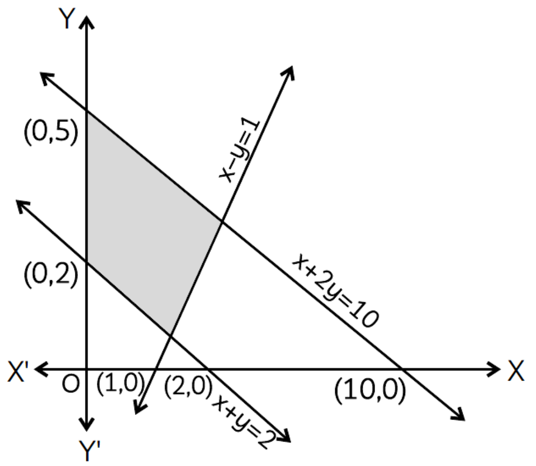
2. In the given graph, the feasible region for a LPP is shaded.



The objective function Z = 2x – 3y will be minimum at:
(a) (4, 10) (b) (6, 8) (c) (0, 8) (d) (6, 5)
Ans. (c) (0, 8)

3. In a linear programming problem, the constraints on the decision variables x and y are $x - 3y \geq 0$, $y \geq 0$, $0 \leq x \leq 3$. The feasible region:
(a) is not in the first quadrant.
(b) is bounded in the first quadrant.
(c) is unbounded in the first quadrant.
(d) does not exist.
Ans. (b) is bounded in the first quadrant
Feasible region is bounded in the first quadrant.

4. The feasible region corresponding to the linear constraints of a linear programming problem is shown in figure.



Which of the following is not a constraint to the given linear programming problem?
(a) $x + y \geq 2$ (b) $x + 2y \leq 10$ (c) $x - y \geq 1$ (d) $x - y \leq 1$
Ans. (c) $x - y \geq 1$
We observe, (0, 0) does not satisfy the inequality $x - y \geq 1$
So, the half plane represented by the above inequality will not contain origin, therefore, it will not contain the shaded feasible region.

5. The solution set of the inequality $3x + 5y < 4$ is:
(a) an open half-plane not containing the origin.
(b) an open half-plane containing the origin.
(c) the whole XY-plane not containing the line $3x + 5y = 4$.
(d) a closed half plane containing the origin.
Ans. (b) an open half-plane containing the origin.
The strict inequality represents an open half plane and it contains the origin as (0, 0) satisfies it.

6. The optimal value of the objective function is attained at the points
(a) given by intersection of inequation with y-axis only.
(b) given by intersection of inequation with x-axis only.
(c) given by corner points of the feasible region.
(d) none of these
Ans. (c) given by corner points of the feasible region.

7. The objective function $Z = ax + by$ of an LPP has maximum value 42 at (4, 6) and minimum value 19 at (3, 2). Which of the following is true?
(a) a = 9, b = 1 (b) a = 5, b = 2 (c) a = 3, b = 5 (d) a = 5, b = 3
Ans. (c) a = 3, b = 5
$Z = ax + by$
$42 = 4a + 6b$ ...(i)
$19 = 3a + 2b$ ...(ii)
Solving (i) and (ii), we get a = 3, b = 5

8. The corner points of the feasible region of a linear programming problem are (0, 4), (8, 0) and $\left(\frac{20}{3}, \frac{4}{3}\right)$. If Z = 30x + 24y is the objective function, then (maximum value of Z – minimum value of Z) is equal to:

(a) 40 (b) 96 (c) 136 (d) 144

Ans. (d) 144

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(a) Both Assertion (A) and Reason (R) are true and Reason(R) is the correct explanation of assertion (A).
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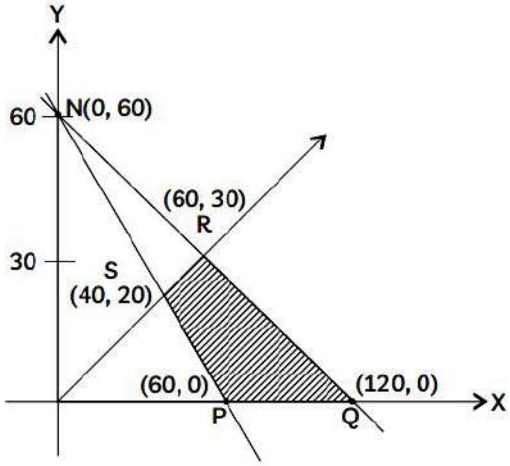
(d) Assertion (A) is false but reason (R) is true.

