

CUET (UG) – MATHEMATICS

Chapter Test - Section B2: Applied Mathematics -Unit VIII: Linear Programming

SOLUTIONS

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Solutions

1. **Correct Option: (B).** An objective function in LPP is a linear function representing the goal (profit/cost) to be optimized.
2. **Correct Option: (C).** The common region that satisfies all system constraints is the feasible region.
3. **Correct Option: (B).** Since decision variables usually represent physical quantities, they are constrained to $x, y \geq 0$.
4. **Correct Option: (C).** $Z(0, 0) = 0$, $Z(4, 0) = 12$, $Z(2, 3) = 6 + 12 = 18$, $Z(0, 5) = 20$. Max value is 20.
5. **Correct Option: (B).** For unbounded regions, the objective function value can often increase indefinitely, though it depends on the objective function's slope.
6. **Correct Option: (C).** The Corner Point Theorem guarantees that if an optimal solution exists, it occurs at a vertex.
7. **Correct Option: (B).** The vertices are $(0,0)$, $(5,0)$, and $(0,5)$, forming a triangle.
8. **Correct Option: (B).** If two vertices are optimal, every point on the segment connecting them is also optimal (infinite solutions).
9. **Correct Option: (B).** Substituting $(0,0)$ into $2x + 3y \leq 6$ gives $0 \leq 6$, which is true; the region includes the origin.
10. **Correct Option: (C).** "At least" indicates the \geq sign. Thus, $2x + y \geq 10$.
11. **Correct Option: (C).** $xy \leq 4$ involves a product of variables, making it a non-linear inequality.
12. **Correct Option: (C).** If constraints are contradictory, no point can satisfy them all, leading to no feasible solution.
13. **Correct Option: (A).** $Z(60, 0) = 300$. Other points like $(0,60)$ give $Z = 600$. Minimum is 300.
14. **Correct Option: (C).** For $(4,4)$, $4 + 2(4) = 12$, which is not ≤ 10 .
15. **Correct Option: (B).** LPP is a mathematical optimization technique for finding the best outcome in a linear model.
16. **Correct Option: (B).** Area of triangle with vertices $(0,0)$, $(3,0)$, and $(0,2)$ is $\frac{1}{2} \times 3 \times 2 = 3$.
17. **Correct Option: (A).** Adding $x + y = 4$ and $2x - y = 2$ gives $3x = 6 \implies x = 2, y = 2$.
18. **Correct Option: (B).** The variables that the designer controls to achieve the objective are called decision variables.
19. **Correct Option: (B).** Vertices are $(0,0)$, $(2,0)$, $(0,2)$, $(2,2)$. Max Z at $(2,2)$ is $2 + 2 = 4$.
20. **Correct Option: (B).** $x \geq y$ means the region is below or on the line $y = x$.