

SCREENING TEST SYLLABUS -ICSE

PHYSICS

Reflection of Light Laws of Reflection, Image formation in Plane mirror, Spherical mirrors, Image formation in Spherical Mirrors, Magnification, and Mirror Formula. Uses of Spherical Mirrors. **Refraction of Light** Refraction & Laws of Refraction, Refractive Index, Refraction through glass slab, Refraction through spherical lenses, Lens formula & Magnification, Human eye, Power of Accommodation, Defects of Vision and their correction, Dispersion, Atmospheric Refraction, Rainbow, Tyndall Effect, Scattering of Light, Total Internal Reflection, Critical angle. **Electricity**: Electric Charges, Electric Current, Electrical Components and Electrical Circuits, Ohms law, Combination of Resistance, Heating Effect of Electric Current, Joules Law, Electric Power, Related Numerical problems, Magnetic Effect of Electric Current **Motion & Laws of motion**: Distance and displacement, Speed & velocity, Average speed and Average velocity, Acceleration, Motion Graphs, Uniform acceleration, Uniform Circular motion, Kinematic equations of motion, Graphical derivation, Numerical problems. Newton's three laws of motion, Inertia, Momentum, Conservation of Momentum, Impulse **Work and Energy**: Work, Positive negative and zero work, Energy, Mechanical Energy, Kinetic energy & Potential energy, Law of Conservation of energy, Power, Commercial unit of energy, Calculation of Electrical Energy Consumed. **Gravitation**: Universal law of Gravitation, Weight vs Mass, freefall, acceleration due to gravity. **Sound**: Production and propagation of sound, Characteristics of Sound, Speed of Sound in Different medium, Reflection of Sound, Application of Reflection of Sound, Range of Hearing, Application of Ultrasonic and Infrasonic Sound.

CHEMISTRY

Periodic Properties and variations of Properties—Physical and Chemical : (i) Periodic properties and their variations in groups and periods. Definitions and trends of the following periodic properties in groups and periods should be studied: atomic size metallic character non-metallic character ionisation potential electron affinity electronegativity (ii) Periodicity on the basis of atomic number for elements. The study of modern periodic table up to period 4 Periodicity and other related properties to be explained on the basis of nuclear charge and shells (not orbitals) **Chemical Bonding**: Electrovalent, covalent and co-ordinate bonding, structures of various compounds, Electron dot structure. (a) Electrovalent bonding: Electron dot structure of Electrovalent compounds NaCl, MgCl₂, CaO. Characteristic properties of electrovalent compounds – state of existence, melting and boiling points, conductivity (heat and electricity), dissociation in solution and in molten state to be linked with electrolysis. (b) Covalent Bonding: Electron dot structure of covalent molecules on the basis of duplet and octet of electrons Non-polar covalent compounds (example: hydrogen, chlorine, oxygen, nitrogen, carbon tetrachloride, methane.) Polar Covalent compounds – based on difference in electronegativity: Examples – HCl, NH₃ and H₂O including structures. Characteristic properties of Covalent compounds – state of existence, melting and boiling points, conductivity (heat and electricity), ionisation in solution. **The Language of Chemistry** (i) Symbol of an element; valency; formulae of radicals and formulae of compounds. Balancing of simple chemical equations. Symbol – definition; symbols of the elements used often. Valency - definition; hydrogen combination and number of valence electrons of the metals and non-metals; mono, di, tri and tetra valent elements. Radicals – definition; formulae and valencies. Compounds – name and formulae. Chemical equation – definition and examples of chemical equations with one reactant and two or three products, two reactants and one product, two reactants and two products and two reactants and three or four products; balancing of equations. (by hit and trial method). (ii) Relative Atomic Masses (atomic weights) and Relative Molecular Masses (molecular weights): either - standard H atom or 1/12th of carbon 12 atom. Definitions Calculation of Relative Molecular Mass and percentage composition of a compound. **Chemical changes and reactions**: (i) Types of chemical changes. Direct combination Decomposition Displacement; Double decomposition (ii) Energy changes in a chemical change. Exothermic and endothermic reactions with examples – evolution/absorption of heat, light and electricity. 5. Atomic Structure (i) Structure of an Atom, mass number and atomic number, Isotopes and Octet Rule. Definition of an atom Constituents of an atom - nucleus (protons, neutrons) with associated electrons; mass number, atomic number Electron distribution in the orbits - 2n² rule, Octet rule. Reason for chemical activity of an atom. Definition and examples of isotopes (hydrogen, carbon, chlorine). **The Periodic Table** Dobereiner's Triads, Newland's law of Octaves,

Mendeleev's contributions; Modern Periodic Law, the Modern Periodic Table. (Groups and periods) General idea of Dobereiner's triads, Newland's law of Octaves, Mendeleev's periodic law. Discovery of Atomic Number and its use as a basis for Modern Periodic law. Modern Periodic Table (Groups 1 to 18 and periods 1 to 7). Special reference to Alkali metals (Group 1), Alkaline Earth metals (Group 2) Halogens (Group 17) and Zero Group (Group 18).