9. Assertion (A): The corner points of the bounded feasible region of a LPP are shown below. The maximum value of Z = x + 2y occurs at infinite points.



Reason (R): The optimal solution of a LPP having bounded feasible region must occur at corner points.

Ans. (b) Both (A) and (R) are true and (R) is not the correct explanation of (A).

10. Assertion (A): Maximum value of Z = 3x +2y, subject to the constraints x + 2y ≤ 2; x ≥ 0; y ≥ 0 will be obtained at point (2, 0).

Reason (R): In a bounded feasible region, it always exist a maximum and minimum value.

Ans. (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. One kind of cake requires 200 g of flour and 25 g of fat and another kind of cake requires 100 g of flour and 50 g of fat, 5 kg of flour and 1 kg of fat is available, formulate the problem to find the maximum number of cakes which can be made, assuming that there is no shortage of the other ingredients used in making the cakes.

Ans. Let x cakes of kind I and y cakes of kind II are made.

Then *LPP* is

Maximise $Z = x + y$

Subject to the constraints $x \geq 0, y \geq 0$

$200x + 100y \leq 5000$

$25x + 50y \leq 1000$

OR

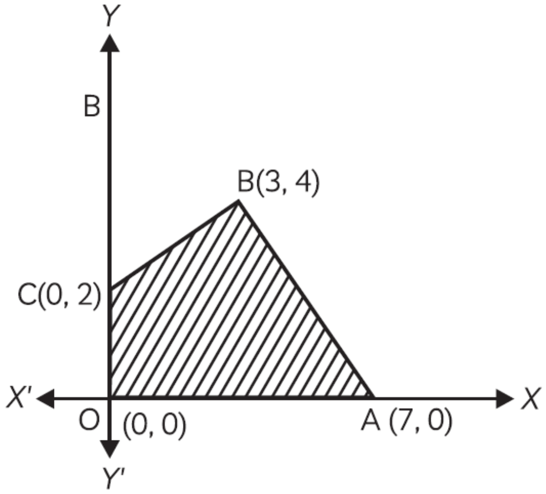
The corner points of the feasible region determined by the following system of linear inequalities:

$2x + y \leq 10,\ x + 3y \leq 15,\ x, y \geq 0$ are (0, 0), (5, 0), (3, 4) and (0, 5)

Let $Z = px + qy$, where $p, q > 0$. What is the condition on p, q. that maximum Z occurs at both (3, 4) and (0, 5)?

Ans. If maximum Z occurs at both (3, 4) and (0, 5), where $Z = px + qy$ with $p, q > 0$
Then $3p + 4q = 0p + 5q$
$\Rightarrow 3p = q$

12. Feasible region (shaded) for a LPP is shown in the figure below. Maximise Z = 5x + 7y.

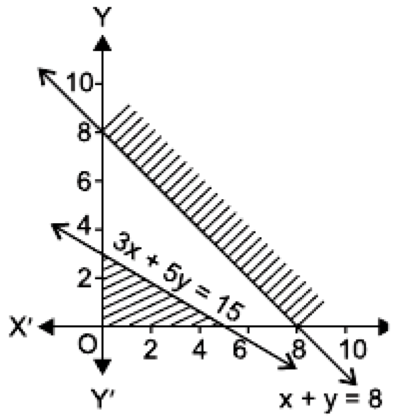


Ans. The shaded region is bounded and has coordinates of corner points as (0, 0), (7, 0), (3, 4) and (0, 2).
Also, Z = 5x + 7y

Corner points	**Z = 5x + 7y**
(0, 0)	0
(7, 0)	35
(3, 4)	43 (Maximum)
(0, 2)	14

Hence, the maximum value of Z is 43 which occurs at point (3, 4).

