

Syllabus :

STANDARD EXAMINATION in HIGH SCHOOL SCIENCE (SEHSS-2026)

A general understanding of Science and Mathematics studied up to Class 8 is expected.

- I. **Matter-Nature and Behaviour:** Definition of matter; solid, liquid and gas; characteristics - shape, volume, density; change of state-melting (absorption of heat), freezing, evaporation (cooling by evaporation), condensation, sublimation. Nature of matter: Elements, compounds and mixtures; heterogeneous and homogeneous mixtures, colloids and suspensions; solutions, concentration of solutions; separation of components of a mixture. Particle nature, basic units: Atoms and molecules, law of constant proportions, atomic and molecular masses; mole concept: relationship of mole to mass of the particles and numbers. Structure of atoms: Electrons, protons and neutrons; valency, chemical formula of common compounds; isotopes and Isobars.
- II. **Chemical Substances - Nature and Behaviour Chemical reactions:** Chemical equation, balanced chemical equation, implications of a balanced chemical equation; types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction. Acids, bases and salts: Their definitions in terms of furnishing of H^+ and OH^- ions; general properties, examples and uses, concept of pH scale, importance of pH in everyday life; preparation and uses of sodium hydroxide, bleaching powder, baking soda, washing soda and Plaster of Paris. Metals and nonmetals: Properties of metals and non-metals; reactivity series; formation and properties of ionic compounds; basic metallurgical processes; corrosion and its prevention. Carbon compounds: Covalent bonding in carbon compounds; versatile nature of carbon; homologous series; nomenclature of carbon compounds containing functional groups (halogens, alcohol, ketones, aldehydes, alkanes and alkynes), difference between saturated hydrocarbons and unsaturated hydrocarbons; chemical properties of carbon compounds (combustion, oxidation, addition and substitution reaction), ethanol and ethanoic acid (only properties and uses), soaps and detergents. Periodic classification of elements: Need for classification, early attempts at classification of elements (Dobereiner's Triads, Newland's Law of Octaves, Mendeleev's Periodic Table), modern periodic table, gradation in properties, valency, atomic number, metallic and non-metallic properties.

- III. **Organization in the Living World Cell - Basic Unit of life:** Cell as a basic unit of life; prokaryotic and eukaryotic cells, multicellular organisms; cell membrane and cell wall, cell organelles and cell inclusions; chloroplast, mitochondria, vacuoles, endoplasmic reticulum, Golgi apparatus; nucleus, chromosomes - basic structure, number. Tissues, Organs, Organ System, Organism: Structure and functions of animal and plant tissues. Biological Diversity: Diversity of plants and animals-basic issues in scientific naming, basis of classification. Hierarchy of categories / groups, Major groups of plants (salient features) (Bacteria, Thallophyta, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms). Major groups of animals (salient features) (Non-chordates upto phyla and chordates upto classes).
- IV. **Life Processes Basic concept of nutrition, respiration, transport and excretion in plants and animals:** Control and coordination in animals and plants: Tropic movements in plants; introduction of plant hormones; control and coordination in animals: nervous system; voluntary, involuntary and reflex action; chemical coordination: animal hormones. Reproduction: Reproduction in animals and plants (asexual and sexual) reproductive health-need and methods of family planning; safe sex vs HIV/AIDS; child bearing and women's health. Heredity and Evolution: Heredity; Mendel's contribution: Laws for inheritance of traits: sex determination: brief introduction. Basic concepts of evolution: Introduction to origin of life & evidences of evolution.
- V. **Motion, Force and Work Motion:** Distance and displacement, velocity; uniform and non-uniform motion along a straight line; acceleration, distance-time and velocity-time graphs for uniform motion and uniformly accelerated motion, derivation of equations of motion by graphical method; elementary idea of uniform circular motion. Force and Newton's laws : Force and motion, Newton's laws of motion, action and reaction forces, inertia of a body, inertia and mass, momentum, force and acceleration. elementary idea of conservation of momentum. Gravitation: Gravitation; Universal law of gravitation, force of gravitation of the earth (gravity), acceleration due to gravity; mass and Weight; free fall. Floatation: Thrust and pressure. Archimedes' principle; buoyancy; elementary idea of relative density. 20 Work, energy and power: Work done by a force, energy, power; kinetic and potential energy; law of conservation of energy. Sound: Nature of sound and its propagation in various media, speed of sound, range of hearing in humans; ultrasound; reflection of sound; echo and SONAR. Structure of the human ear (auditory aspect only).

