**SCIENCE**

**(Code No. 086 / 090)**

The subject of Science plays an important role in developing well-defined abilities in cognitive, affective and physchomotor domains in children. It augments the spirit of enquiry, creativity, objectivity and aesthetic sensibility.

Upper primary stage demands that a number of opportunities should be provided to the students to engage them with the processes of Science like observing, recording observations, drawing, tabulation, plotting graphs, etc., whereas the secondary stage also expects abstraction and quantitative reasoning to occupy a more central place in the teaching and learning of Science. Thus, the idea of atoms and molecules being the buiilding blocks of matter makes its appearance, as does Newton’s law of gravitation.

The present syllabus has been designed around seven broad themes viz. Food; Materials; The World of The Living; How Things Work; Moving Things, People and Ideas; Natural Phenomenon and Natural Resources. Special care has been taken to avoid temptation of adding too many concepts than can be comfortably learnt in the given time frame. No attempt has been made to be comprehensive.

At this stage, while science is still a common subject, the disciplines of Physics, Chemistry and Biology being to emerge. The students should be exposed to experiences based on hands on activities as well as modes of reasoning that are typical of the subject.

**General Instructions :**

1. There will be an Annual examination based on entire syllabus
2. The annual examination will be of 80 marks and 20 marks weightage shall be for internal assessment
3. Out of 80 marks annual examination, 68 marks weightage shall be for theory and 12 marks weightage shall be for practical based questions.
4. For internal assessment
   1. There will be three periodic tests conducted by the school. Average of the best two tests to be taken that will have a weightage of 10 marks towards the final result.
   2. Practical / Laboratory work should be done throughout the year and the student should maintain record of the same. Practical Assessment should be continuous. There will be weightage of 5 marks towards the final result. All practicals listed in the syllabus must be completed.
   3. Regularity, class work and home assignment completion along with neatness and upkeep of notebook will carry a weightage of 5 marks towards the final result.

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**Course Structure Class - IX**

**(Annual Examination)**

|  |  |  |
| --- | --- | --- |
|  |  | Marks : 80 |
|  |  |  |
| Unit No. | Unit | Marks |
| I | Matter - Its Nature and Behaviour | 23 |
| II | Organisation in the Living World | 20 |
| III | Motion, Force and Work | 27 |
| IV | Our Environment | 06 |
| V | Food; Food Production | 04 |
|  | Total | 80 |
|  | Internal assessment | 20 |
|  | Grand Total | 100 |

Note : Above weightage includes the weightage of questions based on practical skills.

**Theme : Materials**

**Unit I : Matter-Nature and Behaviour** **(50 Periods)**

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 andhomogenous mixtures, colloids and suspensions.

**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 formulaof common compounds. Isotopes and Isobars.

**Theme : The World of the Living**

**Unit II : Organization in the Living World** **(45 Periods)**

**Call - Basic Unit of life :** Cell as a basic unit of life; prokaryotic and eukaryoticcells, 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 andplant tissues (only four types of tissues in animals; Meristematic and Permanent tissues in plants).

**Biological Diversity :** Diversity of plants and animals - basic issues in scientificnaming, basis of classification. Hierarchy of categories / groups, Major groups

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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**

**Unit III : Motion, Force and Work** **(60 Periods)**

**Motion :** Distance and displacement, velocity; uniform and non-uniform motionalong a staight 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, Actionand 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 ofthe earth (gravity), Acceleration due to Gravity; Mass and Weight; Free fall.

**Floatation :** Thrust and Pressure. Archimedes’ Principle; Buoyancy; ElementaryIdea 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**

**Unit IV : Our Environment** **(15 Periods)**

**Physical resources :** Air, Water, Soil. Air for respiration, for combustion, formoderating 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.

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**Theme : Food**

**Unit V : Food Production** **(10 Periods)**

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)**

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

**(LIST OF EXPERIMENTS)**

1. Preparation of :
   1. a true solution of common salt, sugar and alum
   2. a suspension of soil, chalk powder and fine sand in water
   3. a colloidal solution of starch in water and egg albumin/milk in water and distinction between these on the basis of
      1. transparency
      2. filtration criterion
      3. stability
2. Preparation of
   1. a mixture
   2. a compound

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

* + 1. appearance, i.e., homogeneity and heterogeneity
    2. behaviour towards a magnet
    3. behaviour towards carbon disulphide as a solvent
    4. effect of heat

1. Separation of the components of a mixture of sand, common salt and ammonium chloride (or camphor).
2. Performing the following reactions and classifying them as physical or chemical changes :
   1. Iron with copper sulphate solution in water
   2. Burning of magnesium ribbon in air
   3. Zinc with dilute sulphuric acid
   4. Heating of copper sulphate crystals
   5. Sodium sulphate with barium chloride in the form of their solutions in water.

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1. Preparation of stained temporary mounts of (a) onion peel, (b) human cheek cells

& to record observations and draw their labeled diagrams.

1. Identification of Parenchyma, Collenchyma and Sclerenchyma tissues in plants, striped, smooth and cardiac muscle fibers and nerve cells in animals from prepared slides. Drawing of their labeled diagrams.
2. Determination of the melting point of ice and the boiling point of water.
3. Verification of the Laws of reflection of sound.
4. Determination of the density of solid (denser than water) by using a spring balance and a measuring cylinder.
5. Establishing the relation between the loss in weight of a solid when fully immersed in
   1. tap water
   2. strongly salty water, with the weight of water displaced by it by taking at least two different solids.
6. Determination of the speed of a pulse propagated through a stretched string / slinky.
7. Study of the characteristics of Spirogyra / Agaricus, Moss / Fern, Pinus (either with male or female cone) and an Angiospermic plant. Drawing and providing two identifying features of the groups they belong to.
8. Observing the given pictures / charts / models of earthworm, cockroach, bony fish and bird. For each organism, drawing of their picture and recording :
   1. one specific feature of its phylum.
   2. one adaptive feature with reference to its habitat.
9. Verification of the law of conservation of mass in a chemical reaction.
10. Study of the external features of root, stem, leaf and flower of monocot and dicot plants.