13. Solve the following problem graphically: Minimise $Z = 3x + 2y$ subject to the constraints: $x + y \geq 8$, $3x + 5y \leq 15$, $x \geq 0$, $y \geq 0$
Ans. Plotting the inequations $x + y \geq 8$, $3x + 5y \leq 15$, $x \geq 0$, $y \geq 0$, we notice there is no common shaded portion. Hence, no feasible solution; so no minimum Z.



14. A firm has to transport atleast 1200 packages daily using large vans which carry 200 packages each and small vans which can take 80 packages each. The cost for engaging each large van is ₹400 and each small van is ₹200. Not more than ₹3,000 is to be spent daily on the job and the number of large vans cannot exceed the number of small vans. Formulate this problem as a LPP given that the objective is to minimize cost.
Ans. Let the number of large vans and small vans be x and y respectively.
Here transportation cost Z be objective function, then
Z = 400x + 200y, which is to be minimized under constraints
$200x + 80y \geq 1200 \Rightarrow 5x + 2y \geq 30$
$400x + 200y \leq 3000 \Rightarrow 2x + y \leq 15$

$x \le y$, $x \ge 0$, $y \ge 0$

OR

A company produces two types of goods A and B, that require gold and silver. Each unit of type A requires 3 g of silver and 1 g of gold while that of type B requires 1 g of silver and 2 g of gold. The company can produce a maximum of 9 g of silver and 8 g of gold. If each unit of type A brings a profit of ₹40 and that of type B ₹50, formulate LPP to maximize profit.

Ans. Let x and y be the number of goods A and goods B respectively. If P be the profit then P = 40x + 50y which is to be maximised under constraints

$3x + y \le 9$

$x + 2y \le 8$

$x \ge 0$, $y \ge 0$

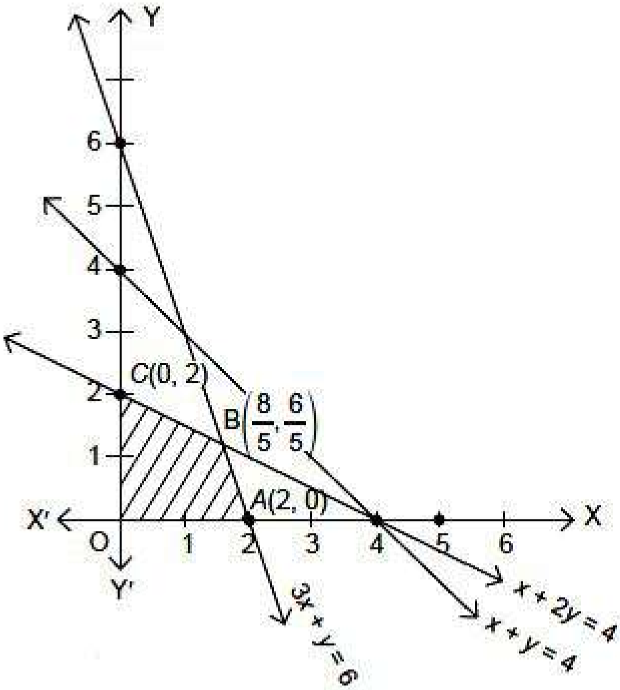
SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Find graphically, the maximum value of $Z = 2x + 5y$, subject to constraints given below: $2x + 4y \le 8$; $3x + y \le 6$; $x + y \le 4$; $x \ge 0, y \ge 0$

Ans. Given inequations are $2x + 4y \le 8$ or $x + 2y \le 4$, $3x + y \le 6$, $x + y \le 4$, $x \ge 0$, $y \ge 0$,

Maximise $Z = 2x + 5y$ on plotting the graph of the inequations we notice shaded portion as feasible solution



Possible points for maximum Z are $A(2, 0)$, $B\left(\frac{8}{5}, \frac{6}{5}\right)$, $C(0, 2)$

Points	$Z = 2x + 5y$	Value
$A(2, 0)$	$4 + 0$	4
$B\left(\frac{8}{5}, \frac{6}{5}\right)$	$\frac{16}{5} + \frac{30}{5}$	$\frac{46}{5} = 9\frac{1}{5}$
C(0, 2)	$0 + 10$	10

