SCIENCE

AIMS

The aims are to:

1. Provide, through well designed studies of the experimental and practical science, a worthwhile educational 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 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 in pure sciences or in applied sciences or in science – dependent course.

2. Develop abilities and skills that:

1.1 are relevant to the study and practice of science.

1.2 are useful in everyday life.

1.3 encourage efficient and safe practice.

1.4 encourage effective communication.

3. Develop Attitude relevant to science such as:

3.1 concern for accuracy and precision.

3.2 objectivity

3.3 integrity

3.4 enquiry

3.5 initiative

3.6 invectiveness

4. **Stimulate interest in and care for the environment**

5. **Promote an 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 are subject to social, economic, technological ethical and cultural influences and limitations.

5.3 The application 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 Biology) 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**

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 operation and aspects of safety.
4. Scientific quantities and their determination.
5. Scientific and technological applications with their social, economic and environmental implications.

The curriculum objectives define the factual material that candidates may be required to recall and explain. Question testing these objectives will often begin with one of the following words; define state, describe, explain or outline etc.

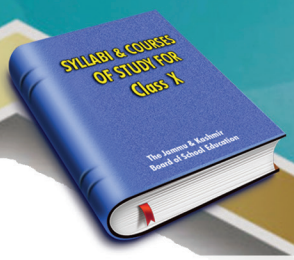
(b) **Handling Information and Solving Problems**

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

1. locate, select, organize and present information from a variety of sources;
2. translate information from one to another;
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 relationships;
6. make predictions and hypotheses;
7. solve problems;

These skills cannot be precisely specified in the curriculum objectives because question testing such skills are often based on information which is unfamiliar to the candidate. In answering such question, candidates are required to use principles and concepts that are within the syllabus and apply them in a logical, deductive manner to a novel situation.

Question testing these skills with often being with one of the following words; Discuss, predict, suggest, calculate or determine etc.



(c) **Experimental Skills and Investigations**

Students should be able to

1. use techniques, apparatus and materials;
2. make and record observations, measurements and estimates;
3. interpret and evaluate experimental observations and date;
4. plan, investigate and/or evaluate methods and suggest possible improvements (including the selection of techniques, apparatus and materials).

SCIENCE

Theory Marks: 84 (Physics + Chemistry + Biology: 28+28+28) **Time allotted: 3 hrs**

Practical Marks: 16 **Marks :28**

Maximum Marks 100

Section – I (Physics)

Unit 1:- Light- Reflection and Refraction **Marks 10**

Reflection of light, spherical mirrors; image formation; use of spherical mirrors.

Sign conventions for spherical mirrors; relation between focal length and radius of curvature; mirror formula (only relation) (Numerical Problems); magnification.

Refraction of light, refraction through a glass slab, refractive index, Conditions for no refraction.

Spherical lenses, image formation, sign conventions, lens formula (only relation) (Numerical Problems), Magnification (Numerical Problems), Power of a lens (Numerical Problems).

Unit 2: The Human Eye and the Colorful World **Marks 05**

Human eye; power of accommodation; defects of vision and their correction.

Glass prism (refraction and dispersion).

Atmospheric refraction – twinkling of stars and color of sun at sunrise and sunset.

Unit 3 :-Electricity **Marks 06**

Concept of electric charge;

Electric current; electric potential and potential difference;

Ohm's law and experimental verification ; resistance and its dependence; combination of resistances (in series and inn parallel) (Numerical Problems)

Heating effect of current – Electric power and energy (Numerical Problems)

Unit 4: Magnetic Effects of Current **Marks 04**

Orested Experiment; Magnetic field and field lines.

Magnetic field due to a current carrying current – Straight, coil (loop) and solenoid (qualitative only).

Force on a current carrying conductor in a magnetic field.

Electric Motor; Domestic electric circuits.

Unit 5:Sources of Energy **Marks 03**

Various sources of energy; conventional sources of energy; improvement in technology for using conventional source of energy (Biomass and wind energy).

Non- conventional sources of energy (Solar energy, Energy from sea).

Nuclear energy (Nuclear fusion and nuclear fissions).

Lasting of energy sources.

SECTION – II (CHEMISTRY) Marks 28

Unit 1: Chemical Reactions and Equation **Marks 05**

Chemical equation, writing of chemical equation; Balancing chemical equations.

