GENERAL MATHEMATICS

SUBJECT CODE - C2

Class - X

1. Board objectives :

Teaching of General Mathematics at the Secondary stage helps the pupils:

- to know the Mathematical terms, concepts, principles and processes required in carrying out his/her day-to-day problems.
- to provide the necessary background for understanding of the allied concepts of other subjects.
- to provide the necessary background for the study of Mathematics.
- to develop interest in mathematical processes and reasoning.
- to develop the habit of precision and accuracy.
- to develop appreciation for the role of Mathematics in the development of other subjects.

2. Specific Objectives :

The teaching of General Mathematics in the Secondary Schools helps the pupil:

(i) to develop :

- Knowledge and understanding of the real number system (R) viz whole numbers; fractions including decimals, irrational numbers and their basic properties.
- Understanding of various forms of symbolic languages i.e. graphs; formulae; equations, etc.
- ability to translate into and form symbolic language, ability to generalise and build patterns of reasoning, ability to solve problems (i.e. decide upon the necessary facts and discard unnecessary; estimate

results, analyse problems and select the appropriate method and check results).

(ii) To develop the following qualities :

- an attitude of checking computations,
- systematic representation of arguments.
- power of observation and generalisation.
- doing calculations systematically and speedily.

(iii) To develop an appreciation of the contribution of mathematics to life and to the development of other subjects.

(iv) To develop the knowledge, understanding and applications of the acquired knowledge, practical works to be done.

(v) To develop the interest with the help of activity.

Mathematics laboratory works :

Mathematics laboratory is a room wherein we find collection of different kinds of materials and teaching/ learning aids, needed for learning and students understand the concepts through relevent, meaningful and concrete activities. The year-end assessment of activities and project work will be done during the session. The following parameters may be kept in mind for the same:

a) Internal examination may be organised 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) Appendix

1: Profs in Mathematics.

2. Introduction to Mathematical Modelling.

These two chapters are very important to develop students' power of reasoning and understanding of mathematical logic. These two areas should be included in practical mathematics. These are to be discussed in the periods dedicated to practical mathematics, i.e. once in a week.

General Guidelines : for Class-X

1. All concepts/identities must be illustrated by situational examples.
2. The language of 'Word problems' must be clear, simple, and unambiguous.
3. All proofs to be produced in a non-didactic manner, allowing the learner to see flow of reason. Wherever possible give more than one proof.
4. Motivate most results. Prove explicitly those where a short and clear argument reingorces mathematical thanking and reasoning. There must be emphasis on correct way of expressing their arguments.
5. The reason for doing ruler and compass construction is to motivate and illustrate logical argument and reasoning. All constructions must include an analysis of the construction, and proof for the steps taken to do the required construction must be given.

marks distribution on practicals/project works

Internal Assessment for Classes X

1) Practicals	7
2) Project	3
Total	10

GENERAL MATHEMATICS

Subject Code : C2

Class : X **Time : 3 hours**
Total Marks : 100 **Pass Marks : 30**

Theory : 90
Internal Assessment : 10
Pass Marks in Written Examination : 27

Units : Class - X

I. Number Systems
II. Algebra
III. Trigonometry
IV. Coordinate Geometry
V. Geometry
VI. Mensuration
VII. Statistics and Probability

Appendix : 1. Proof in Mathematics
2. Mathematical Modelling

Unit I. Number Systems

Real Numbers (Periods 15)

Euclid's division lemma, Fundamental Theorem of Arithmetic-statements after reveiwing 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 II. Algebra

1. Polynomials (Periods 6)

Zeros of a polyomial. 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 Liner Equations in Two Variables*** (Periods 15)

Pair of linear equations in two variables. Geometric representation of different possibilities of solutions/ 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. Simple problems on equations reducible to linear equations may be included.

3. ***Quadratic Equations*** (Periods 15)

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

Problems related to day-to-day activities to be incorporated.

4. ***Arithmetic Progressions*** **(AP)** (Periods 8)

Motivation for studying A.P. Derivation of standard results of finding the n^{th} terms and sum of first n terms.

Unit III : Trigonometry

1. Introduction to Trigonometry (Periods 18)

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

Trigonometric Identities : Proof and applications of the identity $\sin^2 A + \cos^2 A = 1$, $\sec^2 A - \tan^2 A = 1$, $\text{cosec}^2 A - \cot^2 A = 1$. Only simple identities to be given. Trigonometric ratios of complementary angles.

2. Heights and Distances (Not from examination point of view) (Periods 8)

Simple and believable 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 IV : Coordinate Geometry

Lines (In two-dimensions) *(Periods 15)*

Review the concepts of coordinate geometry done earlier including graphs of linear equations. Awareness of geometrical representation of quadratic polynomials. Distance between two points and section formula (internal). Area of a triangle.

Unit V : Geometry

1. Triangles (Periods 15)

Definitions, examples, counter examples of similar triangles.

i) (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.

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

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

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

v) (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.

vi) (Motivate) If a perpendicular is drawn from the vertex of the right angle to the hypotenuse, the triangles on each side of the perpendicular are similar to the whole triangle and to each other.

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

viii) (Prove) In a right triangle, the square of the hypotenuse

is equal to the sum of the squares of the other two sides.

ix) (Prove) In a triangle, if the square of one side is equal to sum of the squares of the other two sides, the angle opposite to the first side is a right triangle.

2. *Circle* (Periods - 8)

Tangent to a circle at any point on it is motivated by chords drawn from points coming closer and closer to the point.

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

ii) (Prove) The lengths of tangents drawn from an external point to a circle are equal.

3. *Constructions* (Periods - 8)

i) Division of a line segment in a given ratio (internally).

ii) Tangent to a circle from a point outside it.

iii) Construction of a triangle similar to a given triangle.

