



Secondary Education Board of Assam (SEBA)

Class 9 & Class 10 Syllabus

Advanced Mathematics (E)

SUBJECT CODE - 19

CLASS - IX-X

1. IMPORTANCE OF INTRODUCTION OF ADVANCED MATHEMATICS

After completing the H.S.L.C and H.S.S.L.C (Previously known as Matriculation and Intermediate) Examinations a sizable section of the students opt for various scientific and technological branches. Besides, some brilliant students have been appearing in different competitive examinations like JEE, AIEEE, OLYMPIADS etc.

The syllabus meant for students of General Mathematics will not help to this section of students to an expected level. So in preparing a syllabus we should emphasize on the interest of this section of brilliant students. Considering this point in mind, SEBA (previously G.U) has been retaining the Advanced Mathematics since many years back.

At Present SEBA has adopted the NCERT syllabi in class IX and X. In CBSE course advanced Mathematics is not included as one of the subjects in classes IX and X. But due to the arguments stated above SEBA wants to retain Advanced Mathematics, in class IX and X for pre-training to advanced course in Mathematics in spite of adoption of Mathematics from NCERT. Therefore it becomes necessary to frame the syllabi of these two classes observing the syllabi of the General Mathematics of NCERT.



2. *Objectives* -

Teaching of Advanced Mathematics at the Secondary School level enables the pupils :

- to develop interest in the study of Mathematics.
- to provide the necessary background for the study of higher Mathematics.
- to help pupil to think and act logically, to develop creativity.
- to lay down greater emphasis on the basic concepts, imagination, reasoning without neglecting the basic skills.
- to encourage the students to pursue mathematics in higher studies.



3. Syllabus of Advanced Mathematics (E)

Subject Code : 19

Class : IX

Total Marks : 100

Unit-I. System of Numeration :

History of Numeration and numerals, Different systems of Numerals: Roman and Indo-Arabian. Different Scales of Numeration with bases 2, 8, 10 and 16. Change of base. Arithmetic of Binary numbers.

Unit-II. Basic Set Theory :

- (A) Fundamentals of Statement Algebra
- (B) Operations of Sets, Algebra of Sets, Proofs of Laws of Algebra of Sets.

Unit-III. Logarithm and properties



Unit-IV. Special product and Factorization of :

- (i) $a^3+b^3+c^3+3(b+c)(c+a)(a+b)$
- (ii) $x^3+(a+b+c)x^2+(ab+bc+ca)x+abc$
- (iii) $(a+b+c)(bc+ca+ab)-abc$
- (iv) $a^3+b^3+c^3-3abc$
- (v) $a^2(b+c)+b^2(c+a)+c^2(a+b)+2abc$
- (vi) $bc(b+c)+ca(c+a)+ab(a+b)+2abc$
- (vii) $a(b^2+c^2)+b(c^2+a^2)+c(a^2+b^2)+2abc$
- (viii) $a^2(b+c)+b^2(c+a)+c^2(a+b)+3abc$
- (ix) $bc(b+c)+ca(c+a)+ab(a+b)+3abc$
- (x) $a(b^2+c^2)+b(c^2+a^2)+c(a^2+b^2)+3abc$
- (xi) $a^2(b-c)+b^2(c-a)+c^2(a-b)$
- (xii) $bc(b-c)+ca(c-a)+ab(a-b)$

$$(xiii) \quad a^3(b-c) + b^3(c-a) + c^3(a-b)$$

$$(xiv) \quad a^3(b^2-c^2) + b^3(c^2-a^2) + c^3(a^2-b^2)$$

Unit V : Concept of inequalities, Tricotomy property (Order relation in R) Elementary properties of inequalities, Simple applications) Inequations and solutions of inequations in two variables, Graphs of inequations (simple cases).

Unit VI : Sequence and series :

(A) Idea of a sequence of numbers -

(B) Arithmetic Progression (AP)-

AP as a special kind of a sequence, General term of an AP, to find an AP having given any two terms of it. If each term of an AP is increased or decreased or multiplied or divided by the same number then the resulting sequence is also an AP, Arithmetic mean (A.M.), insertion of any number of AM between two given positive numbers, Arithmetic series and its sum to n terms and related problems.

(C) Geometric Progression (GP)-

GP as a special kind of sequence and its general terms; to find a GP having given any two terms of it. If each term of GP is multiplied or divided by the same number the resulting sequence is also a GP. Geometric mean (G.M), insert any number of GM between any two given positive numbers. To prove the relation $AM > GM$ in case of any positive real numbers. Geometric series and its sum to n terms and related problems.

(D) Sum of the three series

i) $1 + 2 + 3 + \dots + n$



$$\text{ii) } 1^2+2^2+3^2+ \dots + n^2$$

$$\text{iii) } 1^3+2^3+3^3+ \dots + n^3$$

Unit VII : Plane Geometry

Proofs of the following theorems and exercises on the theorems.

