CLASS X

UNIT I COMMERCIAL MATHEMATICS

Instalments:

- Instalments payments and instalments buying (number of instalment should not be more than 2 in case of buying) (Only equal instalments should be taken. In case of payments through equal instalments, not more than three instalments should be taken).

UNIT II TIME, DISTANCE AND WORK

- Solution of problems based on time, work and distance.

UNIT III ALGEBRA

Polynomials :

- Zeros of a polynomial. Relationship between zeros and co-efficients of a polynomial with particular reference to quadratic polynomials.
- HCF and LCM to be included.
- Rational Expressions.

Linear Equation in Two Variables :

- System of linear equation in two variables.
- Solution of the system of linear equations - (i) Graphical Method (ii) By Algebraic Methods:
  (a) Elimination by substitution method
  (b) Elimination by equating the co-efficients
  (c) Cross multiplication
- Linear equation in two variables in solving simple problems from different areas.

Quadratic Equations :

- Standard form of quadratic equation $ax^2 + bx + c = 0$,(a ‘“ 0). Solution of $ax^2 + bx + c = 0$ by (i) factorisation (ii) quadratic formula.
- Application of quadratic equations in solving word-problems from different areas.
- Relationship between discriminant and nature of roots.(Problems related to day-to-day activities to be incorporated).

Arithmetic Progression (AP):

- Introduction to AP by pattern of number.
- General term of an AP, sum to n-terms of an AP.

Sets :

- Revision.
- Venn Diagrams (not more than three sets).
- Complement of a set, operations on sets (union, intersection and difference of two sets)

UNIT – IV GEOMETRY

Triangles :

- Definitions, examples, counterexamples 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 any two sides of a triangle in the same ratio, then the line is parallel to the third side.
3. (Motivate) Prove that the internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the sides containing the angle.
4. (Motivate) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar.
5. (Motivate) If in two triangles, the corresponding angles are equal, then their corresponding sides are proportional and hence the triangles are similar.
6. (Motivate) If the corresponding sides of two triangles are proportional, their corresponding angles are equal and the two triangles are similar.
7. (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.
8. (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.
9. (Prove)The ratio of the area of two similar triangles is equal to the ratio of the squares on their corresponding sides.
10. (Prove) In a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.
11. (Motivate) 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.

Circles :

1. (Motivate) If two arcs of a circle are congruent, their corresponding chords are equal and its converse.
2. (Prove) The angles subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.
3. (Prove) The angle in a semi circle is a right angle.
4. (Motivate) Converse of 3.
5. (Prove) Angles in the same segment of a circle are equal.
6. (Motivate) If a line segment joining two points subtends equal angle at other two points lying on the same side of the line containing the segment, the four points lie on a circle.
7. (Prove) The sum of either pair of the opposite angles of a cyclic quadrilateral is 180° .
8. (Prove) Converse of 7.
9. (Prove) The tangent at any point of a circle is perpendicular to the radius through the point of contact.
10. (Prove) The lengths of tangents drawn from an external point to a circle are equal.
11. (Prove) If two chords of a circle intersect inside or outside a circle, then the rectangle formed by two parts of one chord is equal in area to the rectangle formed by the two parts of the other.
12. (Prove) If a line touches a circle and from the point of contact a chord is drawn, the angles which this chord makes with the given tangent are equal respectively to the angles formed in the corresponding alternate segments.

Constructions :

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

2. Construction of tangents to a circle (i) At a point on it without using the centre. (ii) At a point on it using the centre. (iii) From a point outside it. [(i) Proofs of constructions not required. (ii) Constructions using ruler and compasses only].
3. Construction of a triangle similar to a given triangle.
4. Construction of a triangle, given its base, vertical angle and either altitude or median through the vertex.

UNIT-V CO-ORDINATE GEOMETRY

Co-ordinate Geometry :

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

UNIT VI TRIGONOMETRY

(a) Proving simple identities based on the following:(proofs not required)
- (i) $\sin^2 A + \cos^2 A = 1$
- (ii) $\sec^2 A = 1 + \tan^2 A$
- (iii) $\text{cosec}^2 A = 1 + \cot^2 A$

(b) Trigonometric ratios of complementary angles:
- (i) $\sin (90° - A) = \cos A$
- (ii) $\cos (90° - A) = \sin A$
- (iii) $\tan (90° - A) = \cot A$
- (iv) $\text{cosec} (90° - A) = \sec A$
- (v) $\cot (90° - A) = \tan A$
- (vi) $\sec (90° - A) = \text{cosec} A$

(c) Problems based on above.

Heights and Distances :

- Simple problems on heights and distances.
  - (i) Problems should not involve more than two right triangles.
  - (ii) Angles of elevation/depression should be only 30°, 45°, 60°

UNIT - VII MENSURATION

Areas Related to Circle :

- Motivate the area of a circle; area of sectors and segments of a circle.
- Problems based on areas and perimeter/circumference of circles. (In calculating area of segment of a circle, problems should be restricted to central angle of 60^o, 90^o and 120^o only).

Surface Areas and Volumes :

- 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.
- 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).

UNIT - VIII STATISTICS AND PROBABILITY

Mean :

- Mean of grouped data. (Calculation by taking assumed mean should also be discussed).
- Median and mode of grouped data.

Probability:

- Elementary idea of probability as a measure of uncertainty (for single event only)

Pictorial representation of data :

- Reading and construction of pie chart (sub parts of pie chart should not exceed five. Central angle should be in multiples of 5 degrees).