Syllabus of Class-9 Science

Subject Code- 033

Part-1

Chapter 1: Ingenious Techniques in Measurement

- What are physical quantities?
- Local units and need for SI standardization
- Fundamental SI quantities and units
- Metric prefixes for scales
- Graduated vs. comparative scales
- Vernier calliper principle and reading
- Screw gauge for ultra-precision measurement

Chapter 2: Inside the Atoms

- World of small particles
- Introduction to electric charges
- Introduction to electron, proton, neutron and nucleus
- Atomic number and mass number
- Isotopes, Isobars and Isotones
- Shells and their capacity to hold electrons (Electronic configuration-upto 20 elements)
- Valence electrons and valence shell
- Why are some elements called inert?

Chapter 3: The Story of Atomic Models

- Ancient thoughts on Atomic Structure
- Contributions of Indian scientists (e.g. Kanada)
- Laws governing chemical reactions
- Billiard Ball Model
- Plum-Pudding Model
- Gold Foil Experiment
- Rutherford's Model of Atom
- Introduction to Bohr's Model

Chapter 4: The Life on Our Planet: Biodiversity

- Diversity in the living world
- Advantages of diversity
- Classification of living organisms and its history
- Brief introduction to five kingdom classification
- Introduction to nomenclature of organisms

Chapter 5: Living Together: Interactions

- Ecological hierarchy- organism, population, community, ecosystem, biome, ecosphere
- Interactions between organisms- commensalism, predation, ammensalism, parasitism
- Trophic structure of a community
- Fundamental concept of ecosystem

Chapter 6: Graphs: An Art of Extracting Hidden Insights

- Graphs as a tool to represent and interpret data
- Variables, data points, and drawing graphs from tables
- Slope of a graph and its physical meaning
- Position, distance, and displacement
- Velocity, speed, and acceleration
- Position-time and velocity-time graphs
- Understanding physical laws in light and everyday phenomenon through graphs

Chapter 7: Forces in Action

- Force as a push or pull
- Magnitude and direction of force
- Balanced and unbalanced forces; net (resultant) force
- Gravitational force and weight
- Normal reaction force
- Friction—static, limiting and kinetic friction
- Elastic forces—spring force and tension
- Forces in fluids
- Newton's third law of motion
- Resultant of forces

Chapter 8: Combining Elements

- Combination of atoms to achieve stable configuration
- Ionic and Covalent Bonds
- Polyatomic Ions
- Introduction to Valency
- Writing of chemical formulae using valency
- Atomic mass, average atomic mass
- Molecular mass and Formula mass
- Concept of mole and Avogadro's number
- Calculations using mole concept:
    - Number of particles
    - Mass
- Gram molecular mass

Chapter 9: The Building Blocks of Life: Carbohydrates and Proteins

- Chemical composition of cells
- Carbohydrates- Classification and importance
- Proteins- Types, structure, lifespan, denaturation
- Enzyme and its action

Chapter 10: The Curved Mirrors

- Uses of curved mirrors in daily life
- Spherical mirrors: concave and convex
- Structure and construction of spherical mirrors
- Terms related to spherical mirrors—Pole, centre of curvature, radius of curvature, principal axis and aperture
- Rules of reflection for spherical mirrors
- Rays from distant objects and the idea of infinity
- Focus of a concave mirror and spherical aberration
- Relation between focal length and radius of curvature
- Real and virtual image formation by concave mirrors
- Image formation and field of view of convex mirrors

Chapter 11: Connect with Me: Communication

- What is a signal?
- Introduction to Radio waves
- Signal transmission in mobile phones and television
- TV dish and role of Geostationary satellites
- GMRT—The Radio telescopes in India
- Internet and optical fibres
- The bits and bytes in computer language
- Pollution by the digital world

PART-2

Chapter 1: Chemical Reactions and Equations

- Writing and balancing chemical equations (hit and trial method)
- Types of chemical reactions:
    - Combination
    - Decomposition
    - Displacement and Double Displacement
    - Precipitation
    - Oxidation and Reduction (oxygen/hydrogen concept)
    - Redox reactions
    - Reversible and Irreversible reactions

