
Syllabus in Biology – Level I

Introduction to biology

1. What is biology
2. Branches in biology
 - a. Botany, Zoology, human
 - b. Basic and applied
3. Importance of biology to man kind
 - a. Agriculture
 - b. Industry
 - c. Conservation of environment
 - d. Pollution control
 - e. Nature study

Living non-living world

1. Characteristics of living things
 - a. Cellular structure
 - b. Definite form and shape
 - c. Metabolism
 - d. Anabolism and catabolism
 - e. Growth and repair
 - f. Movement
 - g. Irritability
 - h. Reproduction
2. Compare living nonliving things
3. Compare plants and animals

Cell

1. Microscope- *parts and functions/working*
2. Cell shape and size
3. Components-
 - a. Cell wall
 - b. Cytoplasm
 - c. Cell membrane
 - d. Endoplasmic reticulum
 - e. Ribosome
 - f. Mitochondria
 - g. Golgi complex
 - h. Lysosomes
 - i. Centrosomes and centrioles
 - j. Plastids
 - k. Nucleus
 - l. Vacuoles and granules
4. Compare Prokaryotic and eukaryotic cell
5. Compare plant and animal cell

Cell Division

1. Introduction and Types of cell division – *Mitosis and meiosis*
2. Mitosis
 - a. Steps in Mitosis
 - b. Importance of mitosis
3. Meiosis
 - a. Steps in meiosis
 - b. Importance of Meiosis

Tissue

1. Plant tissue types
 - a. Permanent and meristematic
 - b. Permanent – *simple and complex. Simple- parenchyma, collenchymas, sclerenchyma. Complex- Phloem and xylem*
 - c. Meristematic- *apical, lateral, intercalary*
2. Animal tissue types
 - a. Epithelial, connective, muscular, nerve
 - b. Epithelial- *squamous, columnar, glandular*
 - c. Connective- *Areolar (Tendon and ligament), Adipose, Skeletal (bone and cartilage), Fluid (Blood and lymph)*
 - d. Muscular- *Striated, unstriated and cardiac*

Evolution

1. Darwin's theory of evolution
 - a. Natural selection
 - b. Survival of the fittest
2. Amoeba to large animals and plants
 - a. Life evolved from single cell
 - b. Prokaryotic organisms
 - c. Eukaryotic organisms
 - d. Modern complex organization
3. Extinct organisms
 - a. Reasons for extinction – *natural and man made*
 - b. examples
4. Endangered organisms and their conservation
 - a. Reasons for becoming endangered
 - b. Conservative measures – *national parks, sanctuaries, awareness, breeding*
 - c. Our contribution

Cultivation and farming

1. Air, soil, water as plant nutrients
2. Processes in farming
3. Types of crops
 - a. Kharip– *introduction, examples*
 - b. Rubi – *introduction, examples*
4. Crop protection methods
5. Post harvesting methods
6. Manures and fertilizers

Life processes

1. What are life processes, their requirement and role
2. Plant life processes- respiration, photosynthesis, transpiration
 - a. Introduction
 - b. Process – *reaction or path*
 - c. Importance in plants
3. Animal processes- digestion, respiration, co-ordination and control, excretion, transport
 - a. Introduction
 - b. Process – *reaction or path*
 - c. Importance in animals
4. Growth and development in plants and animals
 - a. Growth in plants
 - i. Seed types
 - ii. Seed germination and its types
 - iii. Response to light (Tropism)

- iv. Growth hormones and their roles
- b. Growth in animals
 - i. Developmental stages
 - ii. Important stages for human beings – *sericulture, pisciculture, poultry etc*
- c. Human growth
 - i. Developmental stages
 - ii. Growth hormones
 - iii. Adolescence

Nutrition

1. Requirement for nutrition
 - a. Energy source
 - b. Calories
 - c. BMR
2. Macro and micronutrients
 - a. Sources, functions and deficiency symptoms
3. Balanced diet
4. Role of water and roughage

Diseases

1. Infectious and noninfectious
2. Bacterial diseases
 - a. Causes, examples and preventive measures
3. Viral diseases
 - a. Causes, examples and preventive measures
4. Fungal diseases
 - a. Causes, examples and preventive measures
5. Guide to good health
 - a. Good practices and personal hygiene
 - b. Vaccines
 - c. First aid

Bones

1. Bones
 - a. Introduction
 - b. Structure
 - c.
2. Human skeleton
 - a. Names of bones
 - b. Structural peculiarities
3. Bone marrow and its importance in biotechnology
4. Osteoporosis
 - a. Causes
 - b. Prevention and cure

