



SYLLABUS - 2024- 2025
CLASS - XII
SUBJECT - MATHEMATICS

Total Marks - 80

Internal Assessment - 20

HALF-YEARLY EXAMINATION: 2024-2025

Max. Marks: 80

UNIT-I: RELATIONS AND FUNCTIONS

15 Periods

1. Relation and Functions:

Types of relations: reflexive, symmetric, transitive and equivalence relations. One to one and onto Functions.

UNIT-II: ALGEBRA

25 Periods

1. Matrices:

Concept, notation, order, equality, types of matrices, zero and identity matrix, transpose of a matrix, symmetric and skew symmetric matrices. Operations 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 2). Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).

UNIT-III: CALCULUS

20 Periods

1. Continuity and Differentiability:

Continuity and differentiability, chain rule, derivative of inverse trigonometric functions, like $\sin^{-1}x$, $\cos^{-1}x$ and $\tan^{-1}x$ 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.

3. Integrals:

20 Periods

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

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

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

$$\int \sqrt{ax^2 + bx + c} dx$$



Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

5. Differential Equations:

15 Periods

Definition, order and degree, general and particular solutions of a differential equation. Solution of differential equations by method of separation of variables, solutions of homogeneous differential equations of first order and first degree. Solutions of linear differential equations of the type:

$$\frac{dx}{dy} + py = q, \text{ where } p \text{ and } q \text{ are functions of } x \text{ or constants.}$$

$$\frac{dx}{dy} + px = q, \text{ where } p \text{ and } q \text{ are functions of } y \text{ or constants.}$$

UNIT-IV: VECTORS AND THREE-DIMENSIONAL GEOMETRY

1. Vectors:

15 Periods

Vectors and scalars, magnitude and direction of a vector. Direction cosines and direction ratios of a vector. Types of vectors (equal, unit, zero, parallel and collinear 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, Definition, Geometrical Interpretation, properties and application of scalar (dot) product of vectors, vector (cross) product of vectors.

UNIT-V: LINEAR PROGRAMMING

1. Linear Programming:

20 Periods

Introduction, related terminology such as constraints, objective function, optimization, graphical method of solution for problems in two variables, feasible and infeasible regions (bounded or unbounded), feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).



CLASS- XII
SUB- MATHEMATICS

HALF-YEARLY EXAMINATION: 2024-2025
BLUE-PRINT OF DISTRIBUTION OF MARKS

Time: 3 Hours

Total Marks: 80

Unit's No. & Name	Chapter's Name	MCQ (1 Mark)	VSA (1 Mark)	SA-I (2 Marks)	SA-II (3 Marks)	LA-I (4 Marks)	LA-II (5 Marks)	Total Marks
I. Relations & Functions	1. Relation & Function	1x2	1x1	2x1	3x1	-	-	08
II. Algebra	1. Matrices	1x1	1x3	2x1	-	4x1	-	10
III. Calculus	1. Continuity & Differentiability	1x1	1x1	2x1	-	4x2	-	35
	2. Integrals (Indefinite)	1x1	1x1	2x1	3x1	4x2	-	
	3. Differential Equations	1x2	1x2	-	-	4x1	-	
IV. Vectors & 3D- Geometry	1. Vectors	1x2	1x1	-	3x2	-	5x1	14
V. Linear Programming	1. Linear Programming	-	-	-	-	-	5x1	05
VI. Probability	1. Probability (Conditional Probability, Multiplication, theorem on probability, Independence events, total Probability)	1x1	1x1	2x1	-	4x1	-	08
Total Marks		1x10 =10	1x10 =10	2x5 =10	3x4 =12	4x7 =28	5x2 =10	80
Total Nos. of Questions		10	10	05	04	07	02	38

** Internal Assessment - 20



CLASS- XII
SUB- MATHEMATICS

PRE-BOARD/ BOARD FINAL EXAMINATION: 2024-2025

No.	Units	No. of Periods	Marks
I	Relations and Functions	30	08
II	Algebra	50	10
III	Calculus	80	35
IV	Vectors and Three- Dimensional Geometry	30	14
V	Linear Programming	20	05
VI	Probability	30	08
Total		240	80
Internal Assessment			20

UNIT-1: RELATIONS AND FUNCTIONS

1. Relations and Functions:

15 Periods

Types of relations: reflexive, symmetric, transitive and equivalence relations. One to one and onto functions.