- VI. **Effects of Current Electric current, potential difference and electric current. Ohm's law;** resistance, resistivity, factors on which the resistance of a conductor depends. Series combination of resistors, parallel combination of resistors and its applications in daily life. Heating effect of electric current and its applications in daily life. Electric power, interrelation between P, V, I and R. Magnetic effects of current : Magnetic field, field lines, field due to a current carrying conductor, field due to current carrying coil or solenoid; force on current carrying conductor, Fleming's left-hand rule, electric motor, Electromagnetic induction. induced potential difference, induced current. Fleming's right-hand rule, electric generator; direct current; alternating current: frequency of AC. Advantage of AC over DC. Domestic electric circuits.
- VII. **Light:** Reflection of light at plane and curved surfaces; images formed by plane and spherical mirrors, centre of curvature, principal axis, principal focus, focal length, mirror formula (derivation not required), magnification. Refraction; laws of refraction, refractive index; Refraction of light by spherical lens; image formed by spherical lenses; lens formula (derivation not required); magnification. power of a lens. Functioning of a lens in the human eye, defects of vision and their corrections, applications of spherical mirrors and lenses. Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life.
- VIII. **Food Production:** Plant and animal breeding and selection for quality improvement and management; use of fertilizers and manures; protection from pests and diseases; organic farming.
- IX. **Number Systems and Algebra:** Rational and irrational numbers; representation and properties of real numbers; laws of exponents; Fundamental Theorem of Arithmetic and proofs of irrationality; algebraic expressions and polynomials, including degree, zeros and relationship between zeros and coefficients; algebraic identities, factorisation and simplification of rational expressions; sequences and patterns, explicit and recursive rules, Arithmetic and Geometric Progressions and their applications, including fractals and mathematical puzzles; linear equations in two variables, graphs, slope and intercept; pairs of linear equations, graphical and algebraic methods, consistency and nature of solutions; quadratic equations, factorisation, quadratic formula, discriminant and nature of roots, with applications to real-life situations.

- X. **Coordinate Geometry and Geometry:** The Cartesian coordinate system; distance and midpoint/section formulae; graphical representation of linear relationships; Euclidean geometry, axioms and postulates; lines and angles; triangles, congruence, properties and related theorems; quadrilaterals, parallelograms and midpoint theorem; circles, chords, arcs, angles, cyclic quadrilaterals and related theorems; similarity of triangles, Basic Proportionality Theorem and similarity criteria; tangents to circles and related theorems. Emphasis will be placed on geometrical reasoning, proofs, constructions and applications.
- XI. **Trigonometry and Mensuration:** Trigonometric ratios of acute angles; relationships among trigonometric ratios; values of trigonometric ratios of standard angles; fundamental trigonometric identities and their applications; angles of elevation and depression and applications to heights and distances. Perimeter and area of plane figures; circumference and area of circles; length of arcs; areas of sectors and segments; Heron's formula; Brahmagupta's formula and related area applications; surface areas and volumes of cubes, cuboids, cylinders, cones, spheres and hemispheres, including combinations of solids.
- XII. **Statistics and Probability:** Collection, organization, graphical representation and interpretation of data; measures of central tendency including mean, median and mode; weighted averages and grouped frequency distributions; calculation of mean by direct, assumed-mean and step-deviation methods, and median and mode of grouped data; stacked and 100% stacked bar graphs; concept of randomness and probability; probability scale; empirical and theoretical probability; sample space and events; representation and determination of probability using tables and tree diagrams; and application of statistics and probability to real-life situations and data-based problems.