1. The Perpendicular bisectors of the sides of a triangle are concurrent.
2. The internal bisectors of the angles of a triangle are concurrent
3. The perpendiculars drawn from the vertices of a triangle to the opposite sides are concurrent.
4. The medians of a triangle are concurrent.

Unit VIII : Some special Geometrical Constructions :

- (1) Construction of a triangle given its two sides and a median corresponding to these sides.
- (2) (i) Construct a triangle with given Perimeter and the two suitable base angles.
 - (ii) Construct a triangle with given (unequal) medians.
 - (iv) Draw a square equal in area to a given rectangle.
 - (v) Draw a rectangle having given one side and a diagonal.
 - (vi) Draw a regular polygon in a given circle.
- 3) Construction of figures (Triangles, quadrilaterals) similar to the given figure as per the given scale factor.
- 4) Construction of circumcircle and incircle.



LIST OF PRACTICALS
ADVANCED MATHEMATICS (E)

Subject Code : 19

Class: IX

1. Project: Different systems of numerations.
2. If P and Q are any two statements then form any five tautology (or formula).
3. Using Venn diagram, verify the following properties of sets.
 - i) Associative laws.
 - ii) Distributive laws.
 - iii) De-Morgan's laws.
 - iv) Difference laws.
4. Using log tables find the value.

i)
$$\sqrt[7]{\frac{(4.56)^4 \times (32.4)^{15}}{(11.529)^4 \times (6.9642)^3}}$$
 ii) 10th root of 0.0004296



Teachers are requested **not** to provide the same problem (question) to all the students. They are, requested to create similar questions, at least 15-20 so that each student gets different question.

5. Pascal triangle and its application to find the coefficients in the expansion of $(a+b)^n$, $n=4, 5, 6, 7, 8, 9, 10$
6. Solve graphically the following system of linear inequations.
 $2x-3y+6>0$; $3x+5y < 15$; $y> 1$; $x>0$

Note: Teachers are requested **not** provide the same pair of linear inequations to the all students.

7. Verification of the following formulae

i) Sum of first n terms of an AP

ii) $1+2+3+.....+n = \frac{n(n+1)}{2}$

- iii) $1+3+5+\dots+(2n-1)=n^2$
 - iv) $2+4+6+8+\dots+2n=n(n+1)$
8. (a) To verify that the perpendicular bisector of the sides of any triangle are concurrent
 - (b) To verify that the angle bisectors of a triangle are concurrent.
 - (c) To verify that the altitudes of a triangle are concurrent.
 - (d) To verify that the medians of a triangle are concurrent.
 9. Find the positions of Circumcentre, Incentre, Orthocentre and Centroid of a given triangle.
 10. Construct a triangle when the medians are given and hence verify that the centroid divides a median in the ratio 2: 1.

N.B. : Students have to do atleast 8 practicals.



ADVANCED MATHEMATICS (E)

Subject Code : 19

Class - IX

Full Marks : 100

Internal Assessment : 10

Pass marks in written examination : 27

Time : 3 hours

Pass Marks : 30

Sl. No.	LESSONS	Course	
		Half Yearly	Annual
1.	System of Numeration	✓	✓
2.	Sets	✓	✓
3.	Logarithm	✓	✓
4.	Special products and Factorisation	✓	✓
5.	Inequalities		✓
6.	Sequence and Series		✓
7.	Plane Geometry		✓
8.	Some Special Geometrical Constructions		✓
	Total	90	90
9.	Internal Assessment	10	10
	Grand Total	100	100



Textbook: Ucca Ganit

The Assam State Textbook Production and
Publication Corporation Limited, Guwahati-1

* Questions from each Unit/Lesson will carry marks 2-15.

4. Syllabus of Advanced Mathematics (E)

Subject Code : 19

For Class - X

Total Marks - 100

Unit-1. Set

Algebra of sets :

Proofs of laws of Algebra of sets. Derivation of $n(A \cup B) = n(A) + n(B) - n(A \cap B)$. Relation as subset of Cartesian product, function. Concepts of reflexive, symmetric and transitive relation. Equivalence relation.

Unit 2 : Complex Number :

1. Introduction to imaginary numbers.
2. Complex number, as an ordered pair of real numbers.
3. Operations of complex numbers.
4. Properties of complex numbers.
5. Diagrammatic representation of a complex number in a plane.
6. Conjugate complex number, properties of conjugate complex numbers.
7. Modulus of complex number and properties.
8. Argument of a complex number and properties.
9. Representation of complex number in (r, θ) form
10. In a quadratic equation, complex roots occur in conjugate pair (without proof).
11. Square root of complex number.



Unit -3 : Arithmetic of integers :

Method of induction (Statement only) and simple applications. Divisibility of Integers : Division algorithm, Greatest Common Divisor (GCD), simple properties of

GCD.

If d is the GCD of two integers a and b then there exist integers x and y such that $d = ax + by$.

Least common multiple (LCM) of integers. Theorem on GCD & LCM, Calculation of GCD of two integers by Euclid's Algorithm. Prime numbers, composite numbers perfect number, relative prime nos. congruence of integers modulo, properties of modular congruence.

