

MATHEMATICS

CLASS VIII

- Objectives:**
1. To impart knowledge, different concepts and definitions to the pupils.
 2. To guide and help the pupils in understanding the subject or topic.
 3. To enable the pupils to apply their knowledge in daily life situations.
 4. To develop the skills and resources of the pupils in solving different problems so that they are able to think logically and are able to handle abstraction.

There will be three Terminal Examinations for Class VIII, namely 1st Term, 2nd Term and 3rd Term with Unit Tests in between each terminal exam (depending on the subject teacher). The final assessment of a student would however be made on the basis of his/her performance in the Terminal Examinations, besides Unit Tests.

The topics and the chapters for different Terminal Examinations as well as the proposed marks allocation, estimated teaching periods are as below:

1ST TERMINAL EXAMINATION

| TITLE | MARKS ALLOTTED | | | | | ESTIMATED NUMBER OF PERIODS |
|--|---------------------|----------------------|----------------------|----------------------|-------|-----------------------------------|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| <u>NUMBER SYSTEM</u> <u>i) Rational Numbers</u> a) Properties of rational numbers (including identities) using general forms of expression to describe properties. b) Consolidation of operations on rational numbers. c) Representation of rational numbers on the number line. d) Between any two rational numbers there lies another rational number (making children see that if we take two rational numbers, unlike whole numbers, in this case you can keep finding more and more numbers that lie between them.) e) Word problems (higher logic, two operations, including ideas like area). | 1 | 1 | 1 | 1 | 13 | 15 |

| | | | | | | |
|--|---|---|---|---|---|---|
| ii) Powers a) Integers as exponents. b) Laws of exponents with integral powers. | 1 | 1 | 1 | - | 7 | 5 |
|--|---|---|---|---|---|---|

| TITLE | MARKS ALLOTTED | | | | | ESTIMATED NUMBER OF PERIODS |
|--|---------------------|----------------------|----------------------|----------------------|-------|-----------------------------------|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| <u>ALGEBRA</u> i) Algebraic Expressions a) Multiplication and Division of algebraic expressions (Coefficients should be integers) b) Some common errors (e.g., $2 + x \neq 2x$, $7x + y \neq 7xy$) c) Identities $(a \pm b)^2 = a^2 \pm 2ab + b^2$; $a^2 - b^2 = (a + b)(a - b)$ Factorization (simple cases only) as examples of the following types $a(x + y)$, $(x \pm y)^2$, $a^2 - b^2$, $(x + a)(x + b)$. d) Solving linear equations in one variable in contextual problems involving multiplication and division (word problems) (avoid complex coefficients in the equations). | 2 | 4 | 2 | 2 | 30 | 20 |

| | | | | | | |
|---|---|---|---|---|-----------|-----------|
| <u>GEOMETRY</u> i) <u>Understanding shapes</u> a) Properties of quadrilaterals – sum of angles of a quadrilateral is equal to 360° (by verification) b) Properties of parallelogram (by verification) I. Opposite sides of a parallelogram are equal. II. Opposite angles of a parallelogram are equal. III. Diagonals of a parallelogram bisect each other [why IV , V and VI follow from II] IV. Diagonals of a rectangle are equal and bisect each other. V. Diagonals of a rhombus bisect each other at right angles. VI. Diagonals of a square are equal and bisect each other at right angles. | 4 | 1 | 2 | 2 | 26 | 15 |
|---|---|---|---|---|-----------|-----------|

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|---|---------------------|----------------------|----------------------|----------------------|------------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| <u>MENSURATION</u> i) <u>Area of a trapezium and a polygon.</u> ii) <u>Concept of volume, measurement of volume using a basic unit, volume of a cube, cuboid and cylinder.</u> | 2 | 3 | 4 | - | 24 | 5 |
| TOTAL | 10 | 10 | 10 | 5 | 100 | 60 |