Syllabus in Chemistry – Level I**Matter in our surrounding**

- 1) Concept of matter
- 2) Physical nature and characteristics of matter: *Nature of matter , Characteristics of matter*
- 3) Classification of matter
- 4) States of matter: *Solid, Liquid, Gas*
- 5) Properties of states
- 6) Kinetic theory of matter
- 7) Interconversion of states of matter
- 8) Chemical composition of matter : *Elements, Compounds, Mixtures*
- 9) Separation of components of mixture : *Hand picking, Use of a suitable solvent, Sublimation, Filtration, Sedimentation and Decantation, Evaporation, Simple distillation, Fractional distillation , By using separating funnel*
- 10) Solution: *Definition of solution, Properties of solution, Methods of expressing concentration of solution, Effect of temperature on solubility of solute in a solvent, Suspension, Properties of suspension, Colloids, Properties of colloids.*

Air and Atmosphere

- 1) Composition of atmosphere: *Troposphere, Stratosphere, Mesosphere, Thermosphere, Exosphere*
- 2) Air and its composition
- 3) Air pollution: *Volcanoes*
- 4) Effect of pollution on biosphere: *Depletion of ozone layer, Green house effect, Global warming, Acid rain, Photochemical smog , Oxidizing smog*

Fuels and combustion

- 1) Fuel: *Definition, Characteristics of an ideal fuel*
- 2) Types / Classification of fuels:
 - a) Primary solid fuels – Wood, Coal
 - b) Primary liquid fuels – Petroleum- Crude oil
 - c) Primary gaseous fuels – LPG, Natural gas, CNG
 - d) Secondary (derived) solid fuels - Coke, Wood - charcoal
 - e) Secondary (derived) liquid fuels – Gasoline, Kerosene, Diesel, Lubricating oil
 - f) Secondary (derived) gaseous fuels – Coal gas, Water gas, Producer gas, Biogas
- 3) Classification of natural resources
- 4) Methods of conservation of natural resources
- 5) Combustion
- 6) Types of combustion – Slow, Rapid, Spontaneous
- 7) Important terms with reference to combustion
Ignition temperature, Flash point, Fire point, Flame temperature, Explosive range, Aniline point, Specific gravity, Pour point, Cloud point, Coke number,
- 8) Fuel Efficiency – *Calorific value, Heat of combustion*
- 9) Flame – *Parts of candle flame, Bunsen burner flame – Reducing and oxidizing flame*
- 10) Fire extinguisher – *Fire safety at home*

Man- made materials

- 1) A man-made material – *Definition*
- 2) Glass – *Types of glass and their uses, Manufacture of soda glass, Properties of glass, Methods of preparing glassware*
- 3) Clay and Ceramics - *Definition of clay, Definition of ceramics, Types and uses of clay, Advantages of using ceramic materials*
- 4) Soaps and detergents – *Definition of soap and detergent, Action of soap, Action of detergent, Advantages of detergent over soap*
- 5) Plastics – *Definition of plastics, Classification of polymers based on plasticity, Uses of plastic, Problems created by use of plastic*
- 6) Fertilizers – *Definition of fertilizer, Primary and secondary fertilizers, N,P,K fertilizers, Drawbacks of methods of application of fertilizers*
- 7) Pesticides – *Definition of pesticide, Types and examples of pesticides, Care to be taken while using pesticides*
- 8) Fibers – *Definition of fiber, Classification of fibers, Uses of fibers*

Language of Chemistry

- 1) Symbols of elements
- 2) Atoms and molecules : *Atomic weight, Molecular weight, Formula unit mass*
- 3) Valency
- 4) Chemical formula
- 5) Radicals
- 6) Naming a compound from chemical formula : *Binary compounds, Ternary compounds*
- 7) Chemical equation : *Writing a chemical equation, Balancing a chemical equation, Information conveyed by a chemical equation , Limitations of a chemical equation*
- 8) Analytical chemistry: *Action of heat on various substances – Hydrated salts, Oxides, Carbonates, Organic compounds, Coal, Common salt, Ammonium chloride.*
- 9) Detection of gases – *Oxygen, Hydrogen, Water vapour, Carbon dioxide, Sulphur dioxide, Chlorine, Nitric acid, Hydrogen chloride, Hydrogen sulphide, Nitrogen dioxide, Ammonia.*
- 10) Detection of radicals – *Detection of cations, Detection of anions*
- 11) Flame test – *Test of - Sodium, Calcium, Barium, Copper, Some other elements.*

