



SCIENCE

Science plays an important role in developing in children, well defined abilities in cognitive, affective and psychomotor domains, it augments the spirit of enquiry, objectivity, aesthetic sensibility.

Whereas the upper primary stage demands that plentiful opportunities should be provided to the students the engage them with the processes of Science like, observing, recording observations, drawing tabulation, plotting graphs etc., the secondary stage expects abstraction and quantitative reasoning to occupy more central place in the teaching and learning of Science. The present syllabus has been designed to be with “learning without burden as per recommendations of National Curriculum Framework, (NCF – 2005), and has been framed around six broad themes viz Food Materials, The World of living, How things work, People and Ideas, Natural phenomena and Natural Resources.

In the present syllabus, no attempt has been made to be comprehensive, Unnecessary enumeration has been avoided. Special care had been taken to avoid temptation of adding too many concepts.

At the secondary stage while Science is still a common subject, the discipline of physics, chemistry and life science come into being and the learner should be exposed to experience as well as modes of reasoning that are typical of these subjects. The stage also sees a certain consolidation of knowledge within themes.

AIMS

The aims are to:

1. Provide, through well designed studies of the experimental and practical science, a worthwhile education experience for all students, whether or not they intend to go on to study science beyond the secondary stage and in particular, to enable them to acquire sufficient understanding and knowledge to:
 - 1.1 Become confident citizens in a technological world and to take or develop and informed interest in matters of scientific importance.
 - 1.2 Recognize the usefulness, and limitations of scientific method and to appreciate its applicability in other disciplines and in everyday life.
 - 1.3 Be suitably prepared for studies beyond the secondary stage inn pure sciences, in applied sciences or in science- dependent courses.
2. **Develop abilities and skills that:**
 - 2.1 are relevant to the study and practice of science
 - 2.2 are useful in everyday life
 - 2.3 encourage efficient and safe practice
 - 2.4 encourage effective communication
3. **Develop attitudes relevant to sciences such as:**
 - 3.1 Concern for accuracy and precision
 - 3.2 Objectivity



- 3.3 Integrity
- 3.4 Enquiry
- 3.5 Initiative
- 3.6 Inventiveness.

4. Stimulate interest in and care for the environment

5. Promote awareness that:

- 5.1 Scientific theories and methods have developed, and continue to do so, as a result of cooperative activities of groups and individuals.
- 5.2 The study and practice of science is subject to social, economic, technological, ethical and cultural influences and limitations.
- 5.3 The applications of science may be both beneficial and detrimental to the individual, the community and the environment.
- 5.4 Science transcends national boundaries and that the language of science, correctly and rigorously applied, is universal.

DOMAINS:

The three domains in Science (Physics, Chemistry and Life – Sciences) are:

- A. Knowledge with understanding
- B. Handling information and solving problems
- C. Experimental skills and investigations.

Description of each domain is given below:

A. Knowledge with understanding

Students should be able to demonstrate knowledge and understanding in relation to:

- 1. Scientific phenomena, facts, laws, definitions, concepts, theories
- 2. Scientific vocabulary, terminology, conventions including symbols, quantities and units.
- 3. Scientific instruments and apparatus, including techniques of operations and aspects of safety.
- 4. Scientific quantities and their determination
- 5. Scientific and technological application with their social, economic and environmental implications.

B Handling information and solving problems

Students should be able in words or using other written forms of presentation (i.e. Symbolic, graphical and numerical) to:

- 1. Locate, select, organize and present information from a variety of sources.
- 2. Translate information from one to the other.
- 3. Manipulate numerical and other data.
- 4. Use information to identify patterns, report trends and draw inferences.
- 5. Present reasoned explanations for phenomena, patterns and relationship.
- 6. Make predictions and hypotheses.
- 7. Solve problems



C.Experimental skill and Investigations

Students should be able to:

1. Use techniques, apparatus and materials (including the following of a sequence of instructions where appropriate).
2. Make and record observations, measurements and estimates.
3. Interpret and evaluate experimental observations and data.
4. Plan investigations and /or evaluate methods and suggest possible improvements including the selection of techniques, apparatus and materials.

