GENERAL SCIENCE

SUBJECT CODE - C3

Class - IX

Science is taught as General Science at the secondary stage (classes IX-X) of school education. It is a compulsory subject of study. Students learn it as a composite subject and not as a separate discipline like Physics, Chemistry and Biiology.

The aims of teaching science in the Secondary Stage are to :

- ❖ Enable the learners to attain some basic scientific and technological literary.
- ❖ Take the study of science meaningful by linking teaching of scientific principles with daily life experiences of the learners.
- ❖ Provide guidance to the teachers on methods and techniques of learning science to suit the needs of learners of different backgrounds.
- ❖ Nurture the natural curiosity, aestheitc sense and creativity of the learners.
- ❖ Acquire skills for developing scientific temper
- ❖ Enable the learners to acquire some practical knowledge and skills to enter the world of work.

Objectives

The pupils

- ❖ Develop an understanding of facts, concepts, basic principles and laws of science.
- ❖ Understand the methods and process that lead to logical development of scientific knowledge.

- Understand applications of basic scientific principles to solve problems related to daily life.
- Learn about the application of technology in daily life and understand the principles on which they work.
- Learn the techniques, skills and methods of exploring the environment and enrich their experience.
- Learn to observe, collect data, take measurements, formulate hypotheses, perform simple experiments and comunicate scientifically.
- Recongnize the relationship of science, technology and society.
- Recognize the relationship of science, technology and society.
- Develop a scientific attitude and inculcate qualities like open-mindedness, honesty, integrity, co-operation, love and concern for life and environment.
- Learn to think critically.
- Learn to infer and interpret facts, principles and experiments.
- Acquire the skill to solve simple problems based on scientific relations.
- Learn to do experimentation.
- Participate in co-curricular activites like doing projects to solve problems related to agriculture, health, nutrition, protection and preservation of environment etc.
- Cultivate the habit of reading scientific journals, papers reports.
- Develop problem solving and decision making skills.
- The Board has adopted the NCERT science syllabi for Secondary stage w.e.f. the academic session 2013.

NCERT has revised the syllabus on the basis of NCF 2005. In the words of NCERT.

"The exercise of revising the syllabus for science and technology has been carried out with 'Learning without burden' as a guiding light and the position papers of the National Focus Groups as points of reference. The aim is to make the syllabus an enabling document for the creation of textbooks that are interesting and challenging without being loaded with factual information.

The themes chosen for class IX-X are : Food; Materials; The world of the living; How things work; Moving things; People and ideas; Natural phenomena and Natural resources. However the theme 'food has been excluded in class X.

The syllabus is presented in four columns : Questions, Key concepts, Resources and Activites/Process.

The questions lead to delve into the themes/subthemes. In the process the key concepts emerge. The resource and activity/process column guides the teachers to meaningful classroom transaction.

Evaluation :

Assessment of learning is to be done by the process of continuous and comprehensive evaluation and periiodic evaluation (half yearly and annual examination, preparatory examination.) Assessment of learning is to be done continously hand in hand with the process of teaching. This gives a feedback to the teachers to plan strategies for meaningful teaching and learning in the classroom. The areas of evaluation are assessment of knowledge, application of knowledge, understanding of concepts, skill in solving simple numerical problems and drawing. Regular remedial teaching is to be imparted to ensure desirable level of learning of the students.

Science Practicals :

Experimentation is an integral part in science education. The board has made an endeavour to make students learn science in a joyful manner through simple activites.

Experimentation (Practical) has a weightage of 10%. The is School based assessment i.e. Internal assessment.

Experimental activites :

There are three categories of experiments/activities.

A. Teacher's activity : These have to be demostrated by the teacher in the laboratory.

B. Student's activity : These include simple experiments/activites (from which one is allotted to student in examination on the lottery system). The students shall perform the experiment and write the procedure and results/ conclusion methodically. The minimum number of experiments a students will perform is 3 (covering one each from Phyisics and Chemistry and 1 from Botany or Zoology) The experiments/activity will cary 6 marks. This 6 marks will be distributed in the following way :

I. Performance in examination -3 marks :

For this item any experiment either from Physics or Chemistry or Biology will be selected by the students and perform.

II. Practical record book - 3 marks :

C. Activities relating to model/project preparation, specimen collection etc. For this type of activities the teacher will engage students to develop models of instruments/ideas to prepare science projects based on the facts of their own observations/practical experiences/ field experience/ideas, to prepare charts depicting the life process/ to colect speciments (plants and animals). The teachers will entrust the students for this kind of activities at least six months before their final examination. The students

will have to submit their work at leaset 15 days before their commencement of final examination. This item will carry 4 marks.