Carbon and its oxides

- 1) Occurrence of carbon
- 2) Position of carbon in the periodic table
- 3) Allotropes of carbon:
 - a) Crystalline forms of carbon: *Graphite, Diamond, Fullerene - Their structures , properties and uses*
 - b) Amorphous forms of carbon: *Coal, Charcoal, Lamp black - Their structures , properties and uses*
- 4) Bonding in carbon – *The covalent bonds*
- 5) Versatile nature of carbon: *Catenation, Polymerisation, Formation of multiple bonds, Formation of chains, branches and rings .*
- 6) Oxides of carbon: *Carbon monoxide, Carbon dioxide- Preparation, Properties, Tests, Uses*
- 7) Chemical properties of carbon compounds: *Combustion, Oxidation*

Syllabus in Physics – Level I

Mechanics:

- 1) Physical quantities and their measurement(fundamental and derived)
- 2) Units
- 3) Vernier Calipers and Micrometer screw gauge
- 4) Errors and least count
- 5) Simple machines like Lever, Pulley, Screw, Wedges, Axle etc.
- 6) Forms of Energy like kinetic & potential energy

Motion:

- 1) Scalars and vectors
- 2) Displacement, Speed & Velocity
- 3) Acceleration, Momentum & Impulse

Pressure:

- 1) Air pressure
- 2) Barometer, Aneroid barometer
- 3) Land breezes, sea breezes

Light:

- 1) Reflection
- 2) Lateral inversion of image in a plane mirror
- 3) Laws of reflection
- 4) Rotation of plane mirrors
- 5) Kaleidoscope, Periscope & Multiple images
- 6) Shadow & Eclipses
- 7) Plane Mirrors and Applications

Magnetism:

- 1) Magnet,
- 2) Types of magnet & Properties
- 3) Magnetic induction
- 4) Single and double touch magnet
- 5) Introduction of Para, Ferro and diamagnetic materials
- 6) Lines of forces & their properties
- 7) Neutral points

Heat:

- 1) Temperature,
- 2) Thermometer, Types of thermometer
- 3) Thermal expansion
- 4) Linear, Cubical and superficial
- 5) Bimetallic strip and its application

Waves & Oscillation:

- 1) Oscillatory Motion
- 2) Simple Harmonic Motion
- 3) Simple Pendulum
- 4) Characteristics of Oscillatory Motion
- 5) Second's Pendulum
- 6) What are waves?
- 7) Wave motion
- 8) Terms –amplitude, frequency, Velocity, wavelength etc.
- 9) Types of waves and characteristics
- 10) Characteristics required for wave motion

Astrophysics:

- 1) Planets: order no. from the sun
- 2) Orbital speed, Period and revolution around the sun
- 3) Number of satellites, Temperature
- 4) Inner planets (Inferior planets), outer planets (Superior planets)

Sources of Energy:

- 1) Introduction
- 2) Fossil fuel
- 3) Solar energy
- 4) Solar cell
- 5) Wind energy
- 6) Hydro energy
- 7) Ocean energy
- 8) Atomic energy

Syllabus in Mathematics – Level I**Algebra:**

- 1) Indices - Definition of index, base, Experimental form
- 2) Square and square root (Factorization method): Division method
- 3) Cube and cube root Factorization method
- 4) Simple Interest
- 5) Average
- 6) Percentage
- 7) Profit and loss
- 8) Bank Transaction
- 9) Binomial algebraic product $(x + a)(x + b)$
- 10) Identities factors $x^3 + a^3$, $x^3 - a^3$, $x^2 - a^2$
- 11) Factors of quadratic expression (with coefficient of x^2 equal to 1)
- 12) Equation with one variable
- 13) Simultaneous equations
- 14) Quadratic equations
- 15) Polynomial: What is addition, subtraction, multiplication?

Geometry:

- 1) Symmetry
- 2) Area of triangle
- 3) Congruence of triangles
- 4) Similarity
- 5) Construction of triangles and quadrilaterals
- 6) Circle
- 7) Definition/Terms – Chord, Secant, tangent, arc, inscribed angle, intercepted arc, measure of arc, length of arc, sector, and segment
- 8) Area of circle, area of sector, area of segment
- 9) Circumference of circle
- 10) Area of an irregular polygon
- 11) Parallel lines, transverse, types of angles and their characteristics
- 12) Surface area, volume of cube, rectangular parallelepiped, cone, and sphere
- 13) Coordinate geometry: X – Axis, Y – Axis, Coordinate of point, Quadrants