BIOLOGY

Cell- Basic Unit Of Life The cell, a unit of life, protoplasm, basic difference between prokaryotic and eukaryotic cell; differences between an animal and a plant cell. A basic understanding of the cell theory, structure of plant and animal cell with functions of various cell organelles. (Protoplasm, Cytoplasm, Cell Wall, Cell Membrane, Nucleus, Nucleolus, Mitochondria, Endoplasmic Reticulum, Ribosome, Golgi bodies, Plastids, Lysosomes, Centrosome and Vacuole). Major differences between a prokaryotic and eukaryotic cell. Differences between a plant cell and an animal cell should be mainly discussed with respect to cell wall, centrosome, vacuoles and plastids. **Cell Division & Cell Cycle:** Cell cycle – Interphase (G₁, S, G₂) and Mitotic phase. Cell Division: Mitosis and its stages. A basic understanding of Meiosis as a reduction division (stages not required). A brief idea of homologous chromosomes and crossing over leading to variations. Significance and major differences between mitotic and meiotic division. Structure of a chromosome. Basic structure of a chromosome with an elementary understanding of terms such as chromatin, chromatid, gene structure of DNA and centromere. **Tissues:** Tissues: Types of plant and animal tissues. A brief understanding of their location, basic structure and functions with examples. A brief understanding of their role in different physiological processes in plants and animals. **Genetics:** Genetics: Mendel's laws of inheritance and sex-linked inheritance of diseases. The three laws of Mendel. Monohybrid cross – phenotype and genotype. Dihybrid cross – Only phenotype. The following terms to be covered: gene, allele, heterozygous, homozygous, dominant, recessive, mutation, variation, phenotype, genotype. Sex determination in human beings. Sex linked inheritance of diseases to include only X-linked like haemophilia and colour blindness. **Flowering Plants:** Flower: Structure of a bisexual flower, functions of various parts. A brief introduction to complete and incomplete flowers. Essential and non-essential whorls of a bisexual flower; their various parts and functions. Inflorescence and placentation (meaning only) Pollination: self and cross-pollination. Explanation, advantages and disadvantages of self and cross-pollination. Agents of pollination and the characteristic features of flowers pollinated by various agents, such as insects, wind, and water. A brief idea as to how nature favours cross-pollination. Fertilisation: Events taking place between pollination and fertilisation leading to the formation of a zygote in the embryo sac. A brief explanation of the terms double fertilization and triple fusion. Fruit and Seed - definition and significance. **Plant Physiology:** Structure of dicot and monocot seeds, Germination of seeds, types, and conditions for seed germination. Structure and germination of Bean seed and Maize grain. Differences between monocot and dicot seeds. Differences between hypogeal and epigeal germination Respiration in plants: outline of the process, gaseous exchange. A brief outline of the process, mentioning the terms Glycolysis, Krebs cycle and their significance. **Human Physiology:** Circulatory System: Blood and lymph, the structure and working of the heart, blood vessels, circulation of blood (only names of the main blood vessels entering and leaving the heart, liver and kidney will be required). Lymphatic system. Excretory System: A brief introduction to the excretory organs; parts of the urinary system; structure and function of the kidneys; blood vessels associated with kidneys; structure and function of nephron. Nervous system: Structure of Neuron; central, autonomous and peripheral nervous system (in brief); brain and spinal cord; reflex action and how it differs from voluntary action. Sense organs – Eye: Structure, functions, defects and corrective measures: Ear: Parts and functions of the ear. Endocrine System: General study of the following glands: Adrenal, Pancreas, Thyroid and Pituitary. Endocrine and Exocrine glands. The Reproductive System: Organs, fertilisation functions of placenta in the growth of the embryo Menstrual cycle.