2. Inverse Trigonometric Functions:

15 Periods

Definition, range, domain, principal value branch. Graphs of inverse trigonometric functions.

UNIT-II: ALGEBRA

1. Matrices

25 Periods

Concept, notation, order, equality, types of matrices, zero and identity matrix, transpose of a matrix, symmetric and skew symmetric matrices. Operations 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 2). Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).

2. Determinants:

25 Periods

Determinant of a square matrix (up to 3×3 matrices), minors, co-factors 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-III: CALCULUS

1. Continuity and Differentiability:

20 Periods

Continuity and differentiability, chain rule, derivative of inverse trigonometric functions, like $\sin^{-1}x$, $\cos^{-1}x$ and $\tan^{-1}x$, 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.

2. Applications of Derivatives

10 Periods

Applications of derivatives: rate of change of quantities, increasing decreasing functions, maxima and minima (first derivative test motivated geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

3. Integrals:

20 Periods

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

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

Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

4. Applications of the Integrals:

15 Periods

Applications in finding the area under simple curves, especially lines, circles/parabolas/ellipses (in standard form only).

5. Differential Equations:

15 Periods

Definition, order and degree, general and particular solutions of a differential equation. Solution of differential equations by method of separation of variables, solutions of homogeneous differential equations of first order and first degree. Solutions of linear differential equations of the type:

$$\frac{dx}{dy} + py = q, \text{ where } p \text{ and } q \text{ are functions of } x \text{ or constants.}$$

$$\frac{dx}{dy} + px = q, \text{ where } p \text{ and } q \text{ are functions of } y \text{ or constants.}$$



UNIT-IV: VECTORS AND THREE-DIMENSIONAL GEOMETRY

15 Periods

1. Vectors:

Vectors and scalars, magnitude and direction of a vector. Direction cosines and direction ratios of a vector. Types of vectors (equal, unit, zero, parallel and collinear 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. Definition, Geometrical Interpretation, properties and application of scalar (dot) product of vectors, vector (cross) product of vectors.

2. Three-dimensional Geometry:

15 Periods

Direction cosines and direction ratios of a line joining two points. Cartesian equation and vector equation of a line, skew lines, shortest distance between two lines. Angle between two lines.

UNIT-V: LINEAR PROGRAMMING

1. Linear Programming:

20 Periods

Introduction, related terminology such as constraints, objective function, optimization, graphical method of solution for problems in two variables, feasible and infeasible regions (bounded or unbounded), feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).

UNIT-VI: PROBABILITY

1. Probability:

30 Periods

Conditional probability, multiplication theorem on probability, independent events, total probability, Bayes' theorem, Random variable and its probability distribution, mean of random variable.



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I. Relations & Functions	1. Relation & Function	1x1	-	2x1	-	-	-	08
	2. Inverse Trigonometric Functions	1x1	1x1	-	3x1	-	-	
II. Algebra	1. Matrices	-	1x2	-	-	4x1	-	10
	2. Determinants	1x1	1x1	2x1	-	-	-	
III. Calculus	1. Continuity & Differentiability	-	-	2x1	-	4x1	-	35
	2. Application of Derivatives	1x1	-	2x1	-	4x1	-	
	3. Integrals	1x1	1x2	-	3x1	4x1	-	
	4. Application of Integrals	1x1	-	-	-	4x1	-	
	5. Differential Equations	1x1	1x2	-	-	4x1	-	
IV. Vectors & 3D-Geometry	1. Vectors	1x1	1x1	-	3x1	-	-	14
	2. 3-Dimensional Geometry	1x1	-	-	3x1	-	5x1	
V. Linear Programming	1. Linear Programming	-	-	-	-	-	5x1	05
VI. Probability	1. Probability	1x1	1x1	2x1	-	4x1	-	08
Total Marks		1x10 =10	1x10 =10	2x5 =10	3x4 =12	4x7 =28	5x2 =10	80
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