COURSE STRUCTURE

Marks: 200

Science – I (Physics)

Theory 50 Marks

Practical 18 Marks

Section – II (Chemistry)

Theory 50 Marks

Practical 16 Marks

Science – III (Life Science)

Theory 50 Marks

Practical 16 Marks

DETAILED SYLLABUS

1st Term Course

Science – I Physics: Theory:25 Marks: Practical: 9 Marks

Science – II Chemistry : Theory:25 Marks: Practical: 8 Marks

Science – III Life Science : Theory:25 Marks: Practical: 8 Marks

TERM – I

SCIENCE – I (PHYSICS)

Theory:- 25 Marks

Unit – I: Motion

Practical: 9 Marks

10 marks/ 12 periods

Motion is relative, need of origin (reference point) for describing position of an object, Distance and displacement, uniform and non- uniform motion along a straight line, speed, velocity and acceleration, distance – time and velocity- time graphs for uniform and uniformly accelerated motion, equations of motion by graphical method:-

(i) $v = u + at$ (ii) $S = ut + at^2$ (iii) $v^2 - u^2 = 2as$,

Elementary idea of uniform circular motion



Unit – II Force and Laws of Motion

08 marks/ 10 periods

Force and its relation to motion, balanced and unbalanced forces, concept of inertia and its relation with mass. Newton's Laws of motion, momentum, Force and acceleration, Elementary idea of conservation of momentum. Action and reaction forces

Unit – III Work, Energy and Power

07 marks/ 08 periods

Scientific concept of work, work done by constant force, concept of positive and negative work, energy and its various forms, potential and kinetic energy, Law of conservation of energy. Definition of Power and its units.

PRACTICAL

Physics

Ist Term

1. To plot a distance – time graph from a given data and calculate speed from it.
2. To plot a velocity – time graph from a given data and calculate acceleration from it.
3. To measure the temperature of hot water as it cools and plot a temperature – time graph.
4. To demonstrate
 - (i) Equal and opposite forces
 - (ii) Work done in lifting a weight
 - (iii) Work done by a moving body
 - (iv) Work done by a compressed Spring on raised body

Note: Each student will perform atleast three practical.

Suggested areas for Assignment/ Project work

1. To study the motion of a body along an inclined plane.
2. To calculate the work done by a force using a simple toy cart.

Note: Each student needs to work on one assignment.

SCIENCE – I (CHEMISTRY)

TERM – I

Theory: 25 Marks

Practical: 8 Marks

Unit – I: Matter in our Surrounding

10 marks/ period: 12

Physical nature of matter. Characteristics of particles of nature.
States of Matter (Solid, Liquid and Gaseous).
Can we bring about a change in the state of matter?
Evaporation.



A brief introduction about two more states of matter – Plasma and Bose – Einstein condensate.
(Non- Evaluative).

Unit – II Is Matter around us Pure?

15 Marks/ Period:8

Mixture and its types, Solution and its properties.

Concentration of a solution and how it is expressed.

Colloidal solution and its properties. Suspension and its properties.

Separating the components of a mixture by different methods: Evaporation, Centrifugation.

By using separating funnel, Sublimation. Simple distillation, Fractional distillation.

Chromatography, Separation of components of Air.

Physical and Chemical changes. Types of Pure substances (Elements and Compounds)

Difference between a Compound and a Mixture.

PRACTICAL

Chemistry

Marks 08

TERM I

1. To separate the contents of a mixture
 - (i) By sublimation
 - (ii) By crystallization
 - (iii) With the help of a separating funnel
2. To carry out the following processes, record observation and classify them into physical and chemical changes
 - (i) Melting of ice
 - (ii) Adding pieces of iron to copper sulphate solution in a beaker
 - (iii) Burning Magnesium in air
 - (iv) Dissolving common salt in water
 - (v) Adding zinc pieces to dilute Sulphuric acid
3. To Prepare
 - (i) A true solution of sugar and alum
 - (ii) A suspension of chalk powder and fine sand in water
 - (iii) A colloidal solution of starch in water and distinguish between these on the basis of
 - (a) Filtration criterion and
 - (b) Stability



Project work

To study the solubility of three different available substances in water at different temperature and determine.