Evaluation :

Evaluation will be school based. (Internal Assessment)

1. For experiments under category A, the teacher while demonstating the experiments will ask studens relevant questions and will evalute the student out of a total weightage of 2 in eah demonstration. The marks for each student will found by calculating the average mark.

2. (i) For experiments under category B, students will be evaluated on their performance out of a total weightage 3.

   The 3 marks will be distributed as follows : (i) Theory/ Principle : 1 mark, Experiment and result : 2 marks, Total : 3 marks.

(ii) The students are required to maintain a neat well recorded practical book. Marks on the record book is 3.

3. Students will prepare charts/models. The total marks is 2.

SCIENCE PRACTICAL
Class - IX

List of Experiments (Class - IX)

Sl. No. BIOLOGY

1. Demostration of different parts of one Dicot and one Monocot plant.
2. Identification of plants
3. Morphological study of Honey bee/Ant/Fish/Spider/Mollusca
4. Charts on :
   (i) Animal Cell
   (ii) Plant cell.
   (iii) Types of tissues.
   (iv) List of three bacterial and two protozoal diseases with their symptoms.

PHYSICS :

1. To determine valocity and acceletration of a moving body.
2. To Verify Newton's Second Law of Motion.
3. To Study variation of Potential Energy with height.
4. To measure temperature of liquid at various state in Celsius and Fahrenheit scale.

CHEMISTRY :

1. To prepare sulphide from iron filings and sulphur power and to observe the changes in the properties on the consituent elements as they combine to form the compund.
3. To separate the components from mixture of (a) sand and ammonium chloride (b) Common salt and sand.
4. To Study the extent of cooling caused by evaporation on (i) Water (ii) Ethanol (alcohol) (iii) Ether.
5. To determine the Boiling point of water.

List of equipments and materials (Class-IX)

BIOLOGY :

1. Freshly collected paddy plant with roots, stem and leaves intact.
2. White drawing sheet.
3. Eraser
4. Scale
5. Freshly collected mustard plant with roots, stem and leaves intact.
6. Specimen of (i) Basket, grass, (ii) Bermuda grass, (iii) Honey bee (worker) (iv) Termite (worker), (v) Butterfly, (vi) Fish, (vii) Spider, (viii) Mollusca

PHYSICS :

1. A small rubber or marble
2. Two small wooden blocks or match-boxes
3. A foot scale
4. A small toy car
5. A few long paper strips
6. Paper clips
7. An inclined plane
8. A timer cup
9. Thread
10. Wire
11. Colored solution or ink
12. A few coins
13. A spring balance
14. Flour paste
15. A stone (Small size)
16. Cellotape
17. Scissors
18. A support with a hook and scale
19. A glass breaker
20. Thermometer

21. Few pieces of ice
22. Tripod stand
23. Water
24. Spirit burner
25. Wire holder

CHEMISTRY :

1. Porcelain basin
2. Tripod stand
3. Iron fillings
4. Sulphur powder
5. Carbon disulphide
6. Bar or horse shoe magnet
7. Test tubes (3 nos)
8. Beakes (3 nos)
9. Funnel
10. Filter paper
11. Bottle of distilled water
12. Lemon, salt/sugar
13. Sand
14. Starch or egg albumin
15. Spirit lamp
16. Wire gauze
17. Stirrer (glass rod)
18. Ammonium Chloride
19. Cotton
20. Water
21. Ethanol or rectified spirit
22. Ether
23. Thermometer
24. Petridish
25. Stopwatch
26. Pipette/syringe
27. Spring balance

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General Science, Class - IX

Teaching Points and activities

Theme/Sub-theme	Questions	Key concepts	Resources	Activities/Processes
1. **Food** Higher yields	What do we do to get higher yields in our farms?	Plant and animal breeding and selection for quality improvement, use of fertilizers, manures; protection from pests and diseases; organic farming.	Visit to any fish/bee/dairy/ pig etc. farms; data showing harmful effects of insecticides; process for the preparation of compost, vermicompost.	Collection of weeds found in fileds of different crops; collection of diseased crops; discussion and studying composing/ vermicomposing. (periods 8)
2. **Materials** Material in our clothing	What kinds of clothes help us to keep cool? Why do wet clothes feel cool?	Cooling by evaporation. Absorption of heat.	Work done in class-VII; glassware, heat source, black paper, thermo- meters.	Experiments to show cooling by evaporation. Experiments to show that the white objects get less hot. (periods 5)
Dfferent kinds of materials	In what way are materials different from each other? Is there some similarity in materials?	All things occupy space, possess mass. Definition of matter.	Everyday substances like wood, salt, paper, ice, steel, water, etc.	To feel the texture, observe the colour and lustre, effect of air, water and heat, etc. on each of the materials. (periods 4)

