CLASS XII

MATHEMATICS (CODE 041)

SYLLABUS

SESSION (2020-21)

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

Unit-I: Relations and Functions

1.Relations andFunctions:

Types of relations: reflexive, symmetric, transitive and equivalence relations.

One to one and onto functions.

2.Inverse Trigonometric Function:

Definition, range, domain, principal value branch.

Unit-II: Algebra

1.Matrices : 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-commutability of multiplication of matrices, invertible matrices; (Here all matrices will have real entries).

2. Determinants: Determinants of square matrix (upto 3 x 3 matrices), minors, co- factors and applications of determinants in finding the area of 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 functions. Concept of exponential and logarithmic functions. Logarithmic differentiation, derivative of functions expressed in parametric forms. Second order derivatives.

2. Applications of Derivatives: Applications of derivatives: increasing/decreasing functions, tangents and normal, 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 variety of functions by substitution, by partial fractions and by parts. Evaluation of simple integrals of the following types and problems based on them.

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

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

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, parabolas; area of circles/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 solutions of homogeneous differential equations of first order and first degree of the type :

$$\frac{dy}{dx} = \int \left(\frac{y}{x}\right)$$

Solutions of linear differential equation of the type : $\frac{dy}{dx} + py = q$ Where p and q are functions of x or constants

Unit-IV: Vectors and Three-Dimensional Geometry

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:

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.

Unit-V: Linear Programming

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

Unit-VI: Probability

Probability: Conditional probability, multiplication theorem on probability, independent events, total probability, Bayes' theorem, Random variable and its probability distribution.