Unit : VI. Mensuration :

1. *Areas Related to Circles* (Periods 12)

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 60^0, 90^0, and 120^0 only. Plane figures involving triangles, simple quadrilaterals and circle should be taken.)

2. ***Surface Areas and Volumes*** (Periods 12)

i) Problems on finding 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 metalic 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. *Statistics* (Periods 15)

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

2. *Probability* (Periods 10)

Classical definition of probability. Connection with probability as given in Class X.
Simple problems on single events, not using set notation.

Appendix

1. *Proof in Mathematics*

Futher discussion on concept of 'statement'. 'proof' and 'agrument'. Further illustrations of deductive proof with complete arguments using simple results from arithmetic, algebra and geometry. Simple theorems of the "Given... and assuming... prove...". Training of using only the given facts (irrespective of their truths) to arrive at the required conclusion. Explanation of 'converse', 'negation', constructing converses and negations of given result/statements.

2. Mathematical Modelling

Reinforcing the concept of mathematical modelling, using simple examples of models where some constraints are ignored. Estimating probability of occurence of certain events and estimating averages may be considered. Modelling fair instalments payments, using only simple interest and future value (use of AP).

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LIST OF PRACTICALS IN MATHEMATICS PRESCRIBED
FOR CLASS-X

1. Solve a pair of linear equation by graphical method and to verify the result by any other algebraic method. (Chapter-3)
2. To find the zeros of a quadratic polynomial graphically and verification of the result by any other algebraic method (Chapter-2)
3. **Verification of the formula for :-** (chapter-5)
    i. Sum of first n terms of an AP
    ii. Sum of first n natural numbers
    iii. Sum of first n odd natural numbers
    iv. Sum of first n even natural numbers
4. Verification of Basic Proportionality Theorem. (Chapter-6)
5. Verification of converse of Basic Proportionality theorem. chapter-6)
6. To verify that the ratio of the area of to two similar triangles is equal to the ratio of the squares of their correspoding sides. (Chapter-6)
7. Verification of Phythagoras Theorem.
8. Verification of the formula of area of triangle (in co-ordinate geometry) with the help of the formula of plane geometry. (Chapter-7)
9. Construction of a tangent to a circle at any point on it, when the centre of the circle is given (Chapter-10)
10. To verify that the length of the tangents the drawn from an external point to a circle are equal. (Chapter-10)
11. To obtain the formula for the area of a circle with radius r. (Chapter -12)
12. To construct a right circular cylinder with given height

and circumference. (Chapter-13)

13. To construct a right circular cone with given height and circumference of the circular base. For the cone so formed, to determine its radius and height. (Chapter-13)

14. To construct a quadrilateral with given measure and then to construct a similar quadrilateral.

15. To find mean, median and mode from a primary data collected by the students in a specific subject.

16. To Find the median from a given distribution using graph mentioned below and to verify the result. (Chapter-14)
    (i) Using less than type ogive.
    (ii) Using more than type ogive.
    (iii) Using both less than and more than type ogive

17. **Probability :** (Chapter-15)
    (a) To find the probability of getting head or tail from the experiment of tossing a coin 100 times.
    (b) To obtain the probability of an event associated with throwing a pair of dice.

18. Displacement and rotation of triangle. (Chapter-7)
    To verify that under any displacement and rotation of a triangle-
    (a) Distance between the verities remain unchanged.
    (b) Area of the triangle remains unaltered.

19. **Project :**
    1) (a) Write a note on Euclid's Division Lemma
       (b) Write a note on Pythagoras Theorem
    2) Write short life history of 3/4 great Mathematicians

N.B. : Students should do at least 15 practicals and at least one project work.

Revised syllabus of Mathematics, Class-X

GENERAL MATHEMATICS

Subject Code : C2

Class : X **Time : 3 hours**
Full Marks : 100 **Pass Marks : 30**

Theory : 90
Internal Assessment : 10
Pass marks in written examination : 27

Chapter No.	Chapter Name	Units Required	Units Omitted	Marks	
				Half Yearly	HSLC Exam.
	Revision Chapter	Part I & Part II	Part III	✓	✓
1.	Real Number	Whole chapter	Nil	✓	✓
2.	Polynomials	Whole chapter	Nil	✓	✓
3.	Pair of Linear Equations in two variables	Whole chapter	Nil	✓	✓
4.	Quadratic Equations	Whole chapter	Nil	✓	✓
5.	Arithmetic Progressions	Whole chapter	Nil		✓
6.	Triangles	Upto unit 6.4 (i.e. upto Exercise 6.3)	Unit 6.5 onwards	✓	✓
7.	Coordinate Geometry	Whole chapter	Nil	✓	✓
8.	Introduction to Trigonometry	Whole	Nil chapter	✓	✓
9.	*	*	*		
10.	Circles	Whole chapter	Nil		✓
11.	Constructions	Upto unit 11.2 (i.e. Upto Exercise 11.1)	Unit 11.3 onwards		✓

Chapter No.	Chapter Name	Units Required	Units Omitted	Marks	
				Half Yearly	HSLC Exam.
12.	Areas Related to Circles	Upto unit 12.3 (i.e. Upto Exercise 12.2	Unit 12.4 onwards		✓
13.	Surface Area and Volume	Upto unit 13.3 (i.e. Upto Exercise 13.2)	Unit 13.4 onwards		✓
14.	Statistics	Upto unit 14.4 (i.e. Upto Exercise 14.3)	Unit 14.5 onwards		✓
15.	Probability	Whole chapter	Nil		✓
	Theory Total			–	**90**
	Internal Assessments			–	10
	Grand Total			–	**100**

***** Chapter 9 is totally excluded from the syllabus.

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* Questions from each Unit/Lesson will carry marks 2-10.