CUET (UG) – MATHEMATICS

Chapter Test - Linear Programming

General Instructions

1. Total Questions: **20**
2. Duration: **60 Minutes**
3. All questions are compulsory.
4. Each question carries **5 marks**.
5. For each correct answer: **+5 marks**.
6. For each incorrect answer: **-1 mark**.
7. No negative marking for unanswered questions.
8. Use of calculator or electronic devices is strictly prohibited.
9. Choose the most appropriate answer from the given options.

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1. In a Linear Programming Problem (LPP), the objective function $Z = ax + by$ is a:
   (A) Quadratic function to be optimized
   (B) Linear function to be optimized
   (C) Constraint to be satisfied
   (D) Discrete function

2. The common region determined by all the constraints including non-negative constraints $x, y \geq 0$ of an LPP is called:
   (A) Infeasible region
   (B) Unbounded region
   (C) Feasible region
   (D) Optimal region

3. If the feasible region of an LPP is bounded, then the maximum or minimum value of the objective function occurs at:
   (A) The origin only
   (B) Any point inside the region
   (C) At least one corner point (vertex) of the region
   (D) The center of the region

4. Which of the following is not a constraint of an LPP?
   (A) $x + y \leq 5$
   (B) $Z = 3x + 4y$
   (C) $x \geq 0$
   (D) $2x - 3y \geq 10$

5. The feasible region for an LPP is shown in a graph. Let $Z = 3x - 4y$ be the objective function. If the vertices of the region are $(0, 0), (5, 0), (4, 10)$, and $(0, 8)$, the minimum value of Z occurs at:
   (A) $(0, 0)$
   (B) $(0, 8)$
   (C) $(5, 0)$
   (D) $(4, 10)$

6. If the objective function $Z = ax + by$ has the same maximum value on two corner points of the feasible region, then the number of points at which maximum Z occurs is:
   (A) Exactly 2
   (B) Only 1
   (C) Infinite
   (D) Finite

7. In an LPP, the constraints $x \leq 4, y \leq 3, x \geq 0, y \geq 0$ define a feasible region that is:
   (A) A triangle
   (B) A rectangle
   (C) An unbounded region
   (D) A square

8. Objective function $Z = x + y$, subject to $x + y \leq 1, x \geq 0, y \geq 0$. The maximum value of Z is:
   (A) 0
   (B) 1
   (C) 2
   (D) Infinite

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9. If the constraints in an LPP are $x + 2y \leq 10, 3x + y \leq 15, x \geq 0, y \geq 0$, one of the corner points of the feasible region is:
   (A) $(5, 0)$
   (B) $(0, 15)$
   (C) $(10, 0)$
   (D) $(4, 3)$

10. A linear programming problem is called infeasible if:
    (A) The region is unbounded
    (B) There is no common region satisfying all constraints
    (C) The objective function is negative
    (D) The origin is not included

11. Maximise $Z = 4x + y$ subject to $x + y \leq 50, 3x + y \leq 90, x \geq 0, y \geq 0$. The maximum value is:
    (A) 120
    (B) 90
    (C) 200
    (D) 100

12. Which of the following statements is true for a Linear Programming Problem?
    (A) Every LPP has a unique optimal solution
    (B) If an LPP has two optimal solutions, it has infinitely many solutions
    (C) The feasible region must always include the origin
    (D) The objective function must be maximized only

13. The point which provides the optimal value for $Z = 5x+10y$ subject to $x+2y \leq 120, x+y \geq 60, x - 2y \geq 0, x, y \geq 0$ is:
    (A) $(60, 0)$
    (B) $(40, 20)$
    (C) $(120, 0)$
    (D) $(80, 40)$

14. For the constraints $x + y \leq 4, 3x + 3y \geq 18, x, y \geq 0$, the feasible region is:
    (A) A small triangle
    (B) An unbounded quadrilateral
    (C) Empty (Infeasible)
    (D) A line segment

