Science and Technology

Code No. 212

Introduction

Science and Technology course has been specially designed for learners who are motivated to continue their education. The new course has been designed to equip learners to apply the skills learnt in Science and Technology to real life situations. There are two books in this subject and learners are expected to study both of them. The first book has four modules. Each module would take them through various topics like Measurement in Science, Matter in our Surroundings, Moving Things and Energy. The second book has three modules dedicated to the Living World, Natural Resources as well as Humans and Environment. This course would enable learners to understand the scientific principles behind many of the day to day events.

Rationale

In the present times, the laws and principles of science find application, not only in our daily life but also in every walk of life. As a result Science and Technology have become an integral part of human life and culture. Scientific knowledge which is growing day by day is a powerful tool for solving our problems. This knowledge also contributes towards the national productivity. However, a word of caution- misuse of scientific knowledge, indiscriminate use of natural resources leading to depletion of natural resources and environmental pollution can lead to dire consequences. The proper and sensible use of science and technology to achieve the twin goals of 'development' and 'improvement' is of utmost importance. In the light of this, it is becoming increasingly necessary for all to be aware of the basics of science and technology, as also its application in the interest of human welfare. Contribution of Indian scientists in this regard has also been highlighted in this learning material.

Objectives

After completing this course, the learner will be able to:

- explain the science behind natural phenomena;
- enumerate the various facets of science and the role it plays in human welfare;
- develop scientific attitude so that reasoning wins over blind faith and opinions;
- formulate simple hypothesis, verify them and apply in their daily life activities;
- cultivate an interest in science and technology and be encouraged to pursue it as a career.

Scope and job opportunity

As you go through the lessons you will find many new activities closely related to your everyday life experiences. These have been specially designed for better understanding of difficult concepts while giving you an opportunity to enhance important life skills such as thinking, social and emotional skills. After Class 10 a career in this field would mean a life-long learning process.

Eligibility conditions

Age: 14 years

Qualification: Ability to read and write

Medium of instruction: Hindi, English, Urdu, Marathi, Telugu, Gujarati, Malayalam, Tamil and Odia medium

Duration of the course: 1 Year

Weightage

Theory: 85 Marks

Practical: 15 Marks

Tutor Marked Assignments (TMA): 20% Marks of theory

Scheme of studies: 240 hours for theory and 60 hours for practical work, TMA (self paced)

Scheme of evaluation:

Theory paper 85 marks; Practical work- 15 marks; TMA- 17 marks (20% of theory marks)

Pass criteria: 33% Marks

Course content

S. No.	Modules/Topics	Duration (in hours)	Key Learning Outcomes (Theory)	Key Learning Outcomes (Practical)	Weightage (marks)
1.	**Module-I Measurement in Science** 1. Measurement in Science and Technology	04	As measurement is one of the important activities of day to day life, the beginning of this module aims at highlighting the correct way of expressing the units and the methods of measuring physical	There are 30 activities in the Science and Technology Practical Manual. These 30 activities are distributed under three sections as: Physical Sciences, Chemical Sciences and Biological Sciences	04

			quantities and the need of accurate measurement in science and technology.		
2.	**Module-II** **Matter in our Surroundings** 2. Matter in our Surroundings 3. Atom and Molecules 4. Chemical Reaction and Equations 5. Atomic Structure 6. Periodic Classification of Elements 7. Chemical Bonding 8. Acids, Bases and Salts	54	The module is designed to bring out the structure of matter by way of describing an atom and how atoms combine to form different substances. It also highlights that the structure of matter is responsible for its properties.	**Chemical Sciences** 1. To Prepare an Aqueous Solution of Common Salt of a Given Composition 2. Separation of Mixtures 3. To Differentiate between a Chemical and Physical Change in a Given Process 4. To Test the Acidic/ Basic Nature of a Solution with the help of pH Paper 5. To find the pH of Fruit/Vegetables Juices with the help of pH Paper 6. To Identify Washing Soda and Baking Soda out of the Samples of two White Powers 7. To Carry out Chemical Reactions of Different Types	22
3.	**Module-III** **Moving Things** 9. Motion and its Description	24	In this dynamic world everything is in motion with respect to one another. But all	**Physical Sciences** 8. To Determine the Density of the Material of a Given Solid Using a Spring	07

