

# BIHAR BOARD MATHEMATICS SYLLABUS WITH MARKS WEIGHTAGE

UNIT NAME	Marks
UNIT:1 Relation and Function	10
UNIT:2 Calculus	44
UNIT:3 Algebra	13
UNIT:4 Probability	10
UNIT:5 Vector and 3D-Geometry	17
UNIT:6 Linear-Programming Problem	06

#### **Unit-Wise Distribution of Marks**

# Detailed Syllabus for Mathematics Class 12<sup>th</sup>

# Unit 1: Relations and Functions

- Relations and Functions: Types of relations: Reflexive, Symmetric, Transitive and Equivalence relations.
- Functions: One to one and onto functions, composite functions, inverse of a function. Binary operations.
- Inverse Trigonometric Functions: Definition, range, domain, principal value branch.
- Graphs of inverse trigonometric functions. Elementary properties of inverse trigonometric functions.

# Unit 2: Algebra

#### Matrices

- Basics: Concept, notation, order, equality, types of matrices, zero and identity matrix, transpose of a matrix, symmetric and skew symmetric matrices.
- Operation on matrices: Addition and multiplication and multiplication with a scalar. Simple properties of addition, multiplication and scalar multiplication.
- Non-Commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order
- Concept of elementary row and column operations. Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).





### Determinants

- Determinant of a square matrix (up to 3 x 3 matrices), properties of determinants, minors, cofactors and applications of determinants in finding the area of a triangle.
- Adjoint and inverse of a square matrix.
- Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

# Unit 3: Calculus

### **Continuity and Differentiability**

- Derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit functions.
- Concept of exponential and logarithmic functions.
- Derivatives of logarithmic and exponential functions. Logarithmic differentiation, derivative of functions expressed in parametric forms. Second order derivatives.
- Rolle's and Lagrange's Mean Value Theorems and their geometric interpretation.

### **Applications of Derivatives**

- Rate of change of bodies, increasing/decreasing functions, tangents and normal, use of derivatives in approximation, maxima and minima.
- Simple problems (based on basic principles and understanding of the subject as well as real-life situations).

#### Integrals

- Integration as the inverse process of differentiation.
- Integration of a variety of functions by substitution, by partial fractions and by parts
- Evaluation of simple integrals of the following types and problems based on them.

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}$$
$$\int \frac{px + q}{ax^2 + bx + c} dx, \int \frac{px + q}{\sqrt{ax^2 + bx + c}} dx, \int \sqrt{a^2 \pm x^2} dx, \int \sqrt{x^2 - a^2} dx$$
$$\int \sqrt{ax^2 + bx + c} dx, \int (px + q)\sqrt{ax^2 + bx + c} dx$$

• Definite integrals as a limit of a sum, Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

# Applications of Integrals

• Applications in finding area under simple curves, Straight lines, circles/parabolas/ellipses.





• Area between any of the two above said curves (the region should be clearly identifiable)

### **Differential Equations**

- Definition, order and degree, general and particular solutions of a differential equation.
- Formation of differential equation whose general solution is given.
- Solution of differential equations by the method of separation of variables solutions of homogeneous differential equations of first order and first degree.
- Solutions of linear differential equation of the type:
- dy/dx + py = q, where p and q are functions of x or constants.

# Unit 4: Vectors and 3-Dimensional Geometry

#### Vectors

- Vectors and scalars, magnitude and direction of a vector.
- Direction cosines and direction ratios of a vector.
- Types of vectors, position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio.
- Geometrical Interpretation, properties and application of scalar (dot) product of vectors, vector (cross) product of vectors, scalar triple product of vectors.

#### 3 – Dimensional Geometry

- Direction cosines and direction ratios of a line joining two points.
- Cartesian equation and vector equation of a line, coplanar and skew lines, shortest distance between two lines.Cartesian and vector equation of a plane.
- Distance of a point from a plane.
- Angle between
  - a. two lines,
  - b. two planes
  - c. a line and a plane

# Unit 5: Linear Programming

- Introduction
- Related terminology: constraints, objective function, optimization, different types of linear programming (L.P.) problems.
- Mathematical formulation of L.P. problem.
- Graphical method of solution for problems in two variables, feasible and infeasible regions (bounded and unbounded), feasible and infeasible solutions
- Optimal feasible solutions.

	Download eSaral app for	Get IT ON Google Play
	IIT-JEE, NEET, Foundation Preparation	



# Unit 6: Probability

- Multiplication theorem on probability
- Conditional probability
- Independent events, total probability, Baye's theorem
- Random variable and its probability distribution
- Mean and variance of the random variable
- Repeated independent (Bernoulli) trials & Binomial distribution.