- (i) Effect of temperature on solubility
- (ii) Magnitude of solubility at different temperature and
- (iii) Orders of solubility

SCIENCE – II (LIFE SCIENCE) TERM – I

Theory: 25 Marks

Practical: 8 Marks

Unit – I: The Fundamental Unit of Life

09 Marks

What are Living organisms made up of? Structural organization of a cell.

Plasma membrane, its relationship with Isotonic, Hypotonic solution, Osmosis:

Cell wall plasmolysis and deplasmolysis.

Nucleus – Prokaryotic and Eukaryotic cells; cytoplasm. Cell organelles- Endoplasmic reticulum, Golgi apparatus, Lysosomes, Mitochondria, Plastids and Vacuoles.

Unit – II: Tissues

08 Marks

Types of plants and animals tissues. Meristematic, Permanent tissue and their types, (Parenchyma, Collenchyma, Sclerenchyma, Xylem and Phloem with their elements).

Animal tissues, Epithelial tissue, connective tissue, muscular tissue, and nervous tissue.

Unit – III: Diversity in Living organisms

08 Marks

Basis of Classification. Classification and evaluation; the Hierarchy of classification groups.

Characteristics of Monera, Protista, Fungi, Plantae and Animalia.

Major group of Plantae and Animalia, Nomenclature (Binomial)

PRACTICALS

Life Science

TERM I

08 Marks

1. To study the various parts of a Compound Microscope.
2. To Prepare and study Plant cell from Onion peel and Animal Cell from cheek cells.
3. To study different types of Cell from permanent slides/charts/ models of Bacterial cell, Plant cell and Animal Cell.
4. To study different types of Plant Tissues from permanent slides/charts/models of Parenchyma,



Arenchyma, Collenchymas, Sclerenchyma, Xylem and Phloem.

5. To study different types of Animals Tissues from permanent slides/charts/models of Squamous, Cuboidal, Columnar, (Ciliated), Stratified (Squamous) Epithelial tissues, Adipose tissue, Adipose tissue, Tendon, Hyaline cartilage, Erythrocytes, Leucocytes, Striated muscle, Smooth muscle, Cardiac muscle and Neuron.

PROJECT WORKS/ ASSIGNMENT WORK

Term I

1. Collect and preserve the specimen of Lichens, Marchantia, Ferns, Cacti and other plants in your locality.
2. Visit to a botanical garden/locality and study the local flora.
3. Visit to lake/pond and study various aquatic plants.
4. Prepare culture of Algae, Amoeba, Paramecium, Euglena.
5. Preservation of local fish varieties (Schizothorax and Cyprinus caprio).

2nd Term Course

Science – I	Physics:	Theory: 25 Marks; Practical: 9 Mark
Science – II	Chemistry	: Theory: 25 Marks; Practical: 8 Marks
Science – III	Life- Science	: Theory: 25 Marks; Practical :8 Marks

SCIENCE – I(PHYSICS)

TERM II

Marks 25

Unit – IV: Gravitation

10 Marks

Gravity and Gravitation, universal law of gravitation and its importance, Acceleration due to gravity, relation between acceleration due to gravity (g) and gravitational constant (G), Difference between mass and weight, Motion of gravity (use of in equations of motion)

Unit – V: Floatation

05 Marks

Thrust and Pressure, Buoyancy, condition of floatation, Archimedes Principle and its applications, Elementary idea of relative density and specific gravity.

Unit – VI: Sound

10 Marks

Nature of sound and its propagation in various media, Necessity of material medium for propagation of sound, speed of sound, reflection of sound, Echo, range of hearing in humans, infrasonic and ultrasonic sounds; Sonar: structure of human ear (auditory aspect only).



PRACTICALS

Term II

09 Marks

1. To determine the density of a solid (denser than water) by using a spring balance and measuring cylinder.
2. To verify Archimedes Principle.
3. To verify the laws of reflection of sound.
4. To study the oscillations of a
 - (i) Simple pendulum
 - (ii) Tuning fork
 - (iii) Stretched string
 - (iv) Slinky.

