

Linear Programming Notes and Practice Questions

1. Meaning of Linear Programming

Linear programming is a mathematical method used to find the best solution to a problem involving limited resources, such as maximizing profit or minimizing cost.

2. Steps in Solving Linear Programming Problems

- Define variables clearly.
- Form the objective function.
- Write constraints as inequalities.
- Draw the graph of inequalities.
- Identify the feasible region.
- Find corner points.
- Substitute corner points into the objective function to get optimum value.

3. Example Question

A farmer grows maize and beans. A bag of maize gives profit of 40 units, while beans give profit of 30 units. Let x = bags of maize and y = bags of beans. Maximize $Z = 40x + 30y$ subject to: $x + y \leq 10$, $2x + y \leq 16$, $x \geq 0$, $y \geq 0$.

Answer

Corner points are (0,0), (0,10), (6,4), and (8,0). Substituting gives maximum value at (6,4): $Z = 40(6) + 30(4) = 360$.

4. Practice Questions with Answers

1. Maximize $Z = 5x + 4y$ subject to $x + y \leq 5$, $x + 2y \leq 8$. Answer: Maximum at (2,3), $Z=22$.
2. Minimize $C = 3x + 2y$ subject to $x + y \geq 6$, $x + 2y \geq 8$. Answer depends on feasible corner points.
3. A school hires buses and vans to transport students under cost limits.