MATHEMATICS

Pure Arithmetic & Commercial Mathematics: • Rational and Irrational Numbers: Real numbers and their place in the number system; Surds and rationalization of surds; Simplifying expressions by rationalizing the denominator; Representation of rational and irrational numbers on the number line; Proofs of irrationality of specific surds. • Compound Interest: Compound interest as repeated Simple Interest computation with a growing principal; Computing Amount and CI over a period of 2 or 3 years; Half-yearly compounding; Finding missing variables given different combinations of financial parameters; Difference between CI and SI; Rate of growth and depreciation. • Goods and Services Tax (GST): Computation of tax including problems involving discounts, list-price, profit, loss, and basic/cost price including inverse cases; Calculating State GST (SGST) and Central GST (CGST) paid by the consumer. • Banking: Recurring Deposit Accounts; Computation of interest and maturity value. • Shares and Dividends: Face/Nominal Value, Market Value, Dividend, Rate of Dividend, and Premium; Income and Return on investment calculations. **Algebraic Foundations:** • Expansions: Standard algebraic expansions of second and third degree for binomials and trinomials. • Factorisation: Factorising difference of squares, sum/difference of cubes, and quadratic trinomials by splitting the middle term. • Factorisation of Polynomials: Remainder Theorem and Factor Theorem; Completely factorising a polynomial up to degree 3. • Simultaneous Linear Equations: Solving linear equations in two variables algebraically using Elimination, Substitution, and Cross Multiplication methods; Framing and solving simple word problems. • Linear Inequations: Solving linear inequations in one unknown for natural numbers, whole numbers, integers, and real numbers; Writing solutions in set notation; Representing solutions on a number line. • Quadratic Equations in One Variable: Nature of roots based on the discriminant; Solving quadratic equations via factorization and using the quadratic formula; Solving situational word problems. • Ratio and Proportion: Proportion, Continued proportion, and Mean proportion; Properties of Componendo, Dividendo, Alternendo, Invertendo, and their combinations; Direct simple applications. **Exponents, Logarithms & Progressions:** • Indices / Exponents: Handling positive, fractional, negative, and zero indices; Simplification of expressions involving various exponents and use of the laws of exponents. • Logarithms: Interchanging between logarithmic and exponential forms; Laws of logarithms and their application in expanding and simplifying algebraic expressions. • Progressions: Arithmetic Progression (AP) and Geometric Progression (GP); Finding their General Term (n-th term) and the Sum of their first n terms; Simple applications. **Geometry:** • Triangles: Congruency cases (SSS, SAS, AAS, RHS); Inequalities in a triangle involving sides and angles; Mid-Point Theorem and its converse; Equal Intercept theorem; Pythagoras Theorem and its converse with simple applications. • Rectilinear Figures: Theorems on Parallelograms involving opposite sides, opposite angles, and diagonals; Properties of special parallelograms including Rhombus, Rectangle, and Square; Geometric constructions of quadrilaterals and regular hexagons using ruler and compasses only; Area theorems on parallelograms and triangles on the same base and between the same parallels. • Similarity: Similarity as a size transformation; Three conditions of similar triangles; Applications of the Basic Proportionality Theorem; Proportionality of areas of similar triangles to the squares of corresponding sides; Direct applications to maps and models. • Loci: Definition, meaning, and theorems based on locus points including distances from fixed points, intersecting lines, and given point segments. • Circles:– Chord & Arc Properties: Perpendicular from centre to a chord; Distance properties of equal chords from the centre; Circle passing through three non-collinear points; Angles subtended at the centre by equal arcs.– Angle Properties: Double angle property at the centre vis-à-vis the remaining arc; Equality of angles in the same segment; Angle in a semi-circle property. – Cyclic Properties: Supplementary properties of opposite angles of a cyclic quadrilateral; Exterior angle relationship to opposite interior angles. **Coordinate Geometry** • Cartesian System: Ordered pairs, coordinates, and plotting points in the plane; Dependent and independent variables. • Reflection: Reflection of a point in the axes, standard vertical/horizontal lines, and the origin; Identifying invariant points. • Line Formulas: Distance formula; Section formula and Mid-point formula for internal division; Coordinates of the centroid of a triangle. • Equations of a Line: Concept of slope and geometric understanding of gradient; Slope-intercept form and Two-point form of a straight line; Conditions for parallel or perpendicular lines; Solving simultaneous linear equations graphically.

Mensuration • 2-D Figures: Area and perimeter of triangles including Heron's formula; Area and perimeter of all types of quadrilaterals; Circle area and circumference including direct application problems for inner and outer boundary tracks; Areas of sectors. • 3-D Solids (Cube and Cuboid): Surface area and volume of open and closed cubes and cuboids; Problems involving differing internal and external dimensions and related cost calculations; Concept of uniform cross-sectional volume. **Trigonometry** • Trigonometric Ratios: Definitions of sine, cosine, tangent of an angle and their operational reciprocals. • Standard Angles: Evaluation of expressions involving trigonometric ratios of standard acute angles and boundary angles. • Complementary Angles: Concept of trigonometric ratios of complementary angles and their direct structural applications. • Applications: Solving simple two-dimensional problems involving a single right-angled triangle. **Statistics**: • Data Management: Collection and presentation of raw, arrayed, and grouped data; Tabulation using tally-marks; Classification of discrete and continuous variables. • Grouped Frequency Distributions: Class intervals, boundaries, limits, frequency, and class size calculations; Techniques to convert discontinuous intervals to continuous intervals. • Measures of Central Tendency: Calculation of Mean and Median for ungrouped data pools. • Graphical Representation: Construction and structural features of a frequency polygon.