## iv. a. Mathematics and Science
## Mathematics (24+6): Phy.Sci (12+3); Bio.Sci (12+3)

# Mathematics
**Content (24 Marks)**

**I. Arithmetic**

Ratio and Proportion - Applications of Ratio- Comparing Quantities using proportion -Direct and Inverse proportion

**II. Number System**

Knowing Our Numbers –rounding of numbers - Whole Numbers- predecessor – successor – number line - Playing With Numbers – divisibility rules -LCM & HCF -Integers - Fractions - Decimals -Rational Numbers -Squares, cubes,Square roots, Cube roots

Real numbers -Representing irrational numbers on Number line – representing real numbers on the number line through successive magnification – rationalisation –Real numbers- operations on real numbers- law of exponents for real numbers- surds( exponential form & radical form )

Euclid's division lemma & its application in finding HCF – fundamental theorem of Arithmetic & its application (HCF & LCM, decimal representation of rational numbers (terminating or non- terminating recurring and vice versa)

Non-terminating & non recurring decimals as irrationals – irrationality of $\sqrt{2}$, $\sqrt{3}$ etc.- properties of irrational numbers Logarithm-exponential & logarithmic forms- Properties & Laws of logarithms- standard base of logarithm- use of logarithms in daily life situation

Sets & its representation (Roster form& set builder form)- examples- classification of sets(empty, finite, infinite, subset & super set, universal set, disjoint sets, power set of a set, equality of sets) Venn diagram – operations on sets ( union, intersection, difference, cardinal number of a set)

**III. Geometry**

Measures of Lines and Angles - Symmetry - -Understanding 3D, 2D Shapes -Representing 3D in 2D-Lines and Angles - Triangle and Its Properties -Congruency of Triangles- - Quadrilaterals - Practical Geometry - Construction of Triangles Construction of Quadrilaterals - Exploring Geometrical Figures-The Elements of Geometry - Area – Circles -Similar Triangles & Tangents and Secants to a circle Proofs in Mathematics.

**IV. Mensuration**

Perimeter and Area - Area of Plane Figures -Surface areas and Volumes

**V.Algebra**

Introduction to Algebra- Simple Equations- Exponents - Algebraic Expressions Exponents & Powers - Linear Equations in one variable – Factorisation Polynomials & Factorisation - Linear Equations in Two Variables - Pair of Linear Equations in Two Variables - Quadratic Equations- Progressions- Sequences and series- Arithmetic Progression- properties of A.P.- Arithmetic mean – Geometric Progression –$n^{th}$ term–properties of AP,G.P.

**VI. Statistics**

DATA HANDLING - Frequency Distribution Tables and Graphs- Grouped data-ungrouped data – Measures of Central Tendency -Mean, median & mode of grouped and ungrouped data – ogive curves.

**VII. Probability**

Probability - Random experiment and outcomes -Equally likely outcomes - Trail and Events - Linking the chance to Probability uses of probability in real life.

Probability-a theoretical approach – probability & modeling – equally likely events -mutually exclusive events –finding probability – elementary event –exhaustive events - complementary events & probability – impossible & certain events – deck of cards & Probability –use & applications of probability

**VIII. Coordinate Geometry**

Cartesian system-Plotting a point in a plane if its co-ordinates are given Distance between two points - Section formula (internal division of a line segment in the ratio m : n) – centroid of a triangle – trisectional points of a line segment -Area of triangle on coordinate plane- collinearity – straight lines -Slope of a line joining two points

**IX. Trigonometry**

Trigonometry - Naming the side in a right triangle- trigonometric ratios – defining trigonometric ratios – trigonometric ratios of some specific angles (450, 300 &600, 00 &900) –trigonometric ratios of complementary angles – trigonometric identities –

Applications of Trigonometry - Line of sight & horizontal - Angle of elevation & depression - Drawing figures to solve problems – solution for two triangles

**Methodology (6 Marks)**

1. Meaning and Nature of Mathematics, History of Mathematics.
2. Contributions of Great Mathematicians - Aryabhatta, Bhaskaracharya, Srinivasa Ramanujan, Euclid, Pythagoras, George cantor.
3. Aims and Values of teaching Mathematics, Instructional objectives (Blooms taxonomy)
4. Mathematics curriculum: Principles, approaches of curriculum construction, -Logical and Psychological, Topical and Concentric, Spiral approaches. Qualities of a good Mathematics text book.
5. Methods of teaching mathematics- Heuristic method, Laboratory method, Inductive and Deductive methods, Analytic and Synthetic methods, Project method and Problem Solving method.
6. Unit Plan, Year Plan, Lesson Planning in Mathematics.
7. Instructional materials, Edgar Dale's Cone of Experience.
8. Evolving strategies for the gifted students and slow learners,
9. Techniques of teaching mathematics like Oral work, Written work, Drilling, Assignment, Project, Speed and Accuracy.
10. Mathematics club, Mathematics structure, Mathematics order and pattern sequence.
11. Evaluation - Types, Tools and Techniques of Evaluation, Preparation of SAT Analysis, Characteristics of a good test.