← Maximum

Z is maximum at $C(0, 2)$, i.e. $x = 0$, $y = 2$, maximum value = 10

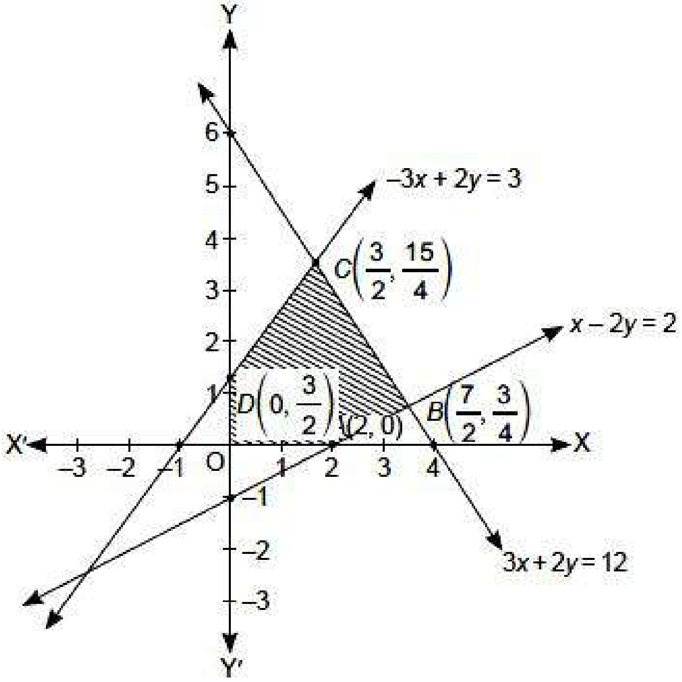
16. Minimise and Maximise $Z = 5x + 2y$ subject to the following constraints:

$x - 2y \le 2$, $3x + 2y \le 12$, $-3x + 2y \le 3$ and $x \ge 0, y \ge 0$

Ans. To minimise and maximise $Z = 5x + 2y$, subject to the constraints.

$x - 2y \le 2.$ $\quad$ $3x + 2y \le 12,$ $\quad$ $-3x + 2y \le 3,$ $\quad$ $x \ge 0, y \ge 0$

Plotting the inequations we get shaded portion as feasible solution. Possible points for maximum and minimum Z are $A(2, 0)$, $B\left(\frac{7}{2}, \frac{3}{4}\right)$, C $\left(\frac{3}{2}, \frac{15}{4}\right)$, D $\left(0, \frac{3}{2}\right)$.

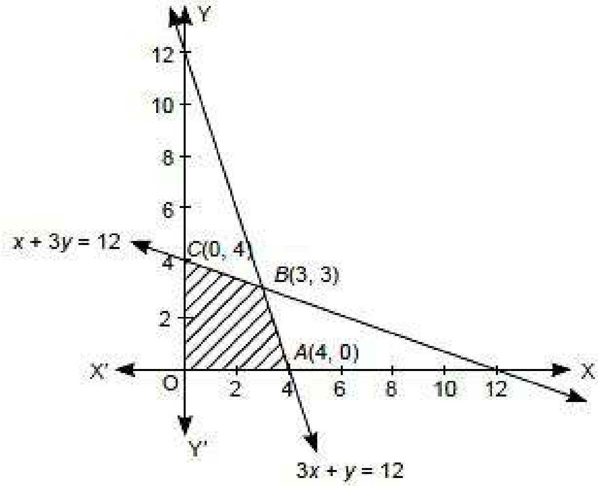


Points	$Z = 5x + 2y$	Value	
$A(2, 0)$	$10 + 0$	10	
$B\left(\frac{7}{2}, \frac{3}{4}\right)$	$\frac{35}{2} + \frac{3}{2}$	19	← Maximum
$C\left(\frac{3}{2}, \frac{15}{4}\right)$	$\frac{15}{2} + \frac{15}{2}$	15	
$D\left(0, \frac{3}{2}\right)$	$0 + 3$	3	← Minimum

Minimum value = 0 at $x = 0$, $y = \frac{3}{2}$

Maximum value = 19 at $x = \frac{7}{2}$, $y = \frac{3}{4}$

17. Solve graphically: Maximise $Z = 2.5x + y$
subject to constraints: $x + 3y \leq 12$, $3x + y \leq 12$, $x, y \geq 0$
Ans. Plotting the inequations $x + 3y \leq 12$, $3x + y \leq 12$, $x \geq 0$, $y \geq 0$
To Maximise $z = 2.5x + y$
The shaded region is feasible solution. Possible points for maximum Z are $A(4, 0)$, $B(3, 3)$, C(0, 4).



