

# Maharashtra State Board

## Syllabus for class 9

### Science

#### Introduction

The National curriculum Framework 2005(NCF 2005) is one of the most comprehensive documents published in the last decade. It suggests radical changes in curricula for the country and offers an excellent framework for preparing need based curricula. While revising the syllabi for Science and Technology, the position paper on science ( NCF 2005) has selected "Learning without burden" as the main theme. It also recommends a pedagogy which is hands-on and inquiry based. The present syllabus of Science and Technology for Std. IX and X is based on the principles and themes suggested in NCF 2005. The Themes are cross-disciplinary in nature: Food, Materials, The world of the Living, How things work, Moving things; people and ideas; Natural Phenomena and Natural Resources. Some themes have been merged to consolidate content. As suggested in NCF 2005, unnecessary focus on enumeration has been avoided. More importance has been given to the processes in science rather than focusing on only factual information.

Since the themes are inter-linked to each other, the entire syllabus has been integrated into one paper . This will facilitate better understanding of the subject across disciplinary boundaries and at the same time expose students to many topics in Biology, Physics and Chemistry.

#### Objectives

1. To enable the students to "Learn without Burden".
2. To expose the students to a "hands-on way" of learning science.

3. To correlate scientific principles to the student's experience.
4. To involve students in exploring topics through discussion and activity.
5. To imbibe the spirit of enquiry in students through valuable learning experiences through experiment.
6. To help the students become autonomous learners.

#### STD. IX

##### 1. Food

- 1.1. Plant and animal breeding and selection for quality improvement.
- 1.2. Use of fertilizers, manures.
- 1.3. Protection from pests and diseases; organic farming.

##### 2. Materials

- 2.1 Matter: All things occupy space, possess mass. Definition of matter, characteristics of solids, liquids and gases e.g. shape, volume, density. Change of state: freezing, melting, evaporation, condensation, sublimation. Cooling by evaporation. Absorption of heat.
- 2.2 Elements, mixtures and Compounds: elements, compounds and mixtures as types of chemical substances. Types of mixtures; Heterogeneous, homogeneous, colloids, suspensions.
- 2.3 Combination of substances: Law of constant proportion, atomic and molecular masses. Particle nature, basic units: Atoms and Molecules.
- 2.4 Mole Concept: Relationship of mole to mass of the particles and numbers.

Valency. Chemical formulae of common compounds.

- 2.5 Atomic Structure: Electrons, protons and neutrons. Atomic number and atomic mass number. Isotopes and Isobars.

### 3. The World of the Living

#### 3.1 Biological Diversity

Diversity of plants and animals: Basic issues in scientific naming. Basis of classification, Hierarchy of categories/groups.

Plant classification: Major Plant groups (salient features): Bacteria,

Thalophyta, Bryophyta, Pteridophyta, gymnosperms and Angiosperms. Animal Classification : Major groups of animals (salient features): Non-Chordates up to phyla and non chordates up to classes.

- 3.2 Smallest living unit of Life, Cell : Cell as a basic unit of life prokaryotic and eukaryotic cells, multicellular organisms; cell membrane and cell wall, cell organelles, chloroplast, mitochondria, vacuoles, ER, Golgi apparatus. Nucleus, chromosomes, basic structure, number. Tissues, organs, organ system, organism

Structure and functions of animal and plant tissues. (four types in animals; meristematic and permanent tissues in plants).

#### 3.3. Health

- \* Failure of health leading to disease.
- \* Disease and its causes.
- \* Diseases caused by microbes and their prevention: Typhoid, diarrhoea, malaria, hepatitis, rabies, AIDS, TB, Polio.

\* Pulse Polio program.

- 3.4. Exchange of substances by living organisms with the external world:

Diffusion/exchange of substances between cells and their environment and between the cell themselves in the living system; role in nutrition, water and food transport, excretion, gaseous exchange.

#### 4. Moving Things. People and ideas. Motion.

- 4.1 Motion: displacement, velocity, Uniform and non-uniform motion along a straight line, acceleration, distance-time and velocity-time graphs for motion and uniformly accelerated motion. Equations of motion by graphical method . Elementary idea of uniform circular motion.

