TRIPURA BOARD OF SECONDARY EDUCATION

SYLLABUS

(Effective from 2017)

SUBJECT : MATHEMATICS

(Class – X)

MATHEMATICS

COURSE STRUCTURE

CLASS X

(Effective from 2017)

One Paper **Time : 3 Hours** **Marks : 100**
Marks

Unit	Title	Marks
I.	Arithmetic : Real Number	4
II.	Algebra	25
III.	Geometry	21
IV.	Trigonometry	10
V.	Mensuration	8
VI.	Co-ordinate Geometry	4
VII.	Statistics and Probability	8
VII.	Internal Assessment	20
	Total	**100**

MATHEMATICS

COURSE STRUCTURE

CLASS – X

UNIT-I: ARITHMETIC

1. REAL NUMBERS

Euclid's division lemma, The Fundamental theorem of Arithmetic – statement 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 :

2. ALGEBRA

2.1 POLYNOMIALS

Zeros of a polynomial. Relationship between zeros and co-efficients of quadratic polynomials. Statement and simple problems on division algorithm for polynomials with real coefficients.

2.2 PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

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 equatiions in two variables algebraically – by substitution, by elimination and by cross multiplication method. Simple situational problems. Simple problems on equations reducible to linear equations.

2.3 QUADRATIC EQUATIONS

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. Relationships between discriminant and nature of roots.

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

2.4 ARITHMETIC PROGRESSIONS

Motivation for studying Arithmetic progression, Derivation of the n^{th} term and sum of the first n terms of A.P. and their application in solving daily life problems.

2.5 LOGARITHM

Logarithm of a real positive number with respect to a base ($\neq 0,1$) Laws of logarithm, simple problems involving logarithm.

UNIT-III :

3. GEOMETRY

3.1 TRIANGLES

Definitions, examples, counter examples of similar triangles.

3.1.1 (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.

3.1.2 (Motivate) If a line divides any two sides of a triangle in the same ratio, the line is parallel to the third side.

3.1.3 (Motivate) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar.

3.1.4 (Motivate) If the corresponding sides of two triangles are proportional, their corresponding angles are equal and the two triangles are similar.

3.1.5 (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.

3.1.6 (Motivate) If a perpendicular is drawn from the ventex 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.

3.1.7 (Prove) The ratio of the areas of two similar triangles is equal to the ratio of the squares on their corresponding sides.

3.1.8 (Prove) In a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.

3.1.9 (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.

3.2 CIRCLES : Tangent to a circle at a point .

3.2.1 (Prove) The tangent at any point of a circle is perpendicular to the radius through the point of contact.

3.2.2 (Prove) The lengths of tangents drawn from an external point to circle are equal and they subtend equal angles at the centre.

3.3 CONSTRUCTIONS

3.3.1 Division of a line segment in a given ratio (internally)

3.3.2 Tangent to a circle from a point outside it.

3.3.3 Construction of a triangle similar to a given triangle.

UNIT IV :

4. TRIGONOMETRY

4.1 INTRODUCTION TO TRIGONOMETRY

Trigonometric ratios of an acute angle of a right angled triangle. Proof of their existence (well defined), motivate the ratio whichever are defined at 0^0 and 90^0 values (with proofs) of the trigonometric ratios of 30^0, 45^0 , and 60^0 . Relationships among the ratios.

4.2 TRIGONOMETRIC IDENTITIES

Proofs and applications of the identities $Sin^2A + Cos^2A = 1$; $Sec^2A = 1 + tan^2A$; $Cosec^2A = 1+Cot^2A$ only simple identities to be given. Trigonometric ratios of complementary angles.

4.3 HEIGHTS AND DISTANCES

Introduction, line of sight, Angles of elevation , Angles of depression .Simple problems on heights and distances. Problems should not involve more than two right triangles. Angles of elevation / depression should be only 30^0, 45^0 , 60^0 .

UNIT-V :

5. MENSURATION

5.1 AREAS RELATED TO CIRCLES

Motivate the area of a circle, area of sector and segment 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 600 , 900 , and 1200 only. Plane figures involving triangles, simple quadrilaterals and circle should be taken.)

5.2 SURFACE AREAS AND VOLUMES

5.2.1 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.