2ND TERMINAL EXAMINATION

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|--|---------------------|----------------------|----------------------|----------------------|-----------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| <u>NUMBER SYSTEM</u> <u>iii) Squares, square roots, cubes, cube roots.</u> a) Square and square roots b) Square roots using factor method and division method for numbers containing - not more than 4 digits and - not more than 2 decimal places. c) Cubes and cube roots (only factor method for numbers containing at most 3 digits) d) Estimating square roots and cube roots. Learning the process of moving nearer to the required number. | 3 | 2 | 3 | 1 | 25 | <i>15</i> |
| <u>ALGEBRA</u> <u>ii) Ratio and Proportion</u> a) Slightly advanced problems involving applications on percentages, profit and loss, overhead expenses, discount, tax. b) Difference between simple and compound interest (compounded yearly up to 3 years or half-yearly up to 3 steps only) arriving at the formula for compound interest through patterns and using it for simple problems. | 2 | 2 | 3 | 2 | 30 | <i>15</i> |

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|--|---------------------|----------------------|----------------------|----------------------|-------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| <u>GEOMETRY</u> ii) <u>Representing 3 D in 2 D.</u> a) Identify and match pictures with objects [more complicated e.g., nested, joint 2D and 3D shaped (not more than 2)] b) Drawing 2D representation of 3D objects (continued and extended) c) Counting vertices, edges and faces and verifying Euler's relation for 3D figures with flat faces (cubes, cuboids, tetrahedrons, prisms and pyramids) iii) <u>Constructions.</u> Construction of Quadrilaterals: a) Given four sides and one diagonal. b) Given three sides and two diagonals c) Given three sides and two included angles. d) Given two adjacent sides and three angles. | 2 | 4 | 2 | - | 18 | 20 |
| <u>MENSURATION</u> iii) <u>Volume and capacity</u> <u>(measurement of capacity).</u> iv) <u>Surface area of a cube, cuboid, cylinder.</u> | 3 | 2 | 2 | 2 | 27 | 10 |
| TOTAL | 10 | 10 | 10 | 5 | 100 | 60 |

3RD TERMINAL EXAMINATION

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|--|---------------------|----------------------|----------------------|----------------------|-----------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| <u>NUMBER SYSTEM</u> iv) <u>Playing with numbers.</u> a) Writing and understanding a two - digit and three – digit number in generalized form ($100a + 10b + c$), where a, b, c can be digits 0 – 9) and engaging with various puzzles concerning this (like finding the missing numerals represented by alphabets in sums involving any of the four operations). Children to solve and create problems and puzzles. b) Number puzzles and games. c) Deducing the divisibility test rules of 2,3,5,9,10 for a two or three – digit number expressed in the general form. | 1 | 3 | 2 | - | 15 | 15 |
| <u>ALGEBRA</u> iii) <u>Variation</u> a) Direct variation – simple and direct word problems. b) Inverse variation – simple and direct word problems. c) Time and work – simple and direct word problems. | 1 | - | 2 | 1 | 15 | 20 |
| | 1 | - | 2 | 1 | 15 | |
| | 1 | - | 2 | 1 | 15 | |

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|---|---------------------|----------------------|----------------------|----------------------|-------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| <u>STATISTICS</u> <u>i) Reading bar – graphs.</u> Ungrouped data, arranging it into groups, representation of ungrouped data through bar graphs, constructing and interpreting bar graphs <u>ii) Simple pie charts with reasonable data numbers.</u> <u>iii) Consolidating and generalizing notion of chance in events like tossing coins, dice, etc.</u> Relating it to chance in life events. Visual representation of frequency outcomes of repeated throws of the same kind of coins or dice. Throwing a large number of identical dice/coins together and aggregating the result of the throws to get a large number of individual events. Observing the aggregating numbers over a large number of repeated events. Comparing with the data for a coin. Observing strings of throws, notion of randomness. | 2 | 4 | 1 | 1 | 20 | 15 |
| <u>INTRODUCTION TO GRAPHS</u> <u>i) Co – ordinate axes.</u> a) Axes (same units), Cartesian plane. b) Plotting points for different kinds of situations (perimeter vs. length for squares, area as a function of side of a square, plotting of multiples of different numbers, simple interest vs. number of years etc.). c) Reading from the graphs. <u>ii) Reading of linear graphs.</u> <u>iii) Reading of distance vs. time graphs.</u> | 4 | 3 | 1 | 1 | 20 | 10 |
| TOTAL | 10 | 10 | 10 | 5 | 100 | 60 |

CLASS IX

- Objectives:**
1. To impart a wider knowledge of the topics learnt in the earlier classes, as well as new areas of Mathematics like Co – ordinate Geometry, Probability and Mathematical Modelling.
 2. To help the pupils in understanding the basic content areas of Mathematics, namely, Arithmetic, Algebra, Geometry and Trigonometry.
 3. To enable the pupils to apply their knowledge of Mathematics in other subjects like Physics, Economics and Commerce.
 4. To inculcate the habit of using Mathematical Instruments so as to develop skills in drawing and constructions and to reason out things while solving different problems in daily life situations.

