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(Including Formative and Summative Assessments)

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DR. V.K. SONI

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VOLUME-II
For
CLASS-X

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Evaluation (CCE) Scheme*

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Comprehensive MATHEMATICS VOL. II CLASS X

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SYLLABUS

MATHEMATICS: CLASS X

(Code No. 041)

General Instructions:

- As per CCE guidelines, the syllabus of Mathematics for class X has been divided term wise.
- The units specified for each term shall be assessed through both Formative and Summative Assessments.
- In each term, there will be two Formative Assessments, each carrying 10% weightage.
- The Summative Assessment in Term I will carry 30% weightage and the Summative Assessment in Term II will carry 30% weightage.
- Listed laboratory activities and projects will necessarily be assessed through Formative Assessments.

COURSE STRUCTURE

SECOND TERM

UNITS	TITLE	MARKS
II	ALGEBRA (Contd.) Quadratic Equations, Arithmetic Progressions	23
III	GEOMETRY (Contd.) Circles, Constructions	17
IV	TRIGONOMETRY (Contd.) (Heights and Distances)	08
V	STATISTICS AND PROBABILITY (Contd.) Probability	08
VI	COORDINATE GEOMETRY Lines (In Two-dimensions)	11
VII	MENSURATION Areas Related to Circles, Surface Areas and Volumes	23
	TOTAL	90

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UNIT II: ALGEBRA (Contd.)

3. Quadratic Equations (15 Periods)

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

4. Arithmetic Progressions (8 Periods)

Motivation for studying Arithmetic Progressions. Derivation of standard results of finding the n^{th} term and sum of first n terms and their application in solving daily life problems.

UNIT III: GEOMETRY (Contd.)

2. Circles (8 Periods)

Tangents to a circle 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 circle are equal.

3. Constructions (8 Periods)

(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 IV: TRIGONOMETRY (Contd.)

3. Heights and Distances (8 Periods)

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 (Contd.)

2. Probability (10 Periods)

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

UNIT VI: COORDINATE GEOMETRY

1. LINES (In Two-dimensions) (14 Periods)

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.

(viii)

UNIT VII: MENSURATION

1. Areas Related to Circles (12 Periods)

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 (12 Periods)

(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 metallic solid into another and other mixed problems. (Problems with combination of not more than two different solids be taken.)

Note: OTBA will appear only in SA-II for 10 marks.

IMPORTANT RESULTS AND FORMULAE

(To be Remembered for Quick Revision)

Chapter 1: Quadratic Equations

- **Standard Form of a Quadratic Equation:** The most general form of a quadratic equation in the variable x called the *standard form*, is: $ax^2 + bx + c = 0$, where $a \neq 0$, a , b , c are *real numbers*.
- **Roots (or Solutions) of a Quadratic Equation:** Those values of x , which satisfy a quadratic equation, are called roots (or solutions) of the equation. Thus, a real number α is called a root of the quadratic equation, $ax^2 + bx + c = 0$, if $a\alpha^2 + b\alpha + c = 0$. A quadratic equation can have *at most two roots*, which are usually denoted by α and β .

NOTE  The zeroes of the quadratic polynomial, $ax^2 + bx + c$, and the roots of the quadratic equation, $ax^2 + bx + c = 0$, are the same.

- **Discriminant of a Quadratic Equation:** It is a relationship between the coefficients of a quadratic equation and is given by Disc. $D = b^2 - 4ac$.
- **Finding the Roots of a Quadratic Equation:** There are *three methods* to find the roots of a quadratic equation, $ax^2 + bx + c = 0$, $a \neq 0$.
 - By the Factorisation Method:* It is applied when the *discriminant* of a quadratic equation, $D (= b^2 - 4ac)$ is a *perfect square* of a positive number. In this case, factorise $ax^2 + bx + c$, $a \neq 0$, into a product of two linear factors, and then the roots of the quadratic equation, $ax^2 + bx + c = 0$ are found by equating each factor to zero.
 - By the Method of Completing the Squares:* The key point involved in its 5-Step Procedure is the addition of $[\frac{1}{2} \text{ the coefficient of } x]^2$ on both the sides, with leading coefficient unity and constant term to R.H.S.
 - By the Quadratic Formula:* It directly gives the two roots of a Quadratic Equation, provided its discriminant $D \geq 0$, by the formula stated below:

$$x = \frac{-b \pm \sqrt{D}}{2a}, \text{ where, } D = b^2 - 4ac$$

- **Nature of Roots of a Quadratic Equation:** The nature of roots of a quadratic equation, $ax^2 + bx + c = 0$, depends upon the nature of its discriminant.
 - If $D > 0$** , (i.e., positive), then the roots are *real and unequal/distinct*.
 - If $D = 0$** , then the roots; are *real and equal/coincident*.
 - If $D < 0$** , then there are no real roots.