Types of chemical reactions, viz. Combination reactions; Decomposition reactions; Displacement reactions; Double displacement reactions; Oxidation and reduction.

Effects of oxidation and reduction reactions in everyday life, viz, corrosion and rancidity.

Unit 2: Periodic Classification of Elements **Marks 04**

Early attempts regarding classification of elements; like Dobereiner's triads, Newland's law of octaves (non evaluating).

Mandeleev's periodic table, its achievements and limitations.

Modern periodic table; position of elements, trends in modern periodic table viz, Valency, Atomic size, Metallic and non- metallic properties.

Unit 3:- Carbon and its Compounds **Marks 08**

Bonding in Carbon, Covalent bond, Allotropes of carbon;

Versatile nature of carbon; Saturated and unsaturated hydrocarbons; chains; branches and rings, homologous series and its characteristics; nomenclature of Carbon compounds.

Chemical properties of carbon compounds viz. combustion; oxidation; addition and substitution reactions.

Important Carbon compounds like Ethane and Ethanoic acid Properties of Ethanol and Ethanoic acid.

Soaps and Detergents.

Unit 4: Metals and Non metals **Marks 06**

Physical prosperities of metals and non- metals.

Chemical properties of metals like action of water, air, acids, salts; Reactivity series of metals.

Cause of reactivity of metals and non- metals.Properties of Ionic compounds.

Occurrence of metals; their extraction, enrichment of ores. Extraction of metals in accordance with activity series; refining of metals.

Corrosion of metals and its prevention.

Unit 5: Acids, Bases and Salts **Marks 05**

Idea about acids and bases; chemical properties of acids and bases viz. Action of metals, metal carbonates, metal hydrogen carbonates (only in case of acids), metallic acids; non- metallic acids and bases.

Similarities in acids and bases; reaction of acids and bases with water.

Strength of acids and base solutions; pH, its importance.

Idea of salts, their family and pH.Chemicals from common salts like Sodium hydroxide, Baking soda and Washing soda; Hydrated salts, Plaster of Paris.

SECTION – III (BIOLOGY)

Marks: 28

Unit I: - Life Processes **Marks 6**

- What are life Processes?
- Nutrition – Autotrophic Nutrition, Heterotrophic Nutrition. How do animals obtain their nutrition? Nutrition in Human beings.
- Respiration.
- Transportation: Transportation in Plants.
- Excretion: Excretion in Human beings, Excretion in Plants.

Unit II:- Control and Co-ordination **Marks 4**

- Animals – Nervous System, What happens in Reflex Action? Human Brain; How are these tissues protected? How does Nervous tissue cause action?
- Coordination in Plants, immediate response to stimulus, movements due to growth.
- Hormones in Animals.

Unit III:- How do Organism Reproduce **Marks 6**

- Do organisms create exact copies of themselves? The importance of variation.
- Modes of reproduction used by unicellular organisms. Fission. Fragmentation, Regeneration. Vegetative Propagation, Budding, Spore Formation.
- Sexual Reproduction: Why the sexual mode of reproduction? Sexual reproduction in flowering plants, Reproduction in human Beings. Male Reproductive System, Female Reproductive System. What happens when the egg is not fertilized? Reproductive Health.

Unit IV: Heredity and Genetics **Marks 4**

- Accumulation of variation during reproduction.
- Heredity: Inherited traits, Rules for the interitance of traits, Mendel's contribution. How do these traits get expressed? Sex determination.
- Acquired and Inherited traits.
- Speciation.
- Classification, tracing evolutionary relationships, fossils, evolution by stages. Evolution should not be equated with progress.

Unit V:- Our Environment **Marks 4**

- What happens when we add our waste to the Environment?
- Ecosystem – What are its components? Food chains and Webs.
- How do our activities effect the environment? Ozone layer and how it is getting depleted. Managing the garbage we produce.

Unit VI:- Management of Natural Resources **Marks 4**

- Why do we need to Manage our Resources?
- Forests and Wild life, Stake holders, Sustainable Management, Dams, Water harvesting. Coal and petroleum.
- An overview of Natural Resources Management.