There will be three Terminal Examinations for Class IX, namely 1st Term, 2nd Term and 3rd Term with Unit Tests in between each terminal exam (depending on the subject teacher). The final assessment of a student would however be made on the basis of his/her performance in the Terminal Examinations, besides Unit Tests.

The topics and the chapters for different Terminal Examinations as well as the proposed marks allocation, estimated teaching periods are as below:

1ST TERMINAL EXAMINATION

| TITLE | MARKS ALLOTTED | | | | | ESTIMATED NUMBER OF PERIODS |
|---|---------------------|----------------------|----------------------|----------------------|-----------|-----------------------------------|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| 1. <u>REAL NUMBERS</u> Review of representation of natural numbers, integers and rational numbers on the number line. Representation of terminating/non-terminating recurring decimals on the number line through successive magnification. Rational numbers as recurring/terminating decimals. Examples of non-recurring/non-terminating decimals such as $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, etc. Existence of non-rational numbers (irrational numbers) such as $\sqrt{2}$, $\sqrt{3}$ and their representation on the number line, and conversely every point on the number line represents a unique real number. Existence of $\sqrt[n]{x}$ for a given positive real number x (visual proof to be emphasised). Definition of n^{th} root of a real number. Recall of laws of exponents with integral powers. Rational exponents with positive real bases (to be done by particular cases, allowing learner to arrive at the general laws). Rationalization (with precise meaning) of real numbers of the type (and their combinations) $\frac{1}{a + b\sqrt{x}}$ and $\frac{1}{\sqrt{x} + \sqrt{y}}$ where x and y are natural numbers and a, b are integers. | 3 | 4 | 1 | - | 15 | 20 |

| TITLE | MARKS ALLOTTED | | | | | ESTIMATED NUMBER OF PERIODS |
|--|---------------------|----------------------|----------------------|----------------------|-------|-----------------------------------|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| 2. POLYNOMIALS Definition of a polynomial in one variable, its co-efficient, with examples and counter examples, its terms; zero polynomial. Degree of a polynomial; constant, linear, quadratic, cubic polynomials; monomials, binomials, trinomials. Factors and multiples. Zeros/roots of polynomial equation. State and motivate the Remainder Theorem with examples and analogy to integers. Statement and proof of the Factor Theorem. Factorization of $ax^2 + bx + c$, $a \neq 0$ where a, b, c are real numbers and of cubic polynomials using the Factor Theorem. Recall of algebraic expressions and identities. Further identities of the type $(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$; $(x \pm y)^3 = x^3 \pm y^3 \pm 3xy(x \pm y)$, $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$ and their use in factorisation of polynomials. Simple expressions reducible to these polynomials. | 4 | 3 | 3 | 1 | 28 | 15 |
| 3. INTRODUCTION TO EUCLID'S GEOMETRY History – Euclid and Geometry in India. Euclid's method of formalizing observed phenomenon into rigorous Mathematics with definitions. Common/obvious notions/postulates and theorems. The five postulates of Euclid. Equivalent versions of the fifth postulate. Showing the relationship between axiom and theorem. i) Given two distinct points, there exists one and only one line through them. ii) (Prove) Two distinct lines cannot have more than one point in common. | 2 | - | - | - | 2 | 6 |
| 4. LINES AND ANGLES i) (Motivate) If a ray stands on a line, then the sum of the two adjacent angles so formed is 180° and the converse. ii) (Prove) If two lines intersect, the vertically opposite angles are equal. iii) (Motivate) Results on corresponding angles, alternate angles, interior angles when a transversal intersects two parallel lines. iv) (Motivate) Lines which are parallel to a given line are parallel. v) (Proof) The sum of the angles of a triangle is 180° . vi) (Motivate) If a side of a triangle is produced, the exterior angle so formed is equal to the sum of the two interior opposite angles. | 1 | 1 | 2 | 1 | 17 | 10 |