Note: Each student will perform at least three practicals in each term

Project/Assignment work

II Term

1. To demonstrate the phenomenon of weightlessness.
2. To study the change in frequency of a Simple pendulum due to change in length of the pendulum.

Note: Each student needs to work on one assignment in each term.



SCIENCE – I (CHEMISTRY)

TERM II

Theory: 25 Marks

Practical: 8 Marks

Unit – III: Atoms and Molecules

15 Marks

Laws of Chemical combination:- Law of conservation of Mass, Law of constant Proportion, Numerical problems on laws of chemical combination. Atom, Atomic Mass. Molecules (Molecules of elements and molecules of compounds).

Ions (simple and Polyatomic). Chemical Formulae, writing chemical formulae of simple compounds. Molecular mass and Mole concept, Formula unit mass. Numerical Problems on Mole concept.

Unit- IV: Structure and Molecules

10 Marks

Charged particles of matter (Electrons and Protons). Thomson Model of atom and its drawbacks. Rutherford's Model of Atom and drawbacks. Bohr's Model of atom (A Brief description). Neutral Particle of Matter (Neutron). Distribution of Electrons in various orbits (shells). Electronic concept of valency. Atomic number and Mass Number. Isotopes and Isobars.

TERM II

08 Marks

1. To experimentally prove the law of conservation of mass.
2. To prepare a chart depicting the distribution of electrons in various orbits (shells) around the nucleus for elements with atomic no's 1 to 20 according to Bohr's Model of Atom.

Project Work

To develop a low cost model for writing Chemical Formulae.



LIFE SCIENCE

TERM II

Theory: 25 marks

Practical: 08 marks

Unit – IV: Why do we fall ill

Marks 07

Health and its failure. Disease and causes – Acute and Chronic disease; Causes of Diseases, Infectious and Non- infectious diseases. Infectious diseases – Agents; Means of spread. Organ specific and tissue specific manifestation. Principles of treatment and prevention.

Unit – V: Natural Resources

06 Marks

Resources of Earth – Air, Air Pollution, Rain, Water, Water pollution, Mineral Riches in the soil, soil pollution Biogeochemical cycles-water cycle, oxygen cycle, carbon cycle and Nitrogen cycle. Green Houses Effect, Ozone layer depletion (Brief).

Unit – VI Improvement in Food Resources

07 Marks

Improvement in Crop yield- variety improvement, crop production management. Nutrient Management (Macro and Micro nutrient). Manures, fertilizers, Irrigation; cropping pattern; crop protection management, Storage of grains. Animal husbandry – Cattle farming Poultry farming, Egg and Broiler Production.

Fish production, Bee keeping.

Unit – VII Prevention of Drug Abuse and Sexually Transmitted Diseases:

05 Marks

Adolescents and Substance Abuse – Their Effects and Therapeutic Effects:

Introduction, Withdrawal Symptoms and Reasons of Drug Abuse, Signs & Symptoms of Drug Addiction, Human Brain and Drug Addiction, Different Types of Drugs: Alcohol, Tobacco Opioids, Cannabinoids, Coca Alkaloid or Cocaine, Therapeutic Measures against Addiction.

Sexually Transmitted Diseases with Special Reference to AIDS:

Introduction, Modes of Transmission and prevention, AIDS: Causes, Affect on person. Spread and Symptoms of AIDS, Diagnoses of HIV infection, Prevention of Spread of Disease, Social Stigma Associated with AIDS.



PRACTICAL

Term II

08 Marks

1. To study permanent slides/charts/models of Amoeba, Paramecium, Spirogyra and Rhizopus.
2. Identification of Specimens- Ascaris, Earthworm, Leech, Butterfly, Octopus, Starfish Torpedo, Labeo rohita, Frog, Lizard, Crow and Rat.
3. To demonstrate the Osmosis, Plasmolysis and deplasmolysis using Potato.
4. Prepare a slide of blood film showing R.B.C's and blood platelets.
5. Prepare a slide of striated muscle taken from frog, cockroach things.