PRACTICAL WORK

List of Practicals

Section – I

(PHYSICS)

Section 1

1. Verify the laws of reflection using mirror strips.
2. Verify the laws of refraction using glass slab, and find the refractive index of the material.
3. Show that the image is as far behind the plane mirror as the object is in front of it.
4. Trace the path of rays through a glass prism and measure the angle of deviation. (2 obs).
5. Using a glass prism, Prove that ∠i+∠e=∠A+∠d
6. Find the focal length of convex mirror using the candle wire gauge and screen.
7. Trace the path of a ray of light through a glass slab and show that the angle of incidence is equal to the angle of emergence.
8. Verify Ohm's law (2 obs).
9. Prepare an electromagnet and observe the relation between the direction of current and polarity of the electromagnet.
10. Draw the magnetic lines for a bar magnet using a compass needle.

Project work

1. To construct an Astronomical Telescope using two convex lenses.
2. Prepare a model showing the production of thermo electric energy.
3. To generate wind energy using a wind mill.
4. Prepare an electromagnet.
5. To prepare a model to demonstrate Orested experiment.

SECTION – II
(CHEMISTRY)

1. Determine the pH of water obtained from different sources (at least four)
2. Determine the pH of juice obtained from different fruits.
3. Simple volumetric acid – based titrations.
4. Preparation of soap.
5. Preparation of hydrogen gas by the action of dil. Sulphuric acid oil and study the properties.
6. To test the conductivity of various salt solutions.

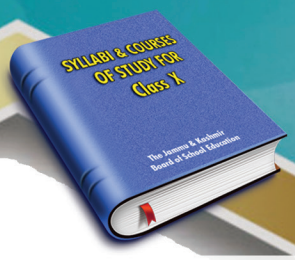
Project work

1. Make a list that contains.
   Five elements in the free state and
   Five elements in the combined state.
2. To frame modern periodic table.
3. To make models of alkanes.

SECTION – III
(BIOLOGY)

Biology (Section III)

1. Identification of organs through charts/ Models of the following.
   a. Digestive system in humans.
   b. Circulatory system in humans.
   c. Nervous system in human beings.
   d. Respiratory system in human beings.
2. To study the reproductive organs of a flower.
3. To measure the body temperature and observe pulse rate.
4. To measure the blood pressure using sphagnometer.
5. To show that green plants synthesize carbohydrates.
6. To prepare and study the temporary mount of Lactobacillus.
7. To study the microorganism in stagnant water under microscope.
8. To study Mendelian ratios using pea seeds.



Project work

a. Preparation of vermicompositing (earth worms).

b. Making a herbarium (At least 10 aquatic and 10 terrestrial plants).

c. Effects of water pollution

Or

Air Pollution

Or

Noise pollution

COURSE WORK
(SCIENCE)

School based assessment under (Continuous and Comprehensive Evaluation):

While unit tests and term tests to be conducted by the schools under the scheme of Continuous and Comprehensive Evaluation are for Testing and coaching for the Board Examination, the course work component has been designed to provide a Frame work to create scientific temper amongst the students by developing in them attitudes relevant to science like.

1. Concern for accuracy and precision.
2. Objectivity.
3. Integrity.
4. Enquiry.
5. Initiatives and
6. Inventiveness

The course work allows particular emphasis on 'Practical work' and experimental skills as identified in Domain 'C' on page under Aims of science.

In order to develop and assess these skills students may be asked to carry out atleast two exercises/ assignments/ project work on the themes drawn from the syllabi for Physics, Chemistry and Biology exercise given under assessment of course work.

The assessment in grade is to be communicated to the Board as per guidelines laid down in the Continuous Comprehensive Evaluation Scheme and directions given by the Board from time to time.

Note While the themes for course may be drawn from the syllabi, some of the theme are given for guidance.

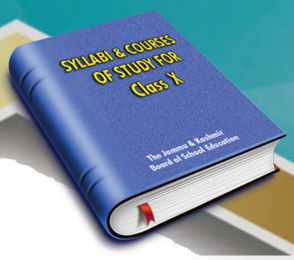
1. To demonstrate propagation of waves through
   (i) Stretched rope
   (ii) Water surface, and
   (iii) Slinky.
2. To determine distance of distinct vision.
3. To construct simple working models of microscope and telescope.
4. To measure and record (tabulation) temperature of different metal placed in the sun and interpret the experimental data.
5. Construct a model of a solar cooker using aluminium foil as a concave reflector (or any other suitable reflecting surface) and demonstrate its use.
6. Construct a model of windmill and show its usage or develop a working model using unconventional

source of energy and show its usage in day-today life.

