MATHEMATICS

Course Structure

I Term Units	Topics	Marks
I	Number System	11
II	Algebra	23
III	Geometry	17
IV	Trigonometry	22
V	Statistics	17
Total		**90**
II Term Units	**Topics**	**Marks**
II	Algebra	23
III	Geometry	17
IV	Trigonometry	8
V	Probability	8
VI	Co-ordinate Geometry	11
VII	Mensuration	23
Total		**90**

First Term Course Syllabus

Unit I: Number Systems

1. Real Numbers

- 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 II: Algebra

1. Polynomials

- 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

- Pair of linear equations in two variables and their graphical solution
- Geometric representation of different possibilities of solutions/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 must be included
- Simple problems on equations reducible to linear equations

Unit III: Geometry

1. Triangles

- Definitions, examples, counter examples of similar triangles
- (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
- (Motivate) If a line divides two sides of a triangle in the same ratio, the line is parallel to the third side
- (Motivate) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar
- (Motivate) If the corresponding sides of two triangles are proportional, their corresponding angles are equal and the two triangles are similar
- (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
- (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
- (Prove) The ratio of the areas of two similar triangles is equal to the ratio of the squares on their corresponding sides

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

Unit IV: Trigonometry

1. Introduction to Trigonometry

- 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°, 45° and 60°
- Relationships between the ratios

2. Trigonometric Identities

- Proof and applications of the identity $\sin2A + \cos2A = 1$
- Only simple identities to be given
- Trigonometric ratios of complementary angles

Unit V: Statistics and Probability

1. Statistics

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

Second Term Course Syllabus

Unit II: Algebra

3. Quadratic Equations

- Standard form of a quadratic equation $ax2+bx+c=0$, $(a \neq 0)$
- Solution of the 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

- Motivation for studying Arithmetic Progression Derivation of the 9^{th} term and sum of the first 'n' terms of A.P. and their application in solving daily life problems.

Unit III: Geometry

2. Circles

- Tangents to a circle motivated by chords drawn from points coming closer and closer to the point
- (Prove) The tangent at any point of a circle is perpendicular to the radius through the point of contact
- (Prove) The lengths of tangents drawn from an external point to circle are equal

3. Constructions

- Division of a line segment in a given ratio (internally)
- Tangent to a circle from a point outside it
- Construction of a triangle similar to a given triangle

Unit IV: Trigonometry

3. Heights and Distances

- 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°, 45°, 60°

Unit V: Statistics and Probability

2. Probability

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

Unit VI: Coordinate Geometry

1. Lines (In two-dimensions)

- 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

- 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

- Problems on finding surface areas and volumes of combinations of any two of the following:
  - Cubes
  - Cuboids
  - Spheres
  - Hemispheres
  - Right circular cylinders/cones
  - Frustum of a cone

- 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.)