General Science, Class - IX

Theme/Sub-theme	Questions	Key concepts	Resources	Activities/Processes
What are things made of ?	In how many ways can you group the different materials you see around? How do solids, liquids and gases differ from each other?	Solid, liquid and gas; characteristics-shape, volume, density, change of state-melting, freezing.	Wax, water, ice, oil, suger, camphor/ammonium chloride/ naphthalene.	Sorting out a medley of materials, in various ways, Observe shape and physical state of different materials.
	Can materials exist in all the three states?	Evaporation, condensation, sublimation.		Observe effect of heat on each of the resources. (Teacher to perform the experiment for camphor, ammonium chloride and naphthalene.) (periods 4)
	What are things around you made of ? What are the various types of chemical substances?	Elements, compounds and mixtures.Heterogeneous and homogeneous mixtures. Colloids and suspensions.	Samples of commonly available elements, compounds and mixtures. Samples of solution, suspension and colloid.	Discussion on claims 'Air is a mixture' (Mixture of what? How can these be separated?), 'Water is compound' and 'Oxygen is an element'.
	Do substances combine in a difinite manner?	Equivalence-that x grams of A is chemically not equal to x grams of B.	Historical accounts. Glassware, chemicals (oxalic acid, sodium hydroxide, magnesium ribbon.)	Titration using droppers or syringes, quantitative experiments
	How do things combine with each other?	Particle nature, basic units; atoms and molecules.	Kits for making molecular models.	Discussion on the fact that elements combine in a fixed proportion. Through discussion on chemical formulae of familiar compounds.
	Are there any patterns which can help us to guess how things will combine with each other ?	Law of constant proportions, Atomic and molecular masses.	Historical account including experiments of Lavoisier and Priestly.	

General Science, Class - IX

Theme/Sub-theme	Questions	Key concepts	Resources	Activities/Processes
	How do chemists weith and count particles of matter?	Mole concept. Relationship of mole to mass of the particles and numbers. Valency. Chemical formulae of common compounds.		Simple numericals to be done by the students. A game for writing formulae. e.g. criss crossing of valencies to be taught through dividing students into pairs. Each student to hold two playcards: one with the symbol and the other with the valency. Keeping symbols in place, teacher to move only valencies to form the formula of a compound.
What is there inside an atom?	Can we see an atom or a molecule under a microscope or by some other means? What is there inside an atom?	Atoms are made up of smaller particles: electrons, protons, and neutrons. These smaller particles are present in all the atoms but their numbers vary in different atoms. Isotopes and isobars.	Charts, films etc.	Brief historical account of Rutherford's experiment. (Periods 18)

General Science, Class - IX

Theme/Sub-theme	Questions	Key concepts	Resources	Activities/Processes
3. The world of the living Biological Diversity	How do the various plants around us differ from each other? How are they similar? What about animals? How are they similar to and different from each other?	Diversity of plants and animals-basic issues in scientific naming. Basis of classification, Hierarchy of categories/groups, Major groups of plants (salient features) (Bacteria, Thallophyta, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms.) Major groups of animals (salient features) (Non-chordates up to phyla and chordates classes.)	Specimens of some animals, and plants not easily observable around you.	Discussion on Diversity and the characteristics associated with any group. (Periods 14)
What is the Living being made up of?	What are we made up of? What are the different parts of our body? What is the smallest living unit?	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 systems, organism,	Permanent slides, model of the human body.	Observation of model of human body to learn about levels of organization-tissue, organ, system, and organism, observe blood smears (frog and human), cheek cell, onion peel cell, Spirogyra, Hydrila leaves (cyclosis.) (Periods 12)

General Science, Class - IX

Theme/Sub-theme	Questions	Key concepts	Resources	Activities/Processes
		Structure and functions of animal and plant tissues (four types in animals; meristematic and permanent tissues in plants.)		
How do we fall sick?	What are the various causes of diseases? How can diseases be prevented? How can we remain healthy?	Health and its failure. Disease and its causes, Diseases caused by microbes and their prevention-Typhiod, diarrhoea, malaria, hepatitis, rabies, AIDS, TB, polio; pulse polio programme.	Newspaper artricles, information from health centres, photographs of various causal organisms. Photographs, permanent slides of bacteria.	Surveying neighbourhood to collect information on disease occurence pattern. Studying the life cycle of the mosquito and malarial parasite. Discussion on how malaria is spread, how to prevent mosquito breeding. (Periods 10)
How do substance move from cell to cell?	How do food and water move from cell to cell? How do gases get into the cells? What are the substance that living organisms exchange with the external world? How do they obtain these substances?	Diffusion/exchange of substances between cells and their evnironment, and between the cells themselves in the living system; role in nutrition, water and food transport, excretion, gaseous exchange.	Egg membrane, Rhoeo leaves, sugar, microscope, slides.	Looking at closed and open stomata, plasmolysis in Rhoeo leaf peels. (Periods 15)