Points	$Z = 2.5x + y$	Value	
$A(4, 0)$	$10 + 0$	10	
$B(3, 3)$	$7.5 + 3$	10.5	←Maximum
$C(0, 4)$	$0 + 4$	4	

$\therefore$ Z is maximum for $B(3, 3)$, i.e. $x = 3$, $y = 3$

OR

Maximise Z = 3x + 4y, subject to the constraints: $x + y \le 1$, $x \ge 0$, $y \ge 0$.

Ans. Maximise Z = 3x + 4y

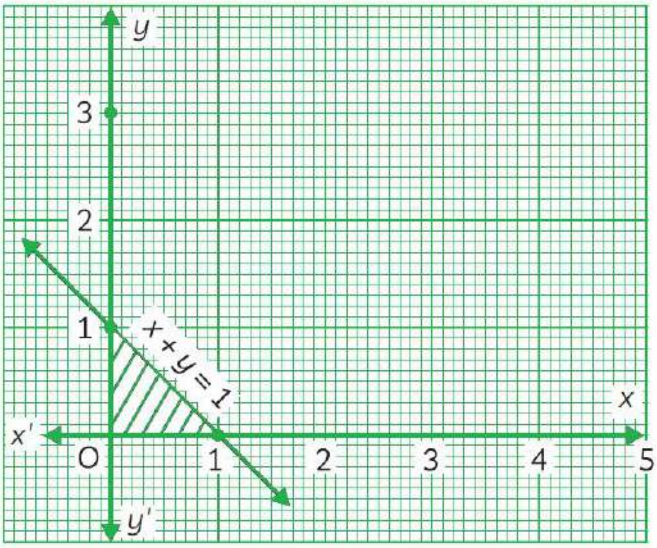
Subject to constraints

$x + y \le 1$

$x \ge 0, y \ge 0$

For x + y = 1,

x:	1	0
y:	0	1



Corner points	Z = 3x + 4y
(0, 0)	0
(1, 0)	3
(0, 1)	4 (Maximum)

Hence the maximum value of Z is 4 at (0, 1).

SECTION – D

Questions 18 carry 5 marks.

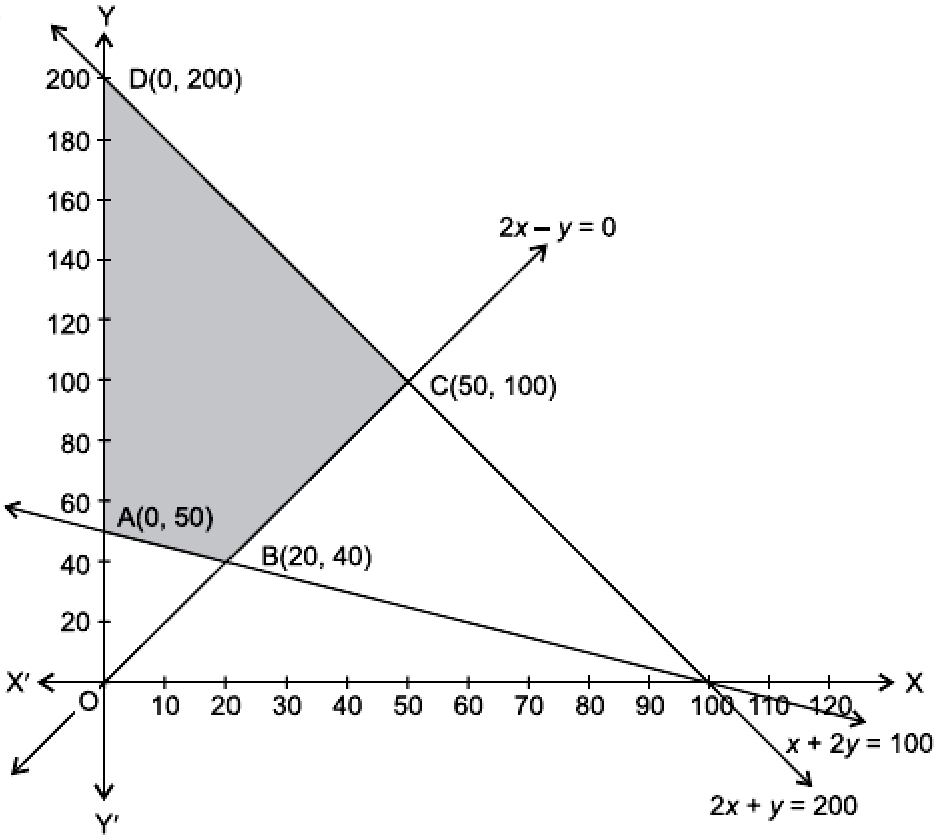
18. Show that the minimum of Z occurs at more than two points. Minimise and Maximise $Z = x + 2y$ subject to $x + 2y \ge 100$, $2x - y \le 0$, $2x + y \le 200$; $x, y \ge 0$.

