Himachal Pradesh Board of School Education, Dharamshala

MATHEMATICS
10 +1

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 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 of visualization of basic facts, concepts, terms, principles and
- 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 awareness of the 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 contribution to the field of Mathematics

Unit-I : Sets and Functions

1: Sets

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

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 Rx Rx 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 & range of a function. Real valued function of the real variable domain and range of these functions, constant, identity, polynomial, rational, modulus, signup and greatest integer functions with their graphs Sum, difference, product and quotients of functions.

3. Trigonometric Functions:

Positive and negative angles Measuring angles in radians & in degrees and conversion from one measure 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. Signs of trigonometric functions and sketch of their graphs Expressing sin (x + y) and cos (x + y) in terms of sin x, sin y, cos x & cos y. Deducing the identities like following

$\tan(x \pm y) = \frac{t\ x \pm t\ y}{1 \pm t\ x\ t\ y}$, $\cot(x \pm y) = \frac{c\ x c\ y \pm 1}{c\ x \pm c\ y}$

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

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

Identities related to sin 2x, cos 2x, tan 2x, sin 3x, cos 3x and tan 3x 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

1. Principle of Mathematical Induction :

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:

Need for complex numbers, expecially $\sqrt{-1}$ 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 :

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 & Combinations :

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

5. Binomial Theorem

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:

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

UNIT-III : COORDINATE GEOMETRY

1. Straight Lines :

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, intercepts form and normal form General equation of a line. Distance of a point from a line

2. Conic Sections :

Sections of 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

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

UNIT-IV: CALCULUS

1. Limits and Derivatives :

Derivative introduced as rate of change both as that of distance function and geometrically, intuitive idea of limit. Definition 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

2. Mathematical Reasoning :

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 between contradiction, converse and contapositive

UNIT-V: STATISTICS & PROBABILITY

1. Statistics :

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

2. Probability :

Random experiments outcomes, sample spaces (set representation) Events occurrence of events, ’not, ’and’ 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

HIMACHAL PRADESH BOARD OF SCHOOL EDUCATION, DHARAMSHALA

Mathematics

XI Class

Syllabus and Distribution of Marks

Session - 2022-23

Time : 3 hrs **Max. Marks : 80**

Unit Wise Distribution of Marks

Unit No.	Particulars	Marks Assigned
Unit-01 Sets and Functions	(i) Sets (ii) Relations and Functions (iii) Trigonometric Functions	23
Unit-02 Algebra	(i) Principal of Mathematical Induction (ii) Complex Numbers and Quadratic Equations (iii) Linear Inequalities (iv) Permutations and Combinations (v) Binomial Theorem (vi) Sequence and Series	25
Unit-03 Coordinate Geometry	(i) Straight Lines (ii) Conic Sections (iii) Introduction to Three-Dimensional Geometry	12
Unit-04 Calculus	(i) Limits and Derivatives (ii) Mathematical Reasoning	08
Unit-05 Statistics and Probability	(i) Statistics (ii) Probability	12
	Total	**80**

Design of Question Paper (Blue Print)

Name of the Unit	1mark MCQ Questions	2marks Questions	3marks Questions	4marks Questions	5marks Questions	Total
Unit-01 Sets and Functions	05	01	01	02	01	23
Unit-02 Algebra	04	02	01	01	02	25
Unit-03 Coordinate Geometry	03	-	03	-	-	12
Unit-04 Calculus and Mathematical Reasoning	04	02	-	-	-	08
Unit-05 Statistics and Probability	-	-	01	01	01	12
Total	1x16 =16	2x5 =10	3x6 =18	4x4 =16	5x4 =20	80

Chapter Wise Distribution of Marks

Name of the Chapter	1mark Questions (MCQ)	2marks Questions	3marks Questions	4marks Questions	5marks Questions	Total
01- Sets	02	-	-	01	-	06
02- Relations and Functions	01	-	-	01	-	05
03- Trigonometric and functions	02	01	01	-	01	12
04- Principle of Mathematical Induction	-	-	-	01	-	04
05- Complex Numbers and Quadratic Equations	02	01	-	-	-	04
06- Linear Inequalities	-	-	01	-	-	03
07- Permutations and Combinations	01	01	-	-	-	03
08- Binomial Theorem	-	-	-	-	01	05
09- Sequence and Series	01	-	-	-	01	06
10- Straight Lines	01	-	01	-	-	04
11- Conic Sections	02	-	01	-	-	05
12- Introduction to Three-Dimensional Geometry	-	-	01	-	-	03
13- Limits and Derivatives	04	01	-	-	-	06
14- Mathematical Reasoning	-	01	-	-	-	02
15- Statistics	-	-	-	-	01	05
16- Probability	-	-	01	01	-	07
Total						80

PRESCRIBED BOOKS

Mathematics Published by HPBOSE Dharamshala