- 4.2. Force and Newton's Laws : Force and Motion; Newton's Laws of Motion. Inertia of a body, inertia and mass, momentum, force and acceleration.

Elementary idea of conservation of momentum, action and reaction forces.

- 4.3. Gravitation: gravitation, universal law of gravitation, force of gravitation of the earth (earth's gravity), acceleration due to gravity, mass and weight, free fall .

- 4.4. Work, Energy and Power: work done by a force, energy, power. Kinetic and Potential energy, Law of conservation of energy.

- 4.5 Floating Bodies: Thrust and Pressure, Archimedes' Principle, Buoyancy. Idea of relative density.

- 4.6. Sound; Nature of sound and its propagation through different media, speed of sound, range of hearing in humans; ultrasound; reflection of sound; echo and SONAR Structure of the

Human Ear. (Auditory aspect).

## 5. Natural Resources - Understanding Ecosystem -

- 5.1 Types of ecosystem - forest, grassland, desert, aquatic, costal, marine
- 5.2 Interaction between biotic and abiotic factors in an eco-system
- 5.3 Energy flow and its importance. Cycles of nutrients in terrestrial and aquatic (fresh water and marine) ecosystems, nature's mechanism in maintaining balance.

## 6. Waste Generation and Management

- 6.1 Sources of waste - domestic, industrial, agricultural and commercial
- 6.2 Classification of waste : biodegradable non biodegradable, toxic, non- toxic biomedical.
- 6.3 Impact of waste accumulation - Spoilage of landscape, pollution, health hazards, effect on terrestrial and aquatic (fresh water and marine) life.
- 6.4 Need for management of waste.
- 6.5 Methods of safe disposal of waste segregation, dumping, composting, drainage, treatment of effluents before discharge, incineration, use of scrubbers and electrostatic precipitators.
- 6.6 Need for reducing, reusing and recycling waste.
- 6.7 Legal provisions for handling and management of waste.

## STD. IX

### PRACTICALS

#### LIST OF EXPERIMENTS

- 1. To prepare
  - 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 of starch in water and egg albumin in water and distinguish between these on the basis of
  - i) transparency
  - ii) filtration criterion
  - iii) stability

## 2. To prepare

- a) a mixture
  - b) A compound
- Using iron filings and sulphur powder and distinguish 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. To carry out the following chemical reactions and record observations. Also identify the type of reaction involved in each case

- i) Iron with copper sulphate solution in water.
- ii) Burning of Magnesium in air.
- iii) Zinc with dilute sulphuric acid
- iv) Heating of Lead Nitrate
- v) Sodium sulphate with Barium chloride in the form of their solutions in water.

- 4. To verify laws of reflection of sound.
- 5. To determine the density of solid. (denser than water) by using a spring balance and a measuring cylinder.
- 6. To establish the relation between the loss in weight of a solid when fully

immersed in

- i) tap water
  - ii) strongly salty water, with the weight of water displaced by it by taking at least two different solids.
7. To measure the temperature of hot water as it cools and plot a temperature-time graph.
  8. To determine the velocity of a pulse propagated through stretched string/slinky.
  9. To prepare stained temporary mounts of onion peel and to record observations and draw labeled diagram.
  10. To identify parenchyma and sclerenchyma tissues in plants, striped muscle fibers and nerve cells in animals, from prepared slides and to draw their labeled diagrams.
  11. To separate the components of a mixture of sand, common salt and ammonium chloride (or camphor) by Sublimation.
  12. To determine the melting point of ice and the boiling point of water.
  13. To test (a) the presence of starch in the given food sample (b) the presence of the adulterant metanil yellow in dal.
  14. To study the characteristic of spirogyra/ Agaricus, Moss/Fern, Pinus (either with male or female cone) and an Angiospermic plant. Draw and give two identifying features of groups they belong to.
  15. To observe and draw the given specimens-earthworm, cockroach, bony fish and bird. For each specimen record.
- a) one specific feature of-its phylum
  - b) one adaptive feature with reference to its habitat.