Ans. Draw graph of inequalities

$x + 2y \ge 100$, $2x - y \le 0$,

$2x + y \le 200$; $x, y \ge 0$.

The feasible region determined by the constraints, $x + 2y \ge 100$, $2x - y \le 0$, $2x + y \le 200$, $x \ge 0$ and $y \ge 0$ is shown; $ABCDA$ is the feasible region.



The corner points of the feasible region are $A(0, 50)$, $B(20, 40)$, $C(50, 100)$ and $D(0, 200)$.
The values of Z at these corner points are as follows:

Corner point	$Z = x + 2y$	
$A(0, 50)$	100	←Minimum
$B(20, 40)$	100	←Minimum
$C(50, 100)$	250	
$D(0, 200)$	400	←Maximum

The maximum value of Z is 400 at (0, 200) and the minimum value of Z is 100 at all the points on the line segment joining the points (0, 50) and (20, 40).

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Case-Study 1: Read the following passage and answer the questions given below.

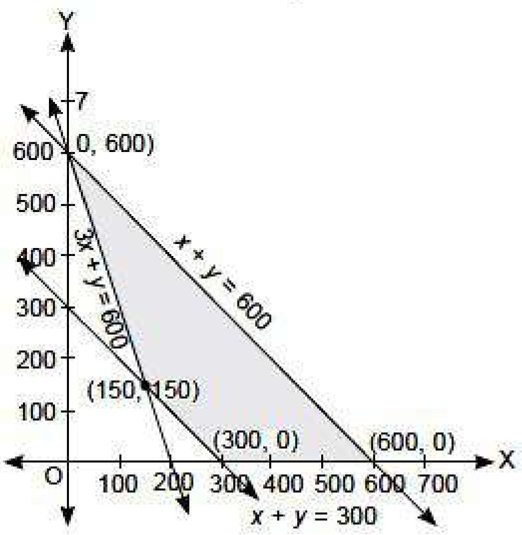
A firm produces bottles of disinfectant and a bathroom cleaner.
• It can produce maximum of 600 bottles in a day.
• It needs to produce at least 300 bottles everyday.
• It takes 6 hours to produce a bottle of disinfectant and 2 hours for a bottle of bathroom cleaner.
• At least 1200 hours of production time should be used daily.
• Manufacturing cost per bottle of disinfectant is ₹ 50 and ₹ 20 for a bottle of bathroom cleaner.

