

MATHEMATICS

REVISED SYLLABUS FOR HIGHER SECONDARY COURSE

The Syllabus in the subject of Mathematics has undergone changes from time to time in accordance with growth of the subject and emerging needs of the society. Senior Secondary stage is a launching stage from where the students go either for higher academic education in Mathematics or for professional courses like engineering, physical and Bioscience, commerce or computer applications. The present revised syllabus has been designed in accordance with National Curriculum Framework 2005 and as per guidelines given in Focus Group on Teaching of Mathematics 2005 which is to meet the emerging needs of all categories of students. Motivating the topics from real life situations and other subject areas, greater emphasis has been laid on application of various concepts.

Objectives

The broad objectives of teaching Mathematics at senior school stage intend to help the pupil:

- ❖ To acquire knowledge and critical understanding, particularly by way of motivation and visualization, of basic concepts, terms, principles, symbols and mastery of underlying processes and skills.
- ❖ To feel the flow of reasons while proving a result or solving a problem.
- ❖ To apply the knowledge and skills acquired to solve problems and wherever possible, by more than one method.
- ❖ To develop positive attitude to think, analyze and articulate logically.
- ❖ To develop interest in the subject by participating in related competitions.
- ❖ To acquaint students with different aspects of mathematics used in daily life.
- ❖ To develop an interest in students to study mathematics as a discipline.
- ❖ To develop awareness of the need for national integration, protection of environment, observance of small family norms, removal of social barriers, elimination of sex biases.
- ❖ To develop reverence and respect towards great Mathematicians for their contributions to the field of Mathematics.

MATHEMATICS

SYLLABUS FOR HIGHER SECONDARY FINAL YEAR COURSE

One Paper

Time : Three Hours

Marks 100

Unitwise Distribution of Marks and Periods :

Unit No.	Title	Marks	Periods
Unit-I	Relations and Functions	08	24
Unit-II	Algebra	14	40
Unit-III	Calculus	44	78
Unit-IV	Vectors and Three-Dimensional Geometry	20	34
Unit-V	Linear Programming	06	08
Unit-VI	Probability	08	16
Total		100	200

Syllabi for H.S. Final Year

APPENDIX :

1. **Proofs in Mathematics :**
2. **Mathematical Modelling :**

Unitwise Distribution of Course contents :

Unit-I : 1. RELATIONS AND FUNCTIONS

Marks-04

Periods-12

Types of relations : Reflexive, symmetric, transitive and equivalence relations. Types of function, composition of functions and invertible function.

2. Inverse Trigonometric Functions :

Marks-04

Periods-12

Definition, range, domain, principal value branches. Graphs of inverse trigonometric functions. Elementary properties of inverse trigonometric functions.

Unit-II : ALGEBRA

1. Matrices :

Marks-06

Periods 20

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 and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). Invertible matrices, proof of uniqueness of inverse if it exist.

2. Determinants :

Marks-08

Periods 20

Determinant of a square matrix (up to 3×3 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 example, 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 : Marks-12 Periods 20

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 derivatives. Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives.

2. Application of Derivatives : Marks-10 Periods 16

Applications of derivatives : Rate of change, 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 : Marks-10 Periods 20

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, Evaluation of integrals of the type.

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

$$\int \sqrt{a^2 \pm x^2} dx, \int \sqrt{ax^2 + bx + c} dx \text{ and } \int \sqrt{x^2 - a^2} dx \text{ and problems based on them.}$$

Syllabi for H.S. Final Year

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

4. Applications of the Integrals : Marks-04 Periods 10

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

5. Differential Equations : Marks-08 Periods 12

Definition, order and degree, general and particular solutions of a differential equation. Solution of differential equations by method of separation of variables, solution of 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 : Marks-12 Periods 20

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 : Marks 08 Periods 14

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

Unit-V : LINEAR PROGRAMMING Marks 06 Periods 08

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 solution, optimal feasible solution.

Unit-VI : PROBABILITY Marks 08 Periods 16

Multiplication theorem on probability. Conditional probability, independent events, total probability, Baye's theorem. Random variable and its probability distribution.

Appendix

1. Proofs in Mathematics :

Through a variety of examples related to mathematics and already familiar to the learner, bring out different kinds of proofs : direct, contrapositive, by contradiction, by counter-example.

2. Mathematical Modelling :

Modelling real-life problems where many constraints may really need to be ignored (continuing from Class XI). However, now the models concerned would use techniques/ results of matrices, calculus and linear programming.

- Recommended textbook
1. Mathematics Part-I by NCERT
 2. Mathematics Part-II by NCERT
 3. Ganit Pratham Khanda by AHSEC
 4. Ganit Dwitiya Khanda by AHSEC
