CUET Mathematics Test

Chapter: 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.

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

2. The feasible region for an LPP is usually:
   (A) A circle
   (B) A convex polygon
   (C) An open parabolic region
   (D) A concave polygon

3. The corner points of the feasible region determined by a system of linear constraints are $(0, 3), (1, 1)$, and $(3, 0)$. The minimum value of $Z = 3x + 4y$ is:
   (A) 12
   (B) 7
   (C) 9
   (D) 0

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

5. If the feasible region for an LPP is unbounded, then the maximum value of the objective function $Z = ax + by$:
   (A) Must exist
   (B) May or may not exist
   (C) Is always zero
   (D) Is always at the origin

6. The feasible region for an LPP is the set of all points that satisfy:
   (A) Only the objective function
   (B) Only the non-negativity constraints
   (C) All the given constraints and non-negativity restrictions
   (D) Only the equality constraints

7. In an LPP, 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 value occurs is:
   (A) 0
   (B) 2
   (C) Infinite
   (D) 1

8. A feasible solution that optimizes an objective function is called:
   (A) Infeasible solution
   (B) Optimal feasible solution
   (C) Boundary solution
   (D) Interior solution

9. Consider the constraints $x + y \leq 2, x \geq 0, y \geq 0$. The number of corner points of the feasible region is:

(A) 2
(B) 3
(C) 4
(D) 1

10. If a constraint in a linear programming problem is $2x + 3y \leq 6$, which of the following points lies in the half-plane containing the origin?
    (A) $(4, 0)$
    (B) $(1, 2)$
    (C) $(0, 0)$
    (D) $(3, 1)$

11. Optimal value of the objective function is attained at:
    (A) Points on the x-axis only
    (B) Points inside the feasible region only
    (C) Corner points of the feasible region
    (D) Any point in the coordinate plane

12. For the LPP: Maximize $Z = x + y$, subject to $x + y \leq 1, x \geq 0, y \geq 0$, the maximum value of Z is:
    (A) 2
    (B) 1
    (C) 0
    (D) 0.5

13. The region represented by the inequalities $x \geq 6, y \geq 2, 2x + y \leq 10$ is:
    (A) Unbounded
    (B) A triangle in the first quadrant
    (C) An empty set (infeasible)
    (D) A rectangle

14. In the context of LPP, non-negativity constraints imply that:
    (A) Variables must be negative
    (B) Variables can take any real value
    (C) Variables must be greater than or equal to zero
    (D) The objective function cannot be minimized

15. Which of the following is a characteristic of a convex set?
    (A) Every point on a line segment joining two points of the set also belongs to the set
    (B) It must be a circle
    (C) It must contain the origin
    (D) It cannot be a polygon

16. For an LPP, if the objective function is $Z = 5x + 10y$ and corner points are $(0, 2), (4, 0), (6, 0), (0, 8)$, the minimum value of Z is:
    (A) 20
    (B) 40
    (C) 30
    (D) 80

17. The point which does not belong to the feasible region of the constraints $2x + 3y \leq 6, x \geq 0, y \geq 0$ is:
    (A) $(0, 0)$
    (B) $(1, 1)$

(C) $(3, 2)$
(D) $(2, 0)$

18. If the corner points of a feasible region are $(0,0), (5,0), (3,4)$ and $(0,5)$, then the maximum value of $Z = 2x + 3y$ is:
    (A) 10
    (B) 15
    (C) 18
    (D) 17

19. The process of finding the best possible value under given restrictions is:
    (A) Differentiation
    (B) Optimization
    (C) Integration
    (D) Probability

20. The maximum value of $Z = 3x + 2y$ for the constraints $x + y \leq 7, x + 2y \leq 10, x, y \geq 0$ is:
    (A) 21
    (B) 18
    (C) 20
    (D) 15

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