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Chapter 2: Arithmetic Progressions

- **Arithmetic Progression (A.P):** An arithmetic progression (A.P) is an ordered list of numbers in which each term progresses (i.e., increases or decreases) successively by a constant/fixed number called, the *common difference* (d). Each term of an A.P, except the first term, is obtained by adding the common difference (d) to the preceding term.
- **The General Form of an A.P:** The general form of an A.P with the first term, a , and common difference, d is given by: $a, a + d, a + 2d, a + 3d, \dots$
- **The General (or n^{th}) Term of an A.P:** In an A.P with first term a and common difference, d , the *General term* (or n^{th} term) is given by $T_n = a + (n - 1) d$.
- **Selection of Terms in an A.P:** (i) For three terms, take: $a - d, a$ and $a + d$ (ii) For four terms, take: $a - 3d, a - d, a + d$ and $a + 3d$ (iii) For five terms, take: $a - 2d, a - d, a, a + d$ and $a + 2d$ and so on.
- **The Sum Formula:** The sum of the first, n terms of an A.P is given by:

$$S_n = \frac{n}{2} [2a + (n - 1)d] \quad \dots \text{1st Form}$$

$$S_n = \frac{n}{2} (a + l) \quad \dots \text{2nd Form}$$

where, l is the last term in S_n

$$\text{i.e., } l = T_n = a + (n - 1) d$$

- **REMARK** In the above *Sum Formula*, use the 1st Form when the common difference, d is known and use the 2nd Form when the last term, l is known.
- **n^{th} Term in Terms of S_n :** If the sum, S_n of n terms of an A.P, is given, then the n^{th} term of the A.P can be computed by using the formula $T_n = S_n - S_{n-1}$, for $n > 1$.

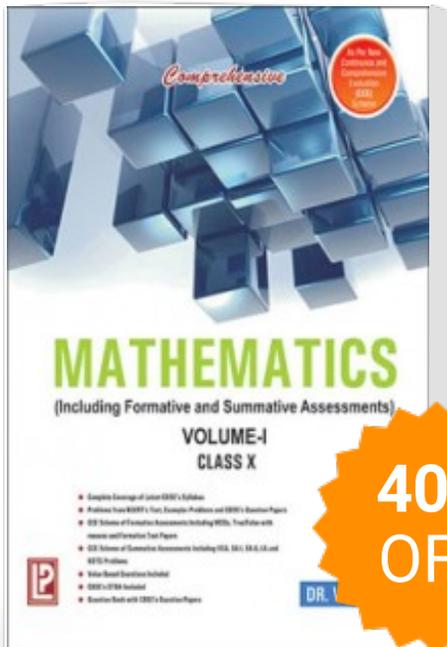
Chapter 3: Circles

- **Concept of the Tangent (s) to a Circle**
Def: A tangent to a circle is *the limiting position of a secant when its two points of intersection with the circle coincide.*
 The point where the tangent touches the circle is called *the point of contact.*
Def: A secant to a circle is a line which intersects it in two distinct points.
 Thus, *the basic difference between a secant and a tangent* is that whilst secant to a circle intersects it in two distinct points, a tangent to a circle intersects it in *exactly one point.*
- **“Tangent Radius” Theorem:** The tangent at any point of a circle is *perpendicular* to the radius through the point of contact.
- **“Equal Tangent Lengths” Theorem:** *The length of the two tangents from an external point to a circle are equal.*

Chapter 4: Constructions

- **Division of a line segment** in a given ratio and its justification by using *Thale’s-Basic Proportionality Theorem.*
- **Construction of a triangle** similar to given triangle, as per the given scale factor which may be less than 1 or greater than 1 and its justification by using the concept of similar triangles.

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