MATHEMATICS

SYLLABUS FOR HIGHER SECONDARY FIRST YEAR 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 Frame work 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.

SLLABUS FOR HIGHER SECONDARY FIRST YEAR COURSE

One Paper   **Time : Three hours**   **Marks : 100**

Unitwise Distribution of Marks & Periods :

Unit	Topics	Marks	Periods
Unit-1	Sets and Functions	29	35
Unit-II	Algebra	37	55
Unit-III	Coordinate Geometry	13	34
Unit-IV	Calculus	06	18
Unit-V	Mathematical Reasoning	03	08
Unit-VI	Statistics and Probability	12	30
	Total :	**100**	**180**

APPENDIX:

1. Infinite Series :
2. Mathematical Modelling :

Unitwise Distribution of Course contents:

Unit-I : SETS AND FUNCTIONS

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1. Sets: **(Marks 09)**

Sets and their representations, Empty set, Finite and Infinite sets, Equal sets, Subsets, Subsets of the set of real numbers especially intervals (with notations), Power set, Universal set, Venn diagrams, Union and Intersection of sets, Difference of sets, Complement of a set.

2. Relations and Functions :   **(Marks 08)**

Ordered pairs, Cartesian product of sets, Number of elements in the Cartesian product of two finite sets, Cartesian product of the reals with itself (upto $R \times R \times R$).

Definition of relation, pictorial diagrams, domain, co-domain and range of a relation, Function as a special kind of relation from one set to another, Pictorial representation of a function, domain, co-domain and range of a function, Real valued function of the real variable, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs, Sum, difference, product and quotients of functions.

3. Trigonometric Functions :   **(Marks 12)**

Positive and negative angles, Measuring angles in radians and in degrees and conversion from one measure to another, Definition of trigonometric functions with the help of unit circle. Truth of the identity $\sin^2 x + \cos^2 X = 1$, for all x. Sings of trigonometric functions and sketch of their graphs, Expressing sin(x+y) and cos(x+y) in terms of sinx, siny, cosx and cosy, Deducing the identities like following :

$$\tan(x \pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y}, \quad \cot(x \pm y) = \frac{\cot x \cot y \mp 1}{\cot y \pm \cot x},$$

$$\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}, \quad \cos x + \cos y = 2 \cos \frac{x+y}{2} \cos \frac{x-y}{2}$$

$$\sin x - \sin y = 2 \cos \frac{x+y}{2} \sin \frac{x-y}{2}, \quad \cos x - \cos y = -2 \sin \frac{x+y}{2} \sin \frac{x-y}{2}$$

Identities related to sin2x, cos2x, tan2x, sin3x, cos3x and tan3x, General solution of trigonometric equations of the type $\sin\theta = \sin\alpha$, $\cos\theta = \cos\alpha$ and $\tan\theta = \tan\alpha$, Proofs and simple applications of sine and cosine formulae.

Unit-II : ALGEBRA

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1. Principle of Mathematical Induction :   **(Marks 04)**

Processes of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers, The principle of mathematical induction and simple applications.

2. Complex Numbers and Quadratic Equations: **(Marks 07)**

Need for complex numbers, especially $\sqrt{-1}$, to be motivated by inability to solve every quadratic equation, Brief description of algebraic properties of complex numbers, Argand plane and polar representation of complex numbers, Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system.

3. Linear Inequalities : **(Marks 05)**

Linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the number line, Graphical solution of linear inequalities in two variables. Solution of system of linear inequalities in two variables- graphically.

4. Permutations and Combinations : **(Marks 07)**

Fundamental principle of counting, Factorial n. Permutations and combinations, derivation of formulae and their connections, simple applications.

5. Binomial Theorem : **(Marks 07)**

History, statement and proof of the binomial theorem for positive integral indices, Pascal's triangle, general and middle term in binomial expansion, simple applications.

6. Sequence and Series : **(Marks 07)**

Sequence and Series. Arithmetic progression (A.P.), arithmetic mean (A.M.), Geometric progression (G.P.), general term of a GP., sum of n terms of a GP., geometric mean (G.M.), relation between A.M. and GM. Sum to n terms of the special series : $\sum n, \sum n^2$ and $\sum n^3$.

Unit-III : COORDINATE GEOMETRY

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1. Straight Lines : **(Marks 05)**

Brief recall of 2D from earlier classes. Slope of a line and angle between two lines, Various forms of equations of a line, parallel to axes, point-slope form, slope-intercept form, two-point form, intercept form and normal form, General equation of a line, Distance of a point from a line.

2. Conic Sections : **(Marks 05)**

Sections of a cone : Circles, ellipse, parabola, hyperbola, a point, a straight line and pair of intersecting lines as a degenerated case of a conic section, Standard equations and simple properties of parabola, ellipse and hyperbola, Standard equation of a circle.

3. Introduction to Three-dimensional Geometry: (Marks 03)

Coordinate axes and coordinate planes in three dimensions, Coordinates of a point, Distance between two points and section formula.

Unit-IV : CALCULUS

Limits and -Derivatives **(Marks 06)**

Derivative introduced as rate of change both as that of distance function and geometrically, intuitive idea of limit, Definitions of derivative, relate it to slope of tangent of the curve, derivative of sum, difference, product and quotient of functions. Derivatives of polynomial and trigonometric functions.

Unit-V : MATHEMATICAL REASONING   (Marks 03)

Mathematically acceptable statements. Connecting words/ phrases- consolidating the understanding of "if and only if (necessary and sufficient) condition", "implies", "and/or", "implied by", "and", "or", "there exists" and their use through variety of examples related to real life and Mathematics. Validating the statements involving the connecting words- difference among contradiction, converse and contrapositive.

Unit-VI : STATISTICS AND PROBABILITY

1. Statistics: (Marks 07)

Measure of Dispersion, Range, Mean deviation, variance and standard deviation of ungrouped/ grouped data, Analysis of frequency distributions with equal means but different variances.

2. Probability: (Marks 05)

Random experiments: Outcomes, sample spaces (set representation), Events : Occurrence of events, 'not', 'and' & 'or' events, exhaustive events, mutually exclusive events, Axiomatic (set theoretic) probability, connections with the theories of earlier classes, Probability of an event, probability of 'not', 'and' & 'or' events.

Appendix

1. Infinite Series :

Binomial theorem for any index, infinite geometric series, exponential and logarithmic series.

2. Mathematical Modelling :

Consolidating the understanding developed up to Class X. Focus on modelling problems related to real-life (like environment, travel, etc.) and connecting with other subjects of study where many constraints may really need to be ignored, formulating the model, looking for solutions, interpreting them in the problem situation and evaluating the model.

Prescribed Textbook :   Mathematics for Class XI, Published by NCERT.
গণিত, Published by AHSEC.

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