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|---|---------------------|----------------------|----------------------|----------------------|------------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| 5. TRIANGLES i) (Motivate) Two triangles are congruent if any two sides and the included angle of one triangle is equal to any two sides and the included angle of the other triangle (SAS Congruence) ii) (Prove) Two triangles are congruent if any two angles and the included side of one triangle is equal to any two angles and the included side of the other triangle. (ASA Congruence) iii) (Motivate) Two triangles are congruent if the three sides of one triangle are equal to the three sides of the other triangle (SSS Congruence) iv) Motivate) Two right triangles are congruent if the hypotenuse and a side of one triangle are equal (respectively) to the hypotenuse and a side of the other triangle. vii) (Prove) The angles opposite to equal sides of a triangle are equal. vi) (Motivate) The sides opposite to equal angles of a triangle are equal. vii) (Motivate) Triangle inequalities and relation between 'angle and facing side': inequalities in triangles. | - | 1 | 2 | 1 | 16 | 20 |
| 6. STATISTICS Introduction to Statistics: Collection of Data, presentation of tabular form, Ungrouped/grouped data, bar graphs, histograms (with varying base lengths), frequency polygons, qualitative analysis of data to choose the correct form of presentation of the collected data. Mean, median, mode of ungrouped data. | - | 1 | 2 | 2 | 22 | 13 |
| TOTAL | 10 | 10 | 10 | 5 | 100 | 84 |

2ND TERMINAL EXAMINATION

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|--|---------------------|----------------------|----------------------|----------------------|-----------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| 1. <u>LINEAR EQUATIONS IN TWO VARIABLES</u> Recall of linear equations in one variable. Introduction to equations in two variables. Prove that a linear equation in two variables has infinitely many solutions, and justify their being written as ordered pairs of real numbers. Plotting them and showing that they seem to lie on a line. Examples, problems from real life, including; Problems on Ratio and Proportion and with algebraic and graphical solutions being done simultaneously. | 4 | 4 | 3 | 1 | 30 | 12 |
| 2. <u>QUADRILATERALS</u> i) (Prove) A diagonal divides a parallelogram into two congruent triangles. ii) (Motivate) In a parallelogram, opposite sides are equal and conversely. iii) (Motivate) In a parallelogram, opposite angles are equal and conversely. iv) (Motivate) A quadrilateral is a parallelogram if a pair of its opposite sides is parallel and equal. v) (Motivate) In a parallelogram, the diagonals bisect each other and conversely. | 1 | 2 | 2 | 1 | 19 | 10 |
| 3. <u>AREAS</u> Review concepts of area. Recall area of a triangle. i) (Prove) Parallelograms on the same base and between the same parallels are equal in area. ii) (Motivate) Triangles on the same base and between the same parallels are equal in area. | 1 | 1 | 1 | 1 | 13 | 4 |

| TITLE | MARKS ALLOTTED | | | | | ESTIMATED NUMBER OF PERIODS |
|---|---------------------|----------------------|----------------------|----------------------|------------|-----------------------------------|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| 4. CONSTRUCTIONS i) Construction of bisectors of line segments. Construction of angles of 60° , 90° , 45° etc., equilateral triangles. ii) Construction of a triangle given its base, sum/difference of the other two sides and one base angle. iii) Construction of a triangle with a given perimeter and base angles. | - | - | 1 | 1 | 10 | 10 |
| 5. MENSURATION Areas: Area of a triangle using Hero's formulas (without proof) and its application in finding the area of a quadrilateral. | 2 | - | 3 | 1 | 20 | 4 |
| 6. PROOFS IN MATHEMATICS What a statement is; when is a statement mathematically valid. Explanation of axiom/postulate through familiar examples. Difference between axiom, conjecture and theorem. The concept and nature of a 'proof' (emphasize deductive nature of the proof, the assumptions, the hypothesis, the logical argument) and writing a proof. Illustrate deductive proof with complete arguments using simple results from arithmetic, algebra and geometry (e.g., product of two odd numbers is odd, etc.). Particular stress on verification and not being proof. Illustrate with a few examples of verifications leading to wrong conclusions – including statements like “every odd number greater than 1 is a prime number”. What disproving means, use of counter examples. | 2 | 3 | - | - | 8 | 5 |
| TOTAL | 10 | 10 | 10 | 5 | 100 | 45 |