General Science, Class - IX

Theme/Sub-theme	Questions	Key concepts	Resources	Activities/Processes
4. Moving Things, People and Ideas Motion	How do we describe motion?	Motion-displacement, velocity; uniform and non uniform motion along a straight line, accelecration, distance-time and velocity-time graphs for uniform and uniformly accelerated motion, equation of motion by graphical method; elementary idea of uniform circular motion.		Analysis of motion of different common objects. Drawing distance time and velocity time graphs for uniform motion and uniformly accelerated motion. (Periods 12)
Force and Newton's Laws	What makes things change their state of motion ?	Force and Motion, Newton's laws of motion: Interia of a body, interia mass, momentum, force and acceleration. Elementary idea of conservation of momentum, action and reaction forces.	Historical accounts; Experinences, from daily life; wooden and glass boards, sand, balls; wooden support, some coins (say of Rs. 2 or Rs. 5) tumbler; balloons etc.	Demonstrating the effect of force on the state of motion of objects in a variety of daily-life situations. Demonstrate the change in direction of motion of an object by applying force. (Periods 10)
Gravitation	What makes things fall?	Gravitation : Universal law of gravition,	Spring balance	Analysis of motion of ball falling down.

General Science, Class - IX

Theme/Sub-theme	Questions	Key concepts	Resources	Activities/Processes
	Do all things fall in the same way?	Force of gravitation of the earth (gravity), acceleration due to gravity; mass and weight;free fall.		and of ball thrown up. measuring mass and weight by a spring balance. (Periods 7)
Work energy and power	How do we measure work done in moving anything? How does falling water make a mill run?	Work done by a force, energy power; kinetic and potential energy;law of conservation of energy.	Rope(or string), board or plank, wooden block, ball, arrow, bamboo stick, spring, etc.	Experiments on body rolling down inclined plane pushing another body. Experiments with pendulum. Experiments with spring. Discussion. (Periods 6)
Floating bodies	How does a boat float on water?	Thrust and pressure. Archimedes' principle, buoyancy, elementary idea at relative density.	Cycle pump; board pins, bulletin board, mug, bucket, water etc.	Experiments with floating and sinking objects. (Periods 4)

General Science, Class - IX

Theme/Sub-theme	Questions	Key concepts	Resources	Activities/Processes
How do we hear from a distance?	How does sound travel? What kind of sounds can we hear? What is an echo? How do we hear?	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)	String, ball or stone as bob, water tank, stick, slinky, rope, echo tube, rubber pipe etc. Model or chart showing structure of human ear.	Experiment on reflection of sound. (Periods 10)

General Science, Class - IX

Theme/Sub-theme	Questions	Key concepts	Resources	Activities/Processes
5. How things work **6. Natural Phenomena** **7. Natural Resources** Balance in Nature	Why do air, water and soil, seem not to be consumed? How does the presence of air support life on earth? How have human activities created disturbances in the atmosphere? How does nature work to maintain balance of its components?	Physical resources: air, water, soil, air for respiration, for combustion, for moderarting temperatures, movements of air and 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, nitrogen.	Daily newspapers, magazines and other reading materials. Weather reports over a few months and air quality reports over the same time period. Case study material.	Case studies of actual situation in India with more generalised overview of inter relationship of air, water, soils, forests. Debates on these issues using resources mentioned alongside, visit to/from an environment NGO; discusssion. (Periods 15)

GENERAL SCIENCE

Subject Code : C3

Class : IX **Time : 3 hours**
Full Marks : 100 **Pass Marks : 30**

Theory : 90
Internal Assessment : 10
Pass marks in written examination : 27

Sl. No.	Chapters	Marks	
		Half Yearly	Annual
1.	Matter in our surroundings	8	5
2.	Is matter arround us pure	8	5
3.	Atoms and molecules		6
4.	Structure of the atom		6
5.	The fundamental unit of life	12	5
6.	Tissues	12	6
7.	Diversity in living organisms		7
8.	Motion	12	7
9.	Force and Laws of Motion	12	8
10.	Gravitation	10	7
11.	Work and energy		7
12.	Sound		6
13.	Why do we fall ill	8	5
14.	Natural resources	8	5
15.	Improvement in Food resources		5
	Total (Theory)	**90**	**90**

Experimental Activites Practicals/Internal Assessment

Marks - 10

Sl. No.	CHAPTERS	Marks	
		Half Yearly	Annual
1.	Category A : Teacher's activity- (Teacher will evaluate the students as he/she demonstrates)		2
2.	Category B : Student's activity-		
	Activity		3
	Practical record book		3
3.	Category C : Chart/Model/ Speciment Collection		2
	Total	**10**	**10**
	Grand Total :	**100**	**100**

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