COURSE STRUCTURE (FIRST TERM) CLASS X

Units		Marks
I	NUMBER SYSTEMS	11
II	ALGEBRA	23
III	GEOMETRY	17
IV	TRIGONOMETRY	22
V	STATISTICS	17
	Total	**90**

UNIT I: NUMBER SYSTEMS

1.   REAL NUMBERS   **(15) Periods**

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

UNIT II: ALGEBRA

1.   POLYNOMIALS   **(7) Periods**

Zeros of a polynomial. Relationship between zeros and coefficients of 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 solution, consistency/inconsistency.

Algebraic conditions for number of solutions. Solution of a pair of linear equations in two variables algebraically - by substitution, by elimination and by cross multiplication method. Simple situational problems. Simple problems on equations reducible to linear equations.

UNIT III: GEOMETRY

1.   TRIANGLES   **(15) Periods**

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 angles opposite to the first side is a right angle.

UNIT IV: 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 (with proofs) of the trigonometric ratios of 30^0, 45^0 and 60^0. Relationships between the ratios.

2. TRIGONOMETRIC IDENTITIES (15) Periods

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

UNIT V: STATISTICS AND PROBABILITY

1. STATISTICS (18) Periods

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

COURSE STRUCTURE (SECOND TERM) CLASS X

Units		Marks
II	ALGEBRA (Contd.)	23
III	GEOMETRY (Contd.	17
IV	TRIGONOMETRY (Contd.)	08
V	PROBABILITY	08
VI	COORDINATE GEOMETRY	11
VII	MENSURATION	23
	Total	90

UNIT II: ALGEBRA (Contd.)

3.   QUADRATIC EQUATIONS   (15) Periods

Standard form of a quadratic equation $ax^2 + bx + c = 0$, $(a \neq 0)$. Solutions of quadratic equations (only real roots) by factorization, by completing the square and by using quadratic formula. Relationship between discriminant and nature of roots.

Situational problems based on quadratic equations related to day to day activities to be incorporated.

4.   ARITHMETIC PROGRESSIONS   (8) Periods

Motivation for studying Arithmetic Progression Derivation of the nth term and sum of the first n terms of A.P. and their application in solving daily life problems.

UNIT III: GEOMETRY (Contd.)

2.   CIRCLES   (8) Periods

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   (8) Periods

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 IV: TRIGONOMETRY

3.   HEIGHTS AND DISTANCES : Angle of elevation, Angle of Depression.   (8) Periods

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 V: STATISTICS AND PROBABILITY

2.   PROBABILITY   (10) Periods

Classical definition of probability. Simple problems on single events (not using set notation).

UNIT VI: 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 VII: 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   **(12) Periods**

(i) 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.

(ii) 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.)

PRESCRIBED BOOKS:

1. Mathematics - Textbook for class IX - NCERT Publication

2. Mathematics - Textbook for class X - NCERT Publication

3. Guidelines for Mathematics Laboratory in Schools, class IX - CBSE Publication

4. Guidelines for Mathematics Laboratory in Schools, class X - CBSE Publication

5. A Handbook for Designing Mathematics Laboratory in Schools - NCERT Publication

6. Laboratory Manual - Mathematics, secondary stage - NCERT Publication

7. Mathematics exemplar problems for class IX, NCERT publication.

8. Mathematics exemplar problems for class X, NCERT publication.

QUESTIONS PAPER DESIGNS 2016–17
CLASS-X

Mathematics (Code No. 041)		Time: 3 Hours					Marks: 90
S. No.	Typology of Questions	Very Short Answer (VSA) (1 Mark)	Short Answer-I (SA) (2 Marks)	Short Answer-II (SA) (3 Marks)	Long Answer (LA) (4 Marks)	Total Marks	% Weightage
1	Remembering - (Knowledge based Simple recall questions, to know specific facts, terms, concepts, principles, or theories; Identify, define, or recite, information)	1	2	2	3	23	26%
2	Understanding- (Comprehension -to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase, or interpret information)	2	1	1	4	23	26%
3	Application (Use abstract information in concrete situation, to apply knowledge to new situations; Use given content to interpret a situation, provide an example, or solve a problem)	1	2	3	2	22	24%
4	Higher Order Thinking Skills (Analysis & Synthesis - Classify, compare, contrast, or differentiate between different pieces of information; Organize and/or integrate unique pieces of information from a variety of sources)	-	1	4	-	14	16%
5	Creating, Evaluation and Multi-Disciplinary- (Generating new ideas, product or ways of viewing things Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	-	-	-	2*	8	8%
	Total	4x1=4	6x2=12	10x3= 30	11x4= 44	90	100%

*One of the LA (4 marks) will be to assess the values inherent in the texts.