7. Measure the temperature of four different substances (sand, saw dust, wheat, floury charcoal powder or any metal powder) given to your keep the materials in Sun for ten minutes then record their temperature. List the materials in descending order of their temperatures.
8. Take a beaker half filled with water and a solar cooker (or any other improvised model of the solar cooker) containing some water and measure the initial temperature of water in beaker and water in solar cooker. Then keep them in sun light or about 10 minutes. Measure the final temperature of both, Record the difference. Draw your own conclusions.
9. To collect different samples of water from different sources and to test them with soap solution to identify them as hard and soft water.
10. To remove temporary hardness of water by boiling.
11. To show the presence of:
    (i) Water vapour.
    (ii) Dust particles and
    (iii) Carbon dioxide atmosphere.
12. To identify the product of combustion of different kinds of fuels.
13. To find what happens to iron in presence of air and water and identify the conditions under which iron can be protected from rusting.
14. Study of cell division stage from permanent slides or from tip of shoot and root.
15. To show that Light is necessary for photosynthesis.
16. To show oxygen evolves during photosynthesis.
17. Study of micro organism in pond/ sewer water under the microscope.
18. Study of curd (for bacteria) under the microscope.
19. To show that green plants synthesis carbohydrates.
20. You are given a weighed mass of a fresh plant material. Dry the plant in oven and calculate the percentage of water content in the given sample.

Note:

1. Private students are exempted from undertaking course work.
2. Grade awarded to candidates appearing under exemption category (students who appeared as regular student but failed), shall be carried forward.



ASSESSMENT

A. **(Board Examination)**

1. **Theory**

In theory the subject shall have 84 marks spread over one single question paper containing three sections, viz, Section – I based on the syllabus of Physics and Section – II based on the syllabus of Chemistry and Section – III based on the syllabus of Biology having a weightage of 84 marks and 3 hours duration with 10 minutes extra for comprehension.

Section I (Physics)	:	**28 marks**
Section II (Chemistry)	:	**28 marks**
Section III (Biology)	:	**28 marks**

Each section shall contain

(i)	Three long answer questions with internal choice each in 6 marks	**3 x 6 = 18 marks**
(ii)	9 short answer questions with internal choice each of 4 marks	**9 x 4 = 36 marks**
(iii)	9 very short answer question each of 02 marks	**9 x 2 = 18 marks**
(iv)	12 multiple choice items each of 01 mark	**12 x 1 = 12 marks**
	Total marks for Physics, Chemistry and Biology Section: 84 marks	

II. Practicals

There shall be one practical paper of 16 marks and 3 hours duration containing three sections one each for assessing practical skill in Physics, Chemistry and Biology. Each section will contain 2 practical/ exercises and every student shall be required to do one practical/ exercise from each section. Each practical/ exercise in each of the section shall be of 4 marks.

(A) **The experimental skills underlying each practical/ exercise are to be assessed in the following manner;**

(i)	Using and organizing techniques, apparatus & materials.	**01 marks**
(ii)	Handling experimental observations and data (Calculation/ result)	**10 marks**
(iii)	Interpretation/ Inferences	**01 mark**
(B)	**Viva – Voce:**	**02 marks**

For Viva – voce only such Questions are based on the practical (s) exercise (s). The student attempts may be asked. The questions asked should pertain to Concept/ Formulas/ Principles/ procedure of experiment, precautions etc.

(C) **Note book/ Practical record:** **02 marks**

Marks are to be awarded on the basis of regularity in submitting the record work; Number of practicals recorded; general neatness; recording experiments in proper manner.

Total marks: 12 + 2 + 02 = 16 marks

(D) **School based Assessment (Course work/ Assignment/ Project work):**

Every student shall have to work on at least one piece of work of his/ her choice during the academic session. The course work shall be assessed internally by the Schools themselves and the grades awarded to each candidate shall be communicated to the Board.

Book Prescribed:

A Textbook of Science for Class X Published by J&K Board of School Education.