Chapter 2: Types of Mixtures and Their Properties

- Classification of matter
- Mixtures and their types:
    - Solutions (e.g. salt in water)
    - Colloids (e.g. milk, smoke)
    - Suspensions (e.g. chalk in water)
- Properties and comparison of solutions, colloids, and suspensions:
    - Particle size
    - Visibility
    - Filtration

    - Tyndall effect
    - Stability
- Everyday examples and uses of mixtures
- Differences between solution, colloid, and suspension

Chapter 3: Methods of Separation and Their Applications

- Techniques of separation:
    - Evaporation (e.g. salt from saltwater)
    - Centrifugation (e.g. cream from milk)
    - Chromatography (e.g. ink pigments)
    - Distillation (e.g. alcohol from water)
    - Fractional distillation (e.g. petroleum products)
    - Crystallisation (e.g. purification of copper sulphate)
- Real-life uses of these techniques
- Diagrams of all separation methods

Chapter 4: Cell

- Historical account of discovery of cell and cell organelles
- Advancements in microscopy which made the discoveries possible
- Cell as a basic unit of life (structure and function)
- Prokaryotic and eukaryotic cell
- Cell membrane and cell wall
- Structure and functions of cell components - mitochondria, plastids, endoplasmic reticulum, Golgi apparatus, vacuoles, ribosomes, lysosomes, nucleus, chromosomes
- Difference between plant and animal cells

Chapter 5: The Essence of Life: Respiration

- Respiration- aerobic and anaerobic
- Aerobic and anaerobic pathway
- Respiration in single celled organisms
- Respiration in multicellular organisms other than human beings
- Exchange of gases in plants

Chapter 6: Transportation

- Need for transport system
- Transport in humans
- Transport in plants

Chapter 7: The Hidden Energy: Heat

- Heat vs. temperature and flow
- Modes of heat transfer
- Molecular basis of heat and internal energy
- Thermal expansion
- Hot-air balloons
- Anomalous expansion of water
- Specific heat capacity

- Latent heat—fusion and vaporisation
- Calorimetry

Chapter 8: Swinging Motion—A Motion that Repeats

- Periodic motion, periodic events and oscillatory motion
- Central (mean/equilibrium) position, extreme positions and amplitude
- Simple pendulum, free oscillations and one complete oscillation
- Time period, frequency and natural frequency; measuring many oscillations
- Effect of amplitude, length and mass on the time period
- Describing position, direction of velocity and changes in speed during oscillation
- Restoring force and the to-and-fro motion about the mean position
- Damped oscillations, forced oscillations and resonance

Chapter 9: Electricity

- Electric charge
- Electric current and electric circuit
- Electric potential and potential difference
- Relation between charge and current
- Circuit diagram
- Ohm's law and resistance
- Experimental plotting of V-I graph for LED
- Factors affecting resistance and resistivity-mathematical relation
- Series and Parallel circuits
- Combination of resistors

Chapter 10: The Invisible World of Magnets

- Magnetic field of permanent magnet
- Drawing of magnetic field lines for a bar magnet
- Earth's magnetism
- Neutral points
- Force exerted by magnets
- Concept of magnetic field
- Magnetic force as a two-stage process

Chapter 11: Calculus

- Rate of Change in Daily Life
- Uniform and Non-Uniform Rates
- Average Speed vs Instantaneous Speed
- Graphical Interpretation of Change
- Concept of Limits
- Derivative as Rate of Change
- Mathematical notation and meaning of dx/dy
- Basic Rules of Differentiation and Functions
- Applications of derivatives to physical and geometrical situations

Chapter 12: Panchang (IKS Chapter- Non-evaluative)

- The Sky as a Clock
- Earth’s Dual Motions
- The Ecliptic and Rashis
- The Five Limbs (Panchang)
- Lunar Cycles and Tithis
- Nakshatras (Lunar Mansions)
- Sun and Moon Alignment
- Logic of Festivals
- Identifying planets and constellations using Sky Map apps