

SYLLABUS OF GRADE X

MATHEMATICS

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. The present revised syllabus has been designed in accordance with National Curriculum Framework 2005 and as per guidelines given in the Focus Group on Teaching of Mathematics which is to meet the emerging needs of all categories of students. For motivating the teacher to relate the topics to real life problems and other subject areas, greater emphasis has been laid on applications of various concepts.

The curriculum at Secondary stage primarily aims at enhancing the capacity of students to employ Mathematics in solving day-to-day life problems and studying the subject as a separate discipline. It is expected that students should acquire the ability to solve problems using algebraic methods and apply the knowledge of simple trigonometry to solve problems of height and distances. Carrying out experiments with numbers and forms of geometry, framing hypothesis and verifying these with further observations form inherent part of Mathematics learning at this stage. The proposed curriculum includes the study of number system, algebra, geometry, trigonometry, mensuration, statistics, graphs and coordinate geometry, etc.

The teaching of Mathematics should be imparted through activities which may involve the use of concrete materials, models, patterns, charts, pictures, posters, games, puzzles and experiments.

Objectives:

The broad objectives of teaching of Mathematics at secondary stage are to help the learners to:

- consolidate the Mathematical knowledge and skills acquired at the upper primary stage;
- acquire knowledge and understanding, particularly by way of motivation and visualization, of basic concepts, terms, principles and symbols and underlying processes and skills;
- develop mastery of basic algebraic skills;
- develop drawing skills;
- feel the flow of reason while proving a result or solving a problem;
- apply the knowledge and skills acquired to solve problems and wherever possible, by more than one method;
- to develop ability to think, analyze and articulate logically;
- to develop awareness of the need for national integration, protection of environment, observance of small family norms, removal of social barriers, elimination of gender biases;
- to develop necessary skills to work with modern technological devices and mathematical software's.
- to develop interest in mathematics as a problem-solving tool in various fields for its beautiful structures and patterns, etc.

- to develop reverence and respect towards great Mathematicians for their contributions to the field of Mathematics;
- 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.

INSTRUCTIONS:

- This syllabus is divided into eight units. All the units are compulsory.
- Separate marks are given with each unit.

COURSE STRUCTURE

Units	Unit Name	Marks
1	Number Systems	06
2	Algebra	20
3	Coordinate Geometry	06
4	Geometry	15
5	Trigonometry	12
6	Mensuration	10
7	Statistics & Probability	11
	Total	80

UNIT 1: NUMBER SYSTEMS:

1. REAL NUMBERS:

(15 Period)

Euclid's division lemma, Fundamental Theorem of Arithmetic - statements after reviewing work done earlier and after illustrating and motivating through examples, Proofs of results - irrationality of $\sqrt{2}, \sqrt{3}, \sqrt{5}$, decimal expansions of rational numbers in terms of terminating/non-terminating recurring decimals.

UNIT 2: ALGEBRA:

1. POLYNOMIALS:

(7 Periods)

Zeros of a polynomial. Relationship between zeros and coefficients of a polynomial with particular reference to quadratic polynomials. Statement and simple problems on division algorithm for polynomials with real coefficients.

2. PAIR OF LINEAR EQUATIONS IN TWO VARIABLES: (15 Periods)

Pair of linear equations in two variables and graphical method of their solutions consistency/inconsistency. Algebraic conditions for number of solutions. Solution of pair of linear equations in two variables algebraically- by substitution, by elimination and by cross multiplication. Simple situational problems must be included.

3. QUADRATIC EQUATIONS: (15 Periods)

Standard form of a quadratic equation $ax^2 + bx + c = 0$, ($a \neq 0$). Solution of the quadratic equations (only real roots) by factorization and by completing the square, i.e., by using quadratic formula. Relationship between discriminate and nature of roots. Problems related to day-to-day activities to be incorporated.

4. ARITHMETIC PROGRESSIONS: (8 Periods)

Motivation for studying AP. Derivation of standard results of finding the n th term and sum of first n terms of AP and their application in solving day-to-day life problems.

