Unit 15. Statistics & Probability **(14 Perlods)**

Raw data, frequency, making frequency table from the given raw data. Ungrouped and grouped data. Range, class size, class limits, class marks. Grouping the given data into classes. Drawing, reading and interpretation of histogram. Circle graphs or ple chart and its drawing. Probability, Chance. Experiment, Outcome, Event, Probability of an event. Simple cases.

Learning Outcomes :

After studying this chapter students will be able to:

1. understand the terms observation. raw data, range, class marks, frequency, frequency table.
2. differentiate between raw data, ungrouped & grouped data.
3. representation of the given data through pictorial representations viz. histogram and pie chart and interpretation of the same.
4. define the term trial, outcome, probability.
5. find the probability under different given situations.

Unit 16. Rotational Symmetry **(4 Periods)**

(By Activities only)

Rotational symmetry and its order, Centre of Rotation, Angle of Rotation. Line symmetry and Rotational Symmetry. Rotational symmetry should be limited to polygons and regular polygons in case number of sides is more than 4.

Learning Outcomes :

The student will be able to :

1. understand symmetry
2. distinguish between line symmetry and rotational symmetry.
3. understand rotational turns about a fixed point.
4. know the order of rotation of symmetry i.e. four in a square and 3 in an equilateral triangle.
5. calculate the angle of rotation about a fixed point.

SCIENCE & TECHNOLOGY

The three components of this