3RD TERMINAL EXAMINATION

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|---|---------------------|----------------------|----------------------|----------------------|-----------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| 1. <u>CO – ORDINATE GEOMETRY</u> The Cartesian plane, co-ordinates of a point, names and terms associated with the co – ordinate plane, notations, plotting points in the plane, graphs of linear equations as examples; focus on linear equations of the type $ax + by + c = 0$ by writing it as $y = mx + c$ and linking with the chapter on linear equations in two variables. | 2 | 4 | 1 | 1 | 20 | 9 |
| 2. <u>CIRCLES</u> Through examples, arrive at definitions of circle related concepts; radius, circumference, diameter, chord, arc, subtended angle. i) (Prove) Equal chords of a circle subtend equal angles at the centre and (motivate) its converse. ii) (Motivate) The perpendicular from the centre of a circle to a chord bisects the chord and conversely, the line drawn through the centre of a circle to bisect a chord is perpendicular to the chord. iii) (Motivate) There is one and only one circle passing through three given non-collinear points. iv) (Motivate) Equal chords of a circle (or of congruent circles) are equivalent from the centre and conversely. v) (Prove) The angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle. vi) (Motivate) Angles in the same segment of a circle are equal. vii) (Motivate) If a line segment joining two points subtends equal angles at two other points lying on the same side of the line containing the segment, the four points lie on a circle. viii) (Motivate) The sum of either pair of opposite angles of a cyclic quadrilateral is 180° and its converse. | 3 | 4 | 3 | 2 | 35 | 15 |

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|--|---------------------|----------------------|----------------------|----------------------|------------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| 3. <u>SURFACE AREAS AND VOLUMES</u> Surface areas and volumes of cubes, cuboids, spheres (including hemispheres) and right circular cylinders/cones. | 2 | - | 3 | 1 | 20 | 10 |
| 4. <u>PROBABILITY</u> History, repeated experiments and observed frequency approach to probability. Focus is on empirical probability (A large amount of time to be devoted to group and to individual activities to motivate the concept; the experiments to be drawn from real-life situations, and from examples used in the chapter on statistics). | 1 | 1 | 3 | - | 15 | 12 |
| 5. <u>INTRODUCTION TO MATHEMATICAL MODELLING</u> The concept of mathematical modeling. Review of work done in earlier classes while looking at situational problems, aims of Mathematical Modelling, discussing the broad stages of modelling – real life situations, setting up of hypothesis, determining an analysing the conclusions and their real – life interpretation, validating the model. Examples to be drawn from ratio, proportion, percentage, etc. | 2 | 1 | - | 1 | 10 | 5 |
| TOTAL | 10 | 10 | 10 | 5 | 100 | 51 |

CLASS X

- Objectives:**
1. To impart knowledge and develop the understanding of mathematical concepts, facts, terms, processes, symbols, principles and solving problems which the pupils come across in real life situations.
 2. To imbibe the ability of logical thinking, abstract thinking and generalisations.
 3. To develop the qualities of working with speed, precision and accuracy; estimation and approximation and the ability to apply mathematics to simple problems.
 4. To enable the pupils to acquire different techniques of problem solving and to develop an attitude for investigation and critical analysis.
 5. To develop in the pupils a Scientific outlook and to prepare them for advanced studies in Science & Technology.
 6. To prepare the pupils for the next higher course of study and also to meet the vocational needs of those pupils who will require certain competencies in Mathematics.

There will be three Terminal Examinations for Class IX, namely 1st Term, 2nd Term and 3rd Term with Unit Tests in between each terminal exam (depending on the subject teacher). The 3rd Term will be a revision of the entire work done for the 1st and 2nd Terms.

The topics and the chapters for different Terminal Examinations as well as the proposed marks allocation, estimated teaching periods are as below:

1ST TERMINAL EXAMINATION

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|---|---------------------|----------------------|----------------------|----------------------|----------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| UNIT I: NUMBER SYSTEM 1. <u>REAL NUMBERS</u> 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. | 3 | 1 | - | - | 5 | 10 |