Unit - 4 : Quadratic equation :

Formation of quadratic equation from roots, equations reducible to Quadratic equation. Application problems involving quadratic equation. Simultaneous equations in two variables - one linear and other quadratic.

Unit - 5 : Application of Common Logarithm :

Characteristic and Mantissa. Use of Log table in numerical calculations.

Unit - 6 : Permutation & Combination :

Combination and Permutation of distinct objects only. Symbols ${}^nC_r$ and ${}^nP_r$ with proofs. Restricted permutations and combinations, applications in simple problems.

Unit - 7 : Plane Trigonometry :

Trigonometric ratios for

angles θ , $90^\circ \pm \theta$, $180^\circ \pm \theta$, $270^\circ \pm \theta$, $360^\circ \pm \theta$.

Trigonometric ratios of compound angles : Formula for $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$, (Idea of multiple angles and with simple application excluding identities)

Unit - 8 : Plane Geometry :

Proofs of the following theorems and exercises on them :

- (i) The angles made by a tangent to a circle with a chord drawn from point of contact are respectively equal to the angles in the alternate segments of the circle.
- (ii) If two chords of a circle cut at a point within or outside it,



the rectangles contained by their segments are equal.

- (iii) If a straight line drawn from an external point P intersects a circle at A and B and a straight line drawn from P touches the circle at T then $PA \cdot PB = PT^2$.
- (iv) The internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the sides containing the angle. (The corresponding theorem about an external bisector should be given as an exercise).
- (v) If the vertical angle of a triangle is bisected by a straight line which cuts the base, the rectangle contained by the sides of the triangle is equal to the rectangle contained by the segment of the base, together with the square on the straight line which bisects the angle.
- (vi) The rectangle contained by the diagonals of a quadrilateral inscribed in a circle is equal to the sum of the two rectangles contained by the opposite sides.

Unit -9 : Co-ordinate Geometry : Straight line :

Every first degree equation in x and y represents a straight line. Equation of straight line in gradient form, intercept form and normal form, passing through two points. Angle between two straight lines and condition of perpendicularity and parallelism.



LIST OF PRACTICALS
ADVANCED MATHEMATICS (E)
Subject Code - 19, Class - X

1. Graph of Relations
2. Plotting complex numbers on Argand plane and to verify-
 - i) Whether the points are concyclic or not.
 - ii) Whether the points are collinear or not.
3. Geometrical representation of
 - i) Addition of complex numbers.
 - ii) Subtraction of complex numbers.
4. To find the prime numbers between 1 and 1000.
5. To draw the graph of quadratic polynomial $p(x)$ and find the roots of the equation $p(x)=0$ (same polynomial should **not** be given to all the students)
6. Find the values using log table.

$$i) \sqrt[11]{\frac{(4.21)^8 \times (7.294)^9}{(16.529)^{10} \times (234.1)^7}} \quad (ii) \left(\frac{315}{2^5 \times 7^6} \right)^{235}$$



Teachers are requested **not** to provide the same problem (question) to all the students. They are requested to create similar question at least 15-20 so that each student gets different question.

7. Verification of fundamental principle of counting.
8. Draw the graph of $y = \sin x$ and $y = \cos x$.
9. To draw a straight line when its slope and a point on it are given.
10. Verify the following theorems
 - i) Tangents drawn to a circle from an external point are equal in length.
 - ii) Alternate segment theorem.
 - iii) Theorems on area of rectangle related to circles.

N.B. : Students have to do atleast 8 (eight) practicals.

ADVANCED MATHEMATICS (E)

Subject Code : 19

Class-X

Time : 3 hours

Full Marks : 100

Pass Marks : 30

Internal Assessment : 10

Pass marks in written examination : 27

Sl. No.	LESSONS	Marks	
		Half Yearly	Final
1.	Sets	✓	✓
2.	Complex Numbers	✓	✓
3.	Arithmetic of Integers	✓	✓
4.	Quadratic Equation	✓	✓
5.	Applications of Common Logarithm	✓	✓
6.	Permutation and Combination		✓
7.	Trigonometry		✓
8.	Plane Geometry		✓
9.	Co-ordinate Geometry		✓
	Total	90	90
10.	Internal Assessment	10	10
	Grand Total	100	100



Textbook: New Advanced Mathematics

The Assam State Textbook Production and
Publication Corporation Limited, Guwahati-1

* Questions from each Unit/Lesson will carry marks 2-15.



Study Materials

aglasem.com

Model Papers

Sample Papers

Half Yearly Sample Papers

Important Resources

Periodic Table

Writing Skills / Formats

Maps of India / World



Notes

- ☐ Class 6 Notes
- ☐ Class 7 Notes
- ☐ Class 8 Notes
- ☐ Class 9 Notes
- ☐ Class 10 Notes
- ☐ Class 11 Notes
- ☐ Class 12 Notes

Books and Solutions

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