Class – XII
REVISED SYLLABUS
(For the Session of 2020-21 Only)
Mathematics
(THEORY)

UNIT I.   RELATIONS AND FUNCTIONS

1.   Relations and Functions :

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

2.   Inverse Trigonometric Functions:

Definition, range, domain, principal value branches.

UNIT-II: ALGEBRA

1.   Matrices:

Concept, notation, order, equality, types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices (restrict to square matrices of order 2). Invertible matrices (Here all matrices will have real entries).

2.   Determinants:

Determinant of a square matrix (up to 3 x 3 matrices), minors, cofactors and applications of determinants in finding the area of a triangle.Adjoint and inverse of a square matrix. 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:

Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit function.Concept of exponential and logarithmic functions and their derivative. Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives.

2. **Applications of Derivatives:**

Applications of derivatives: increasing/decreasing functions, tangents & normals, 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:**

Integration as inverse process of differentiation. Integration of a variaty of functions by substitution, by partial fractions and by parts, only simple integrals of the type

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

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

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

4. **Applications of the Integrals:**

Applications in finding the area under simple curves, especially lines, areas of circles/ parabolas/ ellipses (in standard form only), (the region should be clearly identifiable).

5. **Differential Equations:**

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

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

UNIT-IV: VECTORS AND THREE-DIMENSIONAL GEOMETRY

1. **Vectors:**

Vectors and scalars, magnitude and direction of a vector. Direction cosines/ratios of vectors. 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. Scalar (dot) product of vectors, projection of a vector on a line. Vector (cross) product of vectors.

2. **Three - dimensional Geometry:**

Direction cosines/ratios of a line joining two points. Cartesian 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.

UNIT-V: LINEAR PROGRAMMING

1. **Linear Programming:** Introduction, definition of related terminology such asconstraints, objective function, optimization, different types of linear programming (L.P.) problems, graphical method of solution for problems in two variables, feasible and infeasible regions, feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).

UNIT-VI: PROBABILITY

1. **Probability:**

Multiplication theorem on probability. Conditional probability, independent events, total probability, Baye's theorem, Random variable and its probability distribution, Repeated independent (Bernoulli) trials.