

KEY CONCEPT INVOLVED

1. **Linear Programming Problems** – Problems which concern with finding the minimum or maximum value of a linear function Z (called objective function) of several variables (say x and y), subject to certain conditions that the variables are non-negative and satisfy a set of linear inequalities (called linear constraints) are known as linear programming problems.
2. **Objective function** – A linear function $z = ax + by$, where a and b are constants, which has to be maximised or minimised according to a set of given conditions, is called a linear objective function.
3. **Decision Variables** – In the objective function $z = ax + by$, the variables x, y are said to be decision variables.
4. **Constraints** – The restrictions in the form of inequalities on the variables of a linear programming problem are called constraints. The condition $x \geq 0, y \geq 0$ are known as non – negative restrictions.
5. **Feasible Region** – The common region determined by all the constraints including non–negative constraints $x, y \geq 0$ of linear programming problem is known as feasible region (or solution region) If we shade the region according to the given constraints, then the shaded area is the feasible region which is the common area of the regions drawn under the given constraints.
6. **Feasible Solution** – Each point within and on the boundary of the feasible region represents feasible solution of constraints.
In the feasible region there are infinitely many points which satisfy the given condition.
7. **Optimal Solution** – Any point in the feasible region that gives the optimal value (maximum or minimum) of the objective function is called an optimal solution.
8. **Theorem 1** – Let R be the feasible region (convex polygon) for a linear programming problem and let $Z = ax + by$ be the objective function. When Z has an optimal value (maximum or minimum), where the variables x and y are subject to constraints described by linear inequalities, the optimal value must occur at a corner point of the feasible region.
9. **Theorem 2** – Let R be the feasible region for a linear programming problem, and let $Z = ax + by$ be the objective function. If R is bounded then the objective function Z has both maximum and minimum value on R and each of these occurs at a corner point of R .
10. **Different Types of Linear Programming Problem** –
 - (i) **Manufacturing Problems** – In such problem, we determine the number of units of different products which should be produced and sold by a firm when each product requires a fixed man power required, machines hours, labour hour per unit product needed were house space per unit of the output etc., in order to make maximise profit.
 - (ii) **Diet Problem** – We determine the amount of different types of constituents or nutrients which should be included in a diet so as to minimise the cost of the desired diet such that it contains a certain minimum amount of each constituent/nutrients.
 - (iii) **Transportation Problems** – In these problems, we determine a transportation schedule in order to find the cheapest way of transporting a product from plants/factories situated at different locations to different markets.

CONNECTING CONCEPTS

1. **Formulation of LPP** – Formulation of LPP means converting verbal description of the given problem into mathematical form in terms of objective function, constraints and non negative restriction:
 - (i) Identification of the decision variables whose value is to be determined.
 - (ii) Formation of an objective function as a linear function of the decision variables.
 - (iii) Identification of the set of constraints or restrictions.
Express them as linear inequation with appropriate sign of equality or inequality.
 - (iv) Mention the non negative restriction for the decision variables.
2. **Solve The LPP** –
 - (i) First of all formulate the given problem in terms of mathematical constraints and an objective function.
 - (ii) The constraints would be inequations which shall be plotted and relevant area shall be shaded.
 - (iii) The corner points of common shaded area shall be identified and the coordinates corresponding to these points shall be substituted in the objective function.
 - (iv) The coordinates of one corner point which maximize or minimize the objective function shall be optimal solution of the given problem.
If feasible region is unbounded, then a maximum or a minimum value of the objective function may not exist. However, if it exists, it must occur at a corner point of feasible region