UNIT 3: COORDINATE GEOMETRY:

1. LINES (In two-dimensions) (14 Periods)

Review: Concepts of coordinate geometry, graphs of linear equations. Distance formula. Section formula (internal division). Area of a triangle.

UNIT 4: GEOMETRY:

1. TRIANGLES: (15Periods)

Definitions, examples, counter examples of similar triangles.

1. (Prove) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.
2. (Motivate) If a line divides two sides of a triangle in the same ratio, the line is parallel to the third side.
3. (Motivate) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar.
4. (Motivate) If the corresponding sides of two triangles are proportional, their corresponding angles are equal and the two triangles are similar.
5. (Motivate) If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are proportional, the two triangles are similar.

6. (Motivate) If a perpendicular is drawn from the vertex of the right angle of a right triangle to the hypotenuse, the triangles on each side of the perpendicular are similar to the whole triangle and to each other.
7. (Prove) The ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.
8. (Prove) In a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.
9. (Prove) In a triangle, if the square on one side is equal to sum of the squares on the other two sides, the angle opposite to the first side is a right angle.

2. CIRCLES:

(8Periods)

Tangent to a circle at, point of contact

1. (Prove) The tangent at any point of a circle is perpendicular to the radius through the point of contact.
2. (Prove) The lengths of tangents drawn from an external point to a circle are equal.

3. CONSTRUCTIONS:

(8Periods)

1. Division of a line segment in a given ratio (internally).
2. Tangents to a circle from a point outside it.
3. Construction of a triangle similar to a given triangle.

UNIT V: TRIGONOMETRY:

1. INTRODUCTION TO TRIGONOMETRY:

(10 Periods)

Trigonometric ratios of an acute angle of a right-angled triangle. Proof of their existence (well defined); motivate the ratios whichever are defined at 0° and 90° . Values of the trigonometric ratios of 30° , 45° and 60° . Relationships between the ratios.

2. TRIGONOMETRIC IDENTITIES:

(15 Periods)

Proof and applications of the identity $\sin^2 A + \cos^2 A = 1$. Only simple identities to be given. Trigonometric ratios of complementary angles.

3. HEIGHTS AND DISTANCES:

(8 Periods)

Angle of elevation, Angle of Depression, Simple problems on heights and distances. Problems should not involve more than two right triangles. Angles of elevation / depression should be only 30° , 45° , 60° .

UNIT VI: MENSURATION:

1. AREAS RELATED TO CIRCLES:

(12 Periods)

Motivate the area of a circle; area of sectors and segments of a circle. Problems based on areas and perimeter / circumference of the above said plane figures. (In calculating area of segment of a circle, problems should be restricted to central angle of 60° , 90° and 120° only. Plane figures involving triangles, simple quadrilaterals and circle should be taken.)

2. SURFACE AREAS AND VOLUMES:

(12Periods)

1. Surface areas and volumes of combinations of any two of the following: cubes, cuboids, spheres, hemispheres and right circular cylinders/cones. Frustum of a cone.
2. Problems involving converting one type of metallic solid into another and other mixed problems. (Problems with combination of not more than two different solids be taken).

UNIT VII: STATISTICS AND PROBABILITY:

1. STATISTIC:

(18Periods)

Mean, median and mode of grouped data (bimodal situation to be avoided). Cumulative frequency graph.

2. PROBABILITY:

(10Periods)

Classical definition of probability. Simple problems on finding the probability of an event.

MATHEMATICS-Standard
QUESTION PAPER DESIGN
CLASS – X

Time: 3 Hours

Max. Marks: 80

S. No.	Typology of Questions	Total Marks	% weightage
1	Remembering: Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers. Understanding: Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	43	54
2	Applying: Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	19	24
3	Analysing : Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations Evaluating: Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria. Creating: Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.	18	22
	Total	80	100

INTERNAL ASSESSMENT

20 MARKS

Pen Paper Test and Multiple Assessment

(5+5) 10 Marks

Portfolio

05 Marks

Lab Practical (Lab activities to be done from the prescribed books)

05 Marks