

Class 12: Unit Test, Linear Programming Problem

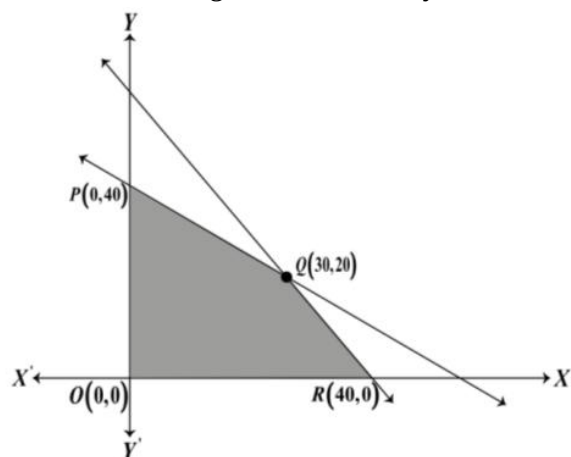
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Duration: 45 mins

Maximum Marks: 15

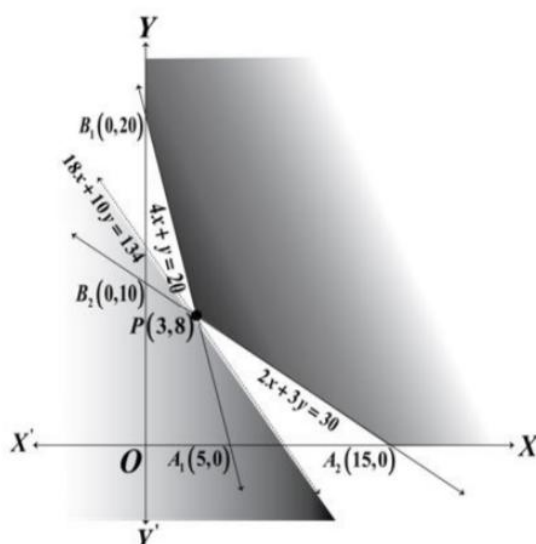
Multiple Choice Questions (1 mark each)

1. For the linear programming problem (LPP), the objective function is $Z = 4x + 3y$ and the feasible region determined by a set of constraints is shown in the graph:



Which of the following statements is true?

- (A) Maximum value of Z is at $R(40, 0)$
 - (B) Maximum value of Z is at $Q(30, 20)$
 - (C) Value of Z at $R(40, 0)$ is less than the value at $P(0, 40)$
 - (D) The value of Z at $Q(30, 20)$ is less than the value at $R(40, 0)$
2. A linear programming problem (LPP) along with the graph of its constraints is shown below. The corresponding objective function is: $Z = 18x + 10y$, which has to be minimized. The smallest value of the objective function Z is 134 and is obtained at the corner point $(3, 8)$



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The optimal solution of the above linear programming problem _____.

(A) does not exist as the feasible region is unbounded.

(B) does not exist as the inequality $18 + 10y < 134$ does not have any point in common with the feasible region.

(C) exists as the inequality $18 + 10y > 134$ has infinitely many points in common with the feasible region.

(D) exists as the inequality $18 + 10y < 134$ does not have any point in common with the feasible region.

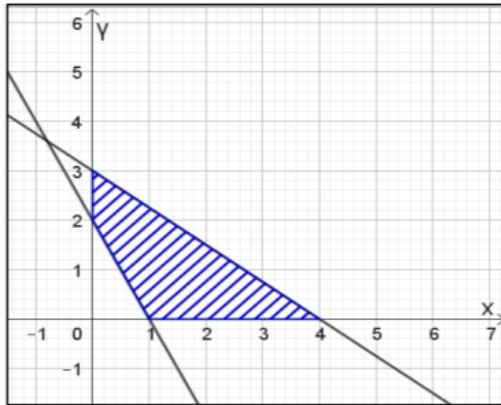
3. A student of class XII studying Mathematics comes across an incomplete question in a book.

Maximise $Z = 3x + 2y + 1$

Subject to the constraints $x \geq 0, y \geq 0, 3x + 4y \leq 12$,

He/ She notices the below shown graph for the said LPP problem, and finds that a constraint is missing in it:

Help him/her choose the required constraint from the graph.



The missing constraint is

(A) $x + 2y \leq 2$

(B) $2x + y \geq 2$

(C) $2x + y \leq 2$

(D) $x + 2y \geq 2$

4. If $Z = ax + by + c$, where $a, b, c > 0$, attains its maximum value at two of its corner points $(4, 0)$ and $(0, 3)$ of the feasible region determined by the system of linear inequalities, then

(A) $4a = 3b$

(B) $3a = 4b$

(C) $4a + c = 3b$

(D) $3a + c = 4$

5. The graph of the inequality $3x + 5y < 10$ is the

(A) Entire XY - plane

(B) Open Half plane that doesn't contain origin

(C) Open Half plane that contains origin, but not the points of the line $3x + 5y = 10$

(D) Half plane that contains origin and the points of the line $3x + 5y = 10$

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3 marks questions

6. Solve graphically: Maximise $Z = 2x + y$
subject to
 $x + y \leq 1200$,
 $x + y \geq 600$,
 $y \leq \frac{x}{2}$,
 $x \geq 0, y \geq 0$,
7. Solve Graphically: Minimize $Z = 3x + 2y$
Subject to
 $x + y \geq 8$
 $3x + 5y \leq 15$
 $x \geq 0, y \geq 0$

4 marks question

8. Consider the following Linear Programming Problem:
Minimise $z = x + 2y$
Subject to
 $2x + y \geq 3$
 $x + 2y \geq 6$
 $x \geq 0, y \geq 0$
Show graphically that the minimum of Z occurs at more than two points

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