

# CUET (UG) – MATHEMATICS

Chapter Test - Linear Programming

## SOLUTIONS

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## Solutions

1. The objective function in an LPP is a linear function representing the goal (profit/cost) to be optimized. Correct Option: **(B)**
2. The feasible region is the set of all points that satisfy all constraints simultaneously. Correct Option: **(C)**
3. The Corner Point Theorem states that if an optimal value exists, it must occur at one of the vertices. Correct Option: **(C)**
4.  $Z = 3x + 4y$  is the objective function, not a constraint. Constraints are inequalities or equations. Correct Option: **(B)**
5. Evaluate  $Z = 3x - 4y$ : at  $(0, 0)$ ,  $Z = 0$ ; at  $(5, 0)$ ,  $Z = 15$ ; at  $(4, 10)$ ,  $Z = 12 - 40 = -28$ ; at  $(0, 8)$ ,  $Z = -32$ . Minimum is at  $(0, 8)$ . Correct Option: **(B)**
6. Any point on the line segment connecting two optimal corner points is also optimal. Correct Option: **(C)**
7. The intersection of  $x \in [0, 4]$  and  $y \in [0, 3]$  forms a rectangle. Correct Option: **(B)**
8. Corner points are  $(0, 0)$ ,  $(1, 0)$ ,  $(0, 1)$ .  $Z$  is max (1) at  $(1, 0)$  and  $(0, 1)$ . Correct Option: **(B)**
9. Solving  $x + 2y = 10$  and  $3x + y = 15$  simultaneously gives  $(4, 3)$ . Other vertices are  $(0, 0)$ ,  $(5, 0)$ ,  $(0, 5)$ . Correct Option: **(A)**
10. If the intersection of all constraint half-planes is empty, the problem is infeasible. Correct Option: **(B)**
11. Vertices are  $(0, 0)$ ,  $(30, 0)$ ,  $(20, 30)$ ,  $(0, 50)$ .  $Z(30, 0) = 4(30) + 0 = 120$  is the maximum. Correct Option: **(A)**
12. If an LPP has two distinct optimal solutions, the entire line segment between them consists of optimal solutions. Correct Option: **(B)**
13. Calculating  $Z$  at  $(60, 0)$ ,  $(120, 0)$ ,  $(40, 20)$ ,  $(80, 40)$  gives 300, 600, 400, 800. Max is at  $(80, 40)$ . Correct Option: **(D)**
14.  $x + y \leq 4$  and  $x + y \geq 6$  do not have a common region. Correct Option: **(C)**
15.  $Z$  values: 0, 2, 3, 1. Maximum is 3. Correct Option: **(B)**
16.  $Z(0, 2) = 10$ ,  $Z(0, 5) = 25$ ,  $Z(4, 1) = 13$ ,  $Z(5, 0) = 10$ . Min is 10, occurring at  $(0, 2)$ . Correct Option: **(C)**
17. The region  $x \geq 2$  and  $y \geq 3$  extends to infinity in the first quadrant. Correct Option: **(C)**
18. The feasible region of any LPP is a convex polygon (or convex set). Correct Option: **(B)**
19.  $Z(0, 10) = 90$ ,  $Z(5, 5) = 15 + 45 = 60$ ,  $Z(15, 15) = 180$ ,  $Z(0, 20) = 180$ . Minimum is 60. Correct Option: **(A)**
20. The optimal solution is always located on the boundary, specifically at corner points. Correct Option: **(C)**