Based on above, answer the following questions.
(i) What is the objective function and constraints for this LPP keeping manufacturing cost as low as possible? (1)
(ii) Find the number of bottles of disinfectant and bathroom cleaner to be produced per day keeping total cost of manufacturing the lowest. (2)
(iii) If Z = 50x + 20y, then find the value of Z at (150, 150). (1)

OR

If Z = 50x + 20y, then find the value of Z at (300, 0). (1)
Ans. (i) Let ‘x’ bottles of disinfectant and ‘y’ bottles of bathroom cleaner be produced per day. The total manufacturing cost of ‘x’ bottles of disinfectant and ‘y’ bottles of bathroom cleaner is 50x + 20y. As, we want to minimise the production cost, so objective function is,
Minimise Z = 50x + 20y
Subject to constraints,
$6x + 2y \geq 1200$
$x + y \geq 300$
$x + y \leq 600$
and $x \geq 0$, $y \geq 0$,

(ii)



On plotting the graph of inequations, we notice shaded portion is feasible solution.
The corner points of shaded feasible region are: (0, 600), (150, 150), (300, 0) and (600, 0).

Points	Z = 50x + 20y	Values	
(0, 600)	50 × 0 + 20 × 600	12000	
(150, 150)	50 × 150 + 20 × 150	10500	←Minimum
(300, 0)	50 × 300 + 20 × 0	15000	
(600, 0)	50 × 600 + 20 × 0	30000	

So, x = 150; y = 150
(iii) z = 50x + 20y
At x = y = 150, we get
z = 50 × 150 + 20 × 150
= 7500 + 3000 = 10500

OR

z = 50x + 20y

At x = 300; y = 0, we get

z = 50 × 300 + 20 × 0 = 15000

20. Case-Study 2: Read the following passage and answer the questions given below.

Different activities are taken up daily, for its implementation lots of work and calculations are required as we work within limitations. A company is planning some manufacturing activity and based on information available the following data is obtained for some variables x and y related to manufacturing activity.

Z = 2x + 3y

$x \geq 0, y \geq 0$

$x + 2y \leq 40$

$2x + y \leq 50$

(i) Find the maximum value of z.

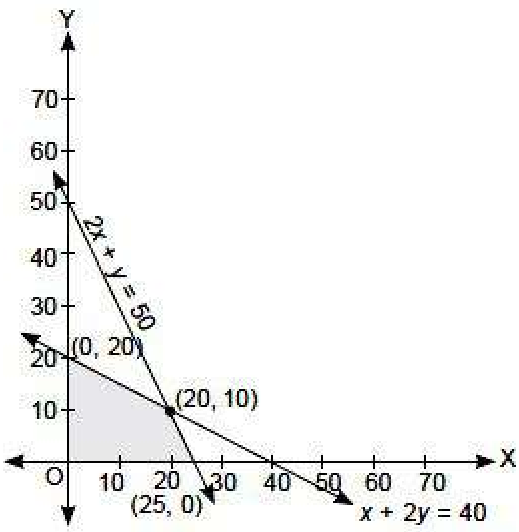
(ii) Find the relation between p and q if the objective function z = px + qy, where p, q > 0 attains equal values at (3, 4) and (2, 7).

(iii) Check whether the ordered pair (12, 27) lies in the graphical solution of $2x + y \leq 50$.

OR

Check whether the ordered pair (20, 10) lies in the graphical solution of $2x - y \geq 50$.

Ans. (i)



On plotting the graph of inequations, we notice shaded portion as feasible solution. Possible points for maximum z are (0, 0), (25, 0), (20, 10) and (0, 20).

Corner Points	Values of $Z = 2x + 3y$	
(0, 0)	0	
(25, 0)	50	
(20, 10)	70	←Maximum
(0, 20)	60	

So, maximum value of z is 70.
(ii) We have $z = px + qy$ where $p, q > 0$
Value of z at (3, 4) = value of z at (2, 7)
$\Rightarrow 3p + 4q = 2p + 7q$
$\Rightarrow p = 3q$
(iii) The given inequation is,
$2x + y \leq 50$
Put $x = 12$; $y = 27$ in the above inequation, we get
$2 \times 12 + 27 \leq 50$, not true
So, (12, 27) doesn't lie in the graphical solution of
$2x + y \leq 50$.

OR

The given inequation is
$2x - y \geq 50$
Put $x = 20$; $y = 10$ in above inequation, we get
$2 \times 20 - 10 \geq 50 \Rightarrow 30 \geq 50$ (Not true)
So, (20, 10) doesn't lie in the graphical solution of
$2x - y \geq 50$.