| TITLE | MARKS ALLOTTED | | | | | ESTIMATED NUMBER OF PERIODS |
|--|---------------------|----------------------|----------------------|----------------------|-------|-----------------------------------|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| UNIT II: ALGEBRA 2. <u>POLYNOMIALS</u> Zeros of a polynomial. Relationship between zeros and coefficients of a polynomial with particular reference to quadratic polynomials. Statement and simple problems on division algorithm for polynomials with real coefficients. | 2 | 1 | - | - | 4 | 6 |
| 3. <u>PAIR OF LINEAR EQUATIONS IN TWO VARIABLES</u> Pair of linear equations in two variables. Geometric representation of different possibilities of solution/inconsistency. Algebraic conditions for number of solutions. Solution of pair of linear equations in two variables algebraically – by substitution, by elimination and by cross – multiplication. Simple situational problems must be included. Simple problems on equations reducible to linear equations may be included. | 1 | 1 | 2 | 2 | 23 | 15 |
| UNIT III: TRIGONOMETRY 4. <u>TRIGONOMETRIC RATIOS</u> 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. | 1 | 2 | 2 | - | 13 | 12 |
| 5. <u>TRIGONOMETRIC IDENTITIES</u> Proof and applications of the identity $\sin^2 A + \cos^2 A = 1$. Only simple identities to be given. Trigonometric ratios of complementary angles. | 1 | 3 | - | - | 7 | 6 |

| TITLE | MARKS ALLOTTED | | | | | ESTIMATED NUMBER OF PERIODS |
|---|---------------------|----------------------|----------------------|----------------------|-------|-----------------------------------|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| UNIT IV: GEOMETRY 6. TRIANGLES Definitions, examples, counter examples of similar triangles. i) (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. ii) (Motivate) If a line divides two sides of a triangle in the same ratio, the line is parallel to the third side. iii) (Motivate) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar. iv) (Motivate) If the corresponding sides of two triangles are proportional, their corresponding angles are equal and the two triangles are similar. v) (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. vi) (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. vii) (Prove) The ratio of the areas of two similar triangles is equal to the ratio of the squares on their corresponding sides. viii) (Prove) In a right triangle, the square on the hypotenuse is equal to the sum of the squares of the other two sides. ix) (Prove) In a triangle, if the square on one side is equal to the sum of the squares of the other two sides, the angle opposite to the first side is a right angle. | 1 | - | 2 | 2 | 21 | 20 |

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|--|---------------------|----------------------|----------------------|----------------------|------------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| UNIT V: MENSURATION 7. <u>AREAS OF PLANE FIGURES</u> Motivate the area of a circle; area of sectors and segments of a circle. Problems based on area and perimeter/circumference of the above said plane figures. (In calculating area of segment of a circle, problem should be restricted to central angles of 60°, 90°, and 120° only. Plane figures involving triangles, simple quadrilaterals and circles should be taken). | 1 | 1 | 2 | - | 11 | <i>12</i> |
| UNIT VI: STATISTICS AND PROBABILITY 8. <u>STATISTICS</u> Mean, median and mode of grouped data (bimodal situation to be avoided) Cumulative frequency graph. | - | 1 | 1 | 1 | 12 | <i>15</i> |
| 9. <u>PROBABILITY</u> Classical definition of Probability, Connection with probability has been given in class IX. Simple problems on single events not using set notation. | - | - | 1 | - | 4 | <i>10</i> |
| TOTAL | 10 | 10 | 10 | 5 | 100 | <i>106</i> |

2ND TERMINAL EXAMINATION

| TITLE | MARKS ALLOTTED | | | | | ESTIMATED NUMBER OF PERIODS |
|---|---------------------|----------------------|----------------------|----------------------|-----------|-----------------------------------|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| UNIT II: ALGEBRA 1. <u>QUADRATIC EQUATIONS</u> Standard form of a quadratic equation $ax^2 + bx + c = 0$, ($a \neq 0$). Solution of a quadratic equation (only real roots) by factorisation and completing the squares, i.e., by using quadratic formula. Relationship between the discriminant and nature of roots. Problems related to day – to – day activities to be incorporated. | 2 | 2 | 2 | 1 | 20 | 15 |
| 2. <u>ARITHMETIC PROGRESSIONS</u> Motivation for studying Arithmetic Progression. Derivation of standard results of finding the n^{th} term and sum of the first n terms. | 2 | 2 | 2 | - | 14 | 8 |
| UNIT III: TRIGONOMETRY 3. <u>HEIGHTS & DISTANCES</u> 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° . | 1 | 1 | 1 | 1 | 13 | 8 |
| UNIT IV: GEOMETRY/CO – <u>ORDINATE GEOMETRY</u> 4. <u>CO – ORDINATE GEOMETRY</u> Lines (In two dimensions) Review the concepts of coordinates 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. | 1 | 2 | 2 | 1 | 19 | 15 |