	10. Force and Motion 11. Gravitation		these motions are not alike. To understand the motion of the objects this unit will describe the terms distance, displacement, speed, velocity, acceleration etc. It will also describe the cause of motion in terms of force, momentum, pressure, upthrust etc. This unit will also describe the gravitational force, gravitational acceleration and other related phenomenon like weightlessness.	Balance and a Measuring Cylinder 9. To Find the Average Speed of an Individual, as One Walks/Runs, To and Fro between Two Points 10. To Observe and Compare the Pressure Exerted by a Solid Iron Cuboid Placed on Fine Sand/Wheat Flour while Resting on its three different Faces and Calculate the Pressure Exerted in the three different Cases 11. To Verify the Third Law of Motion Using Two Spring Balances	
4.	**Module-IV** **Energy** 12. Sources of Energy 13. Work and Energy 14. Thermal Energy 15. Light Energy 16. Electrical Energy 17. Magnetic Effect of Electric Current 18. Sound and	52	The module intends to highlight the various types of energy, their sources, properties and applications in our daily life. The means and ways of meeting the challenge of energy crisis will also be discussed in this module	**Physical Sciences** 12. To Determine the Melting Point of Ice 13. To Study the Laws of Reflection of Light Using a Plane Mirror 14. To Study the Change in the Size, and Position of Image formed by a Convex Lens by hanging the Position of an Object (Candle) Placed in front of it 15. To Study the Change	15

	Communication			in Current through a Resistor by Changing Potential Difference across it. Determine the Resistance of the Resistor by Plotting a Graph between Potential Difference and Current 16. To Assemble a Household CircuitComprising Two Bulbs (3 Volt each), Two Turn On-Off Switches, a Fuse and Two Dry Cells as Source of Power 17. To Determine the Speed of a Pulse Propagated through a Stretched String	
5.	**Module-V** **The Living World** 19. Classification of Living Organisms 20. History of Life on Earth 21. Building Blocks of Life –Cell and Tissues 22. Life Processes – I : Nutrition, Transportation, Respirationand Excretion 23. Life Processes – II : Control	47	The variety of living organisms inhabiting the earth forms an integral component of the earth's environment. This theme includes lessons on Origin and Diversity of life deals with the origin and evolution of life, concept of biodiversity. Classification of living organisms for convenient and systematic study.	**Biological Sciences** 18. To Prepare a Temporary Stained Mount of (i) Onion Peel, Observe Under the Microscope and Record Observations and (ii) To Prepare a Temporary Stained Mount of Human Cheek Cells, Observe under the microscope and Record Observations	15

	and Coordination 24. Life Processes – III : Reproduction 25. Heredity		One lesson on life processes encompasses the recognition of the cell as the basic building block of organisms and others deal with physiological processes such as nutrition, circulation, respiration, excretion, control and coordination. It also includes basics of reproduction, patterns of inheritance, genetic material and techniques of its manipulation.	19. To Study and Draw Different Types of Plant and Animal Tissues with the Help of Permanent Slides : Plant tissues: Parenchyma and Sclerenchyma; Animal tissues: Blood, Striped muscle fibres and Nerve cells 20. To Study the Process of Osmosis through a Semi permeable Membrane 21. To Test the Presence of Starch in Green Leaves Exposed to Sunlight 22. To Observe that Oxygen is Released during the Process of PhotosynthesisTo Show that CO2 is given out during Respiration. 23. To Study External Structural Adaptations in Any Two Organisms out of Cockroach, Fish, Frog, Lizard and Pigeon.	
6.	**Module-VI** **Natural Resources** 26. Air and Water 27. Metals and	26.	They are important for our survival and well being. Basic resources required by society are	**Chemical Sciences** 24. To Test the Presence of Water Vapours in Air	10

	Non-metals 28. Carbon and Its Compounds		discussed in this theme.	25. To Test the Presence of Carbon Dioxide (CO_2) in Air. 26. To find out the Approximate Percentage of Oxygen in Air.	
7.	**Module-VII Humans and Environment** 29. Natural Environment 30. Human Impact on Environment 31. Food Production 32. Health and Hygiene	33	Healthy environment is an important asset. Modern humans have made enormous progress in industry and technology. At the same time the industrial and urban development has progressively degraded. The environment and adversely affected the health and well being.	**Biological Sciences** 27. To Test the Presence of Starch and Fat in Given Food Samples. 28. To Test the Presence of Adulterants in (a) Milk and (b) Metanil Yellow in Pulse. 29. To Estimate the Level of Pollution in Terms of Particulate Matter by Comparing Leaf Samples Collected from Different Areas. 30.To Observe Organisms from Given Pictures or Specimens or in the Surroundings (e.g. Crop Field, a Garden, or a nearby Pond) Classify Them as Producers and Consumers, and Construct Their Food Chains and indicate their Trophic Levels.	12