

# Manipur Board Class 9 Science Syllabus

## COURSE STRUCTURE

### CLASS IX

(Annual Examination)

Marks: 80

Unit No.	Unit	Marks	Periods
I	Matter - Its Nature and Behaviour	23	50
II	Organization in the Living World	20	45
III	Motion, Force and Work	27	60
IV	Our Environment	06	15
V	Food; Food Production	04	10
	<b>Total</b>	<b>80</b>	
	<b>Internal assessment</b>	<b>20</b>	
	<b>Grand Total</b>	<b>100</b>	

#### Theme: Materials

(50 Periods)

##### Unit 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 homogenous mixtures, colloids and suspensions.

**Particle nature and their 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.

#### Theme: The World of the Living

(45 Periods)

##### Unit II: 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 (only four types of tissues in animals; Meristematic and Permanent tissues in plants).

**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).

**Health and Diseases:** Health and its failure. Infectious and Non-infectious diseases, their causes and manifestation. Diseases caused by microbes (Virus, Bacteria and Protozoans) and their prevention; Principles of treatment and prevention. Pulse Polio programmes.

**Theme: Moving Things, People and Ideas**

**(60 Periods)**

**Unit III: 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.

**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).

**Theme: Natural Resources: Balance in nature**

**(15 Periods)**

**Unit IV: Our Environment**

**Physical resources:** Air, Water, Soil. Air for respiration, for combustion, for moderating temperatures; movements of air and its role in bringing rains across India.

Air, water and soil pollution (brief introduction). Holes in ozone layer and the probable damages.

**Bio-geo chemical cycles in nature:** Water, Oxygen, Carbon and Nitrogen.

**Theme: Food**

**(10 Periods)**

**Unit V: 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.

**PRACTICALS**

**(30 Periods)**

**Practicals should be conducted alongside the concepts taught in theory classes.**

**(LIST OF EXPERIMENTS)**

1. Preparation of: **Unit-I**
  - a) a true solution of common salt, sugar and alum
  - b) a suspension of soil, chalk powder and fine sand in water
  - c) a colloidal solution of starch in water and egg albumin/milk in water and distinguish between these on the basis of
    - transparency
    - filtration criterion
    - stability
  
2. Preparation of **Unit-I**
  - a) A mixture
  - b) A compound

using iron filings and sulphur powder and distinguishing between these on the basis of:

  - (i) appearance, i.e., homogeneity and heterogeneity
  - (ii) behaviour towards a magnet
  - (iii) behaviour towards carbon disulphide as a solvent
  - (iv) effect of heat
  
3. Separation of the components of a mixture of sand, common salt and ammonium chloride (or camphor). **Unit-I**
  
4. Perform the following reactions and classify them as physical or chemical changes: **Unit-I**
  - a) Iron with copper sulphate solution in water
  - b) Burning of magnesium ribbon in air
  - c) Zinc with dilute sulphuric acid
  - d) Heating of copper sulphate crystals
  - e) Sodium sulphate with barium chloride in the form of their solutions in water
  
5. Preparation of stained temporary mounts of (a) onion peel, (b) human cheek cells & to record observations and draw their labeled diagrams. **Unit-II**

6. Identification of Parenchyma, collenchyma and Sclerenchyma tissues in plants, striped, smooth and cardiac muscle fibers and nerve cells in animals, from prepared slides. Draw their labeled diagrams. **Unit-II**
7. Determination of the melting point of ice and the boiling point of water. **Unit-I**
8. Verification of the Laws of reflection of sound. **Unit-III**
9. Determination of the density of solid (denser than water) by using a spring balance and a measuring cylinder. **Unit-III**
10. Establishing the relation between the loss in weight of a solid when fully immersed in
  - a) Tap water **Unit-III**
  - b) Strongly salty water with the weight of water displaced by it by taking at least two different solids.
11. Determination of the speed of a pulse propagated through a stretched string/slinky (helical spring). **Unit-III**
12. Study of the characteristics of *Spirogyra*, *Agaricus*, Moss, Fern, Pinus (either with male or female cone) and an Angiospermic plant. Draw and give two identifying features of the groups they belong to. **Unit-II**
13. Observe the given pictures/charts/models of earthworm, cockroach, bony fish and bird. For each organism, draw their picture and record:
  - a) one specific feature of its phylum.
  - b) one adaptive feature with reference to its habitat.**Unit-II**
14. Verification of the law of conservation of mass in a chemical reaction. **Unit-III**
15. Study of the external features of root, stem, leaf and flower of monocot and dicot plants. **Unit-III**