5.2.2 Problems from real life situation such as converting one type of metallic solid into another, combination of solids(not more than two types), immersing a solid into a liquid contained in another solid, flow of water through a pipe, embankment.

UNIT-VI :

6. CO-ORDINATE GEOMETRY

6.1 Introduction, concept of co-ordinate geometry, distance between two points, section formula, area of a triangle.

UNIT-VII :

STATISTICS AND PROBABILITY

7.1 STATISTICS

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

7.2 PROBABILITY

Concept of events – Simple and compound, Classical definition of probability, Simple Problems on events (not using set notation)

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Course Content for Pre-Test Examination:

1. Arithmetic (6 marks)
2. Algebra (22 marks) :

2.1 Polynomial

2.2 Pair of linear equations in two variables

2.3 Quadratic equations in one variable

3. Geometry (20 marks) :

3.1 Triangle

3.3 Constructions related to triangles

4. Trigonometry (12 marks) :

4.1 Introduction to trigonometry

4.2 Identity

5. Mensuration (10 marks) :

5.1 Area related to circles

7. Statistics and probability (10 marks) :

7.1 Statistics

7.2 Probability

MATHEMATICS CLASS – X

PRE-TEST EXAMINATION

UNIT-WISE QUESTION TYPES WITH MARKS DISTRIBUTION

Unit	Chapters	Topics	VSA (1 mark)	SA (2 marks)	LA-I (3 marks)	LA-II (4 marks)	Total Marks
I	**Arithmetic**	1.1 Real Numbers (6 marks)	1	1	1	–	6
II	**Algebra**	(2.1) Polynomials (7 marks)	1	–	2	–	22
		(2.2) Pair of linear equations (9 marks)	–	1	1	1	
		(2.3) Quadratic equations(6 marks)	–	–	2	–	
III	**Geometry**	(3.1) Triangle (16 marks)	1	–	1	3	20
		(3.3) Construction(4 marks)	–	–	–	1	
IV	**Trigonometry**	(4.1) Introduction to Trigonometry (6 marks)	–	1	–	1	12
		(4.2) Identity (6 marks)	–	1	–	1	
V	**Mensuration**	(5.1)Area related to Circle(10 marks)	–	–	2	1	10
VII	**Statistics and Probability**	(7.1) Statistics (6 marks)	–	1	–	1	10
		(7.2) Probability (4 marks)	–	–	–	1	
Total No. of Questions			3Nos.	5Nos.	9Nos.	10Nos.	27Nos.
Total Marks			3marks.	10 marks	27 marks	40 marks	80 marks

N.B. 1. All questions are compulsory.

2. There is no overall choice in the paper. However internal choice is provided in one question of three marks in Unit-III(Geometry), one question of four marks in Unit-V(Mensuration) and one question of four marks in topic7.1(Statistics)under Unit VII.

3. In LA-I and LA-II type of questions total marks may be subdivided into different parts, if necessary.

4. Use of calculator is ***not*** permitted.

MATHEMATICS CLASS – X

TEST/FINAL EXAMINATION

UNIT-WISE QUESTION TYPES WITH MARKS DISTRIBUTION

Unit	Chapters	Topics	VSA (1 mark)	SA (2 marks)	LA-I (3 marks)	LA-II (4 marks)	Total Marks
I	**Arithmetic**	Real Numbers	1	–	1	–	4
II	**Algebra**	(2.1) Polynomials(5 marks)	–	1	1	–	25
		(2.2) Pair of linear equations(6 marks)	–	1	–	1	
		(2.3) Quadratic equations(6 marks)	–	–	2	–	
		(2.4) Arithmetic Progression(4 marks)	–	–	–	1	
		(2.5) Logarithm(4 marks)	1	–	1	–	
III	**Geometry**	(3.1) Triangle (9 marks)	–	1	1	1	21
		(3.2) Circle (8 marks)	1	–	1	1	
		(3.3) Construction(4 marks)	–	–	–	1	
IV	**Trigonometry**	(4.1) Introduction to Trigonometry (3 marks)	–	–	1	–	10
		(4.2) Identity (3 marks)	–	–	1	–	
		(4.3) Height and Distance (4 marks)	–	–	–	1	
V	**Mensuration**	(5.1)Area related to Circle(4 marks)	–	–	–	1	8
		(5.2) Surface Area and Volume (4 marks)	–	–	–	1	
VI	**Co-Ordinate Geometry**	(6.1) Co-Ordinate Geometry In 2-dimension (4 marks)	–	2	–	–	4
VII	**Statistics and Probability**	(7.1) Statistics (4 marks)	–	–	–	1	8
		(7.2) Probability (4 marks)	–	–	–	1	
Total No. of Questions			3Nos.	5Nos.	9Nos.	10Nos.	27Nos.
Total Marks			3marks.	10 marks	27 marks	40 marks	80 marks