15. The corner points of a feasible region are $(0, 0), (2, 0), (1, 2), (0, 1)$. The maximum value of $Z = x + y$ is:
    (A) 2
    (B) 3
    (C) 1
    (D) 0

16. In an LPP, if the objective function is $Z = 2x + 5y$ and the feasible region is bounded by $(0, 2), (0, 5), (4, 1), (5, 0)$, the minimum value of Z occurs at:
    (A) $(5, 0)$
    (B) $(4, 1)$
    (C) $(0, 2)$
    (D) $(0, 5)$

17. A linear programming problem is used to maximize $Z = 3x + 2y$ subject to $x \geq 2, y \geq 3$. The feasible region is:

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(A) Bounded
(B) Infeasible
(C) Unbounded
(D) A single point

18. The set of all feasible solutions to an LPP is a:
(A) Concave set
(B) Convex set
(C) Empty set only
(D) Circular set

19. Corner points of the feasible region for $Z = 3x + 9y$ are $(0, 10), (5, 5), (15, 15), (0, 20)$. The minimum value of Z is:
(A) 60
(B) 90
(C) 180
(D) 75

20. The optimal value of the objective function is attained at the points:
(A) On the x-axis
(B) On the y-axis
(C) At the corner points of the feasible region
(D) On the line $x = y$

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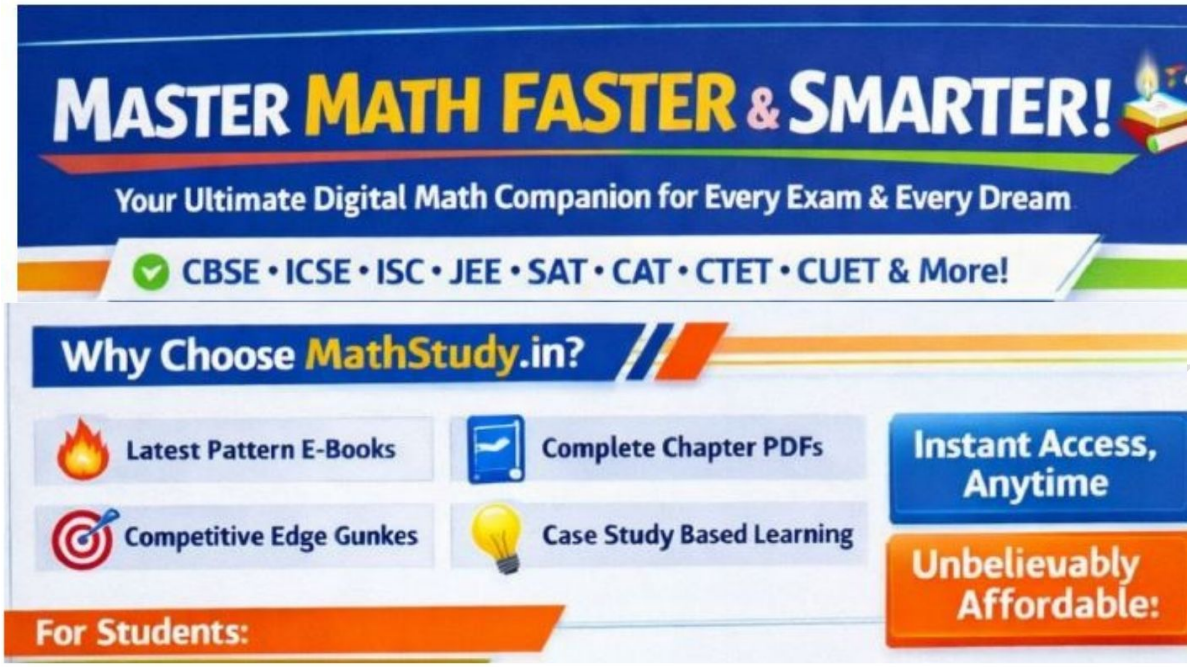

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