Class 12 Maths NCERT Solutions

NCERT Solutions	Important Questions	NCERT Exemplar
Chapter 1 Relations and Functions	Relations and Functions	Chapter 1 Relations and Functions
Chapter 2 Inverse Trigonometric Functions	Concept of Relations and Functions	Chapter 2 Inverse Trigonometric Functions
Chapter 3 Matrices	Binary Operations	Chapter 3 Matrices
Chapter 4 Determinants	Inverse Trigonometric Functions	Chapter 4 Determinants
Chapter 5 Continuity and Differentiability	Matrices	Chapter 5 Continuity and Differentiability
Chapter 6 Application of Derivatives	Matrix and Operations of Matrices	Chapter 6 Application of Derivatives
Chapter 7 Integrals Ex 7.1	Transpose of a Matrix and Symmetric Matrix	Chapter 7 Integrals
Integrals Class 12 Ex 7.2	Inverse of a Matrix by Elementary Operations	Chapter 8 Applications of Integrals
Integrals Class 12 Ex 7.3	Determinants	Chapter 9 Differential Equations
Integrals Class 12 Ex 7.4	Expansion of Determinants	Chapter 10 Vector Algebra
Integrals Class 12 Ex 7.5	Properties of Determinants	Chapter 11 Three Dimensional Geometry
Integrals Class 12 Ex 7.6	Inverse of a Matrix and Application of Determinants and Matrix	Chapter 12 Linear Programming
Integrals Class 12 Ex 7.7	Continuity and Differentiability	Chapter 13 Probability
Integrals Class 12 Ex 7.8	Continuity	
Integrals Class 12 Ex 7.9	Differentiability	
Integrals Class 12 Ex 7.10	Application of Derivatives	
Integrals Class 12 Ex 7.11	Rate Measure Approximations and Increasing-Decreasing Functions	
Integrals Class 12 Miscellaneous Exercise	Tangents and Normals	
Chapter 8 Application of Integrals	Maxima and Minima	
Chapter 9 Differential Equations	Integrals	
Chapter 10 Vector Algebra	Types of Integrals	
Chapter 11 Three Dimensional Geometry	Differential Equation	
Chapter 12 Linear Programming	Formation of Differential Equations	
Chapter 13 Probability Ex	Solution of Different Types of Differential	

13.1	Equations	
Probability Solutions Ex 13.2	Vector Algebra	
Probability Solutions Ex 13.3	Algebra of Vectors	
Probability Solutions Ex 13.4	Dot and Cross Products of Two Vectors	
Probability Solutions Ex 13.5	Three Dimensional Geometry	
	Direction Cosines and Lines	
	Plane	
	Linear Programming	
	Probability	
	Conditional Probability and Independent Events	
	Baye's Theorem and Probability Distribution	

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Chapter 1: Relations	Chapter 12: Higher Order Derivatives	Chapter 23 Algebra of Vectors
Chapter 2: Functions	Chapter 13: Derivative as a Rate Measurer	Chapter 24: Scalar Or Dot Product
Chapter 3: Binary Operations	Chapter 14: Differentials, Errors and Approximations	Chapter 25: Vector or Cross Product
Chapter 4: Inverse Trigonometric Functions	Chapter 15: Mean Value Theorems	Chapter 26: Scalar Triple Product
Chapter 5: Algebra of Matrices	Chapter 16: Tangents and Normals	Chapter 27: Direction Cosines and Direction Ratios
Chapter 6: Determinants	Chapter 17: Increasing and Decreasing Functions	Chapter 28 Straight line in space
Chapter 7: Adjoint and Inverse of a Matrix	Chapter 18: Maxima and Minima	Chapter 29: The plane
Chapter 8: Solution of Simultaneous Linear Equations	Chapter 19: Indefinite Integrals	Chapter 30: Linear programming
Chapter 9: Continuity	Chapter 20: Definite Integrals	Chapter 31: Probability
Chapter 10: Differentiability	Chapter 21: Areas of Bounded Regions	Chapter 32: Mean and variance of a random variable
Chapter 11: Differentiation	Chapter 22: Differential Equations	Chapter 33: Binomial Distribution

JEE Main Maths Chapter wise Previous Year Questions

1. [Relations, Functions and Reasoning](#)
2. [Complex Numbers](#)
3. [Quadratic Equations And Expressions](#)
4. [Matrices, Determinants and Solutions of Linear Equations](#)
5. [Permutations and Combinations](#)
6. [Binomial Theorem and Mathematical Induction](#)
7. [Sequences and Series](#)
8. [Limits, Continuity, Differentiability and Differentiation](#)
9. [Applications of Derivatives](#)
10. [Indefinite and Definite Integrals](#)
11. [Differential Equations and Areas](#)
12. [Cartesian System and Straight Lines](#)
13. [Circles and System of Circles](#)
14. [Conic Sections](#)
15. [Three Dimensional Geometry](#)
16. [Vectors](#)
17. [Statistics and Probability](#)
18. [Trigonometry](#)
19. [Miscellaneous](#)

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