Assignment/ Project Work

Term II

1. Obtain silk moth eggs from Sericulture Department and observe growth of Larvae, Caterpillar up to Cocoon formation.
2. Surveying neighborhood to collect information on disease occurrence and pattern.
3. Visit a weed infested field in the month of July or August and make a list of the weeds and insect pests in the fields.
4. Make a herbarium of Cereals, Pulses and oil seeds and identify the seasons of their sowing.
5. Collect and preserve insect like Grasshopper, Dragon flies and butterflies.

Note: At least two projects to be complete in each term, preferably one project on flora and one on fauna.

Assessment of performance in the 3rd Term Course shall be based on two Unit Tests and one Term Test

Unit Test – I

1. Physics
2. Chemistry
3. Life Science

15 Marks

05 Marks

05 Marks

05 Marks

Unit Test – II

1. Physics
2. Chemistry
3. Life Science

15 Marks

05 Marks

05 Marks

05 Marks



First Term Test

1. Physics
2. Chemistry
3. Life Science

45 Marks

15 Marks
15 Marks
15 Marks

Types of questions in each section:

1. Long answer (Essay type) questions with internal and parallel choice
 $1 \times 5 = 5$ Marks
2. Short answer questions
 $2 \times 3 = 6$ Marks
3. Very Short answer questions
 $2 \times 1 = 2$ Marks
4. Multiple choice questions
 $2 \times 1 = 2$ Marks

Total= 15 Marks

Weightage to objective:

- (i) Knowledge with Understanding = 40%
- (ii) Handling information and solving = 60 %

PRACTICALS

The performance shall be assessed through one Term test carrying 25 marks with 9 marks reserved for Physics, 8 to Chemistry and 08 for Life Science.

Assessment of performance in Second Term Course:

There shall be one Unit Test of 12 marks and Term Test of 63 marks containing three sections one each for physics, Chemistry and Life Science. Each section shall be of 21 marks. The distribution of marks shall be:

Unit Test – III

1. Physics
2. Chemistry
3. Life Science

12 Marks

04 Marks
04Marks
04 Marks

Term Test – II

1. Physics
2. Chemistry
3. Life Science

63 Marks

21Marks Time: 2 hrs
21 Mark
21 Marks



Forms of questions in each Section:

- | | |
|--|-------------------------|
| (i) 2 long answer (Essay Type) questions with internal and parallel choice | $2 \times 5 = 10$ Marks |
| (ii) 2 short answer questions | $2 \times 3 = 6$ Marks |
| (iii) 3 very short answer questions | $3 \times 1 = 3$ Marks |
| (iv) 2 MCQ (Objective) | $2 \times 1 = 2$ Marks |

II. Practicals

There shall be one practical paper of 25 marks for each Term, containing three sections one each for assessing practical skills in Physics, Chemistry and Life Science. Each section will contain 2 practical/ exercises and every student shall be required to do a practical/ exercise from each section. Each practical/ exercise in each section, except Physics, in which each exercise shall be of 5 marks.

The experimental skills are to be assessed in the following manner:

05 Marks

- | | |
|--|----------|
| 1. Using and organizing techniques, apparatus and materials. | 01 Marks |
| 2. Observing, measuring, recording and identifying.
(02 Marks in case of Physics) | 02 Marks |
| 3. Handling experimental observation and data (Calculation/ result) | 01 Marks |
| 4. Interpretation/ inferences | 01 Marks |

Note: In case of Physics step II shall carry 02 marks

For viva –voce question based on the practical (s) / Exercise (s) the student attempts may be asked. The questions should pertain to concepts/ formulae/ principle/ procedure and precautions.

Notebook/ Practical Record :- 02 Marks

Marks to be awarded on the basis of:

- regularity in submitting record work.
- number of practicals recorded,
- general neatness and
- Recording experiments in a proper manner.

Total Marks: $05 + 02 + 02 = 09$ Marks, for Physics and Total marks for Chemistry and Life Science are as: $04 + 02 + 02 = 08$ Marks each.

BOOK PRESCRIBED

“Science for Class IX” Published by J and K State Board of School Education.