| TITLE | MARKS ALLOTTED | | | | | ESTIMATED NUMBER OF PERIODS |
|--|---------------------|----------------------|----------------------|----------------------|-------|---|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| 5. <u>CIRCLES</u> 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 a perpendicular to the radius through the point of contact. ii) (Prove) The lengths of tangents drawn from an external point to a circle are equal. | 2 | 1 | - | 1 | 10 | 8 |
| 6. <u>CONSTRUCTIONS</u> 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. | - | - | 1 | - | 4 | 8 |
| UNIT V: MENSURATION 7. <u>SURFACE AREAS AND VOLUMES</u> 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 may be taken). | 2 | 2 | 2 | 1 | 20 | 12 |
| UNIT VII: PROOFS IN MATHEMATICS 8. <u>PROOFS IN MATHEMATICS</u> Further discussion on concept of 'statement', 'proof' and 'argument'. Further illustrations of deductive proof with complete arguments using simple results from Arithmetic, Algebra and Geometry. Simple theorems of the "Given and assuming ... prove" Training of using only the given facts (irrespective of their truths) to arrive at the required conclusion. Explanation of the 'Converse', 'negation', constructing converses and negations of given results/statements. | - | - | - | - | - | 3 Not to be included in the question paper for the time being. |

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|--|---------------------|----------------------|----------------------|----------------------|------------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| UNIT VIII: MATHEMATICAL MODELLING 9. <u>MATHEMATICAL MODELLING</u> Reinforcing the concept of Mathematical Modelling, using simple examples of models where some constraints are ignored. Estimating probability of occurrence of certain events and estimating averages may be considered. Modelling fair, instalments payments, using only simple interest and future value (use of AP). | - | - | - | - | - | 3 Not to be included in the question paper for the time being. |
| TOTAL | 10 | 10 | 10 | 5 | 100 | 80 |

3RD TERMINAL EXAMINATION

REVISION OF 1ST AND 2ND TERMS

| TITLE | MARKS ALLOTTED | | | | | <i>ESTIMATED NUMBER OF PERIODS</i> |
|---|---------------------|----------------------|----------------------|----------------------|-------|--|
| | 1 mark questions | 2 marks questions | 4 marks questions | 6 marks questions | TOTAL | |
| UNIT I: NUMBER SYSTEMS | | | | | | |
| REAL NUMBERS | 2 | - | - | - | 2 | 15 |
| UNIT II: ALGEBRA | | | | | | |
| 1. POLYNOMIALS | 1 | 1 | - | - | 3 | 6 |
| 2. PAIRS OF LINEAR EQUATIONS IN TWO VARIABLES | - | 1 | 2 | - | 10 | 15 |
| 3. QUADRATIC EQUATIONS | 1 | 2 | 1 | - | 9 | 15 |
| 4. ARITHMETIC PROGRESSIONS | - | 2 | - | - | 4 | 8 |
| UNIT III: TRIGONOMETRY | | | | | | |
| 1. TRIGONOMETRIC RATIOS | 1 | 1 | - | - | 3 | 12 |
| 2. TRIGONOMETRIC IDENTITIES | - | 1 | 1 | - | 6 | 6 |
| 3. HEIGHTS & DISTANCES | - | - | - | 1 | 6 | 8 |
| UNIT IV: CO – ORDINATE GEOMETRY/GEOMETRY | | | | | | |
| 1. LINES IN TWO DIMENSIONS | - | - | 2 | - | 8 | 15 |
| 2. TRIANGLES | 3 | - | - | 1 | 9 | 15 |
| 3. CIRCLES | 1 | - | - | 1 | 7 | 8 |
| 4. CONSTRUCTIONS | - | - | 1 | - | 4 | 8 |
| UNIT V: MENSURATION | | | | | | |
| 1. AREAS OF PLANE FIGURES | 1 | 2 | - | - | 5 | 12 |
| 2. SURFACE AREAS AND VOLUMES | - | - | 1 | 1 | 10 | 12 |
| UNIT VI: STATISTICS & PROBABILITY | | | | | | |
| 1. STATISTICS | - | - | 1 | 1 | 10 | 15 |
| 2. PROBABILITY | - | - | 1 | - | 4 | 10 |
| TOTAL | 10 | 10 | 10 | 5 | 100 | 180 |