N.B. 1. All questions are compulsory.

2. There is no overall choice in the paper. However internal choice is provided in one question of three marks in Unit-III(Geometry), one question of four marks in Unit-V(Mensuration) and one question of four marks in topic7.1(Statistics)under Unit VII.

3. In LA-I and LA-II type of questions total marks may be subdivided into different parts, if necessary.

4. Use of calculator is ***not*** permitted.

INTERNAL ASSESSMENT FOR CLASS X

Internal assessment of 20 marks, will be on school-based activities. It will have the following break-up :

Year-end assessment of activities	: 10 marks
Assessment of project work	: 05 marks
Continuous assessment	: 05 marks

Assessment of Activity Work

The year-end assessment of activities and project work will be done during an organized session of an hour and a half with intimation to the Board. The following parameters may be kept in mind for the same:

(a) The proposed internal examination may be organized as per the convenience of the schools.

(b) Every student may be asked to perform two given activities during the allotted time. Special care may be taken in choosing these two activities to ensure that the students are not put to any kind of stress due to time constraint.

(c) The students may be divided into small groups of 20-25 as per the convenience of the schools.

(d) The assessment may be carried out by a team of two mathematics teachers including the teacher teaching the particular section.

(e) The break-up of 10 marks for assessment of a single activity could be as under :

- Statement of the objective of activity : 01 marks
- Design or approach to the activity : 02 marks
- Actual conduct of the activity : 03 marks
- Descriptive/explanation of the procedure : 03 marks
- Result and conclusion : 01 marks

The marks for assessment of two activities (10+10) may be added and then reduced to be out of 10.

The schools will keep a record of the conduct of this examination. This assessment will be internal and done by a team of two teachers.

Evaluation of Project Work

Every student will be asked to do one project based on the concepts learn in the classroom but as an extension of learning to real life situations. This project work should not be repetition or extension of laboratory activities but should infuse new elements and could be open ended and carried out beyond the school working hours.

Five marks weightage could be further split up as under :

Identification and statement of the project	:	01 marks
Design of the project	:	01 marks
Procedure/processes adopted	:	02 marks
Interpretation of results	:	01 marks

Continuous Assessment

The procedure given below may be followed for awarding marks for continuous assessment in Class X :

(a) Reduce the marks of the Class X Pretest examination to be out of ten marks.

(b) Reduce the marks of Class X test examination to be out of ten marks.

(c) Add the marks of (a) and (b) above and get the achievement of the learner out of twenty marks.

(d) Reduce the total in (c) above to the achievement out of five marks.

These marks (out of 5) may be added to score of year-end assessment of activities and to score in project work (10+5) to get the total score out of 20 marks.

Some Models of Project work for Class-X

1. To derive the trigonometric identities $\sin^2\theta + \cos^2\theta = 1$, $1+ \tan^2\theta = \sec^2\theta$, $1+\cot^2\theta = \text{cosec}^2\theta$
2. To derive the trigonometric ratio of 45˚, 60˚ and 30˚ (Geometrically)
3. Basic proportion theorem (Thales theorem)
4. Pythogoras theorem
5. Pair of linear equations in two variables. (By using graph paper)
6. Length of tangent drawn from an external point to a circle.
7. To find the curved surface and total surface areas of a cylinder.
8. To verify the volume of cylinder is equal to three times that of a Cone having same base and same height.
9. To draw a bar graph of the marks obtained five subjects in pre-test Examination.
10. To throw a coin twenty times and to note the number of tails and heads and thus to find the probability of appearing heads and tails.

Esteemed teachers are requested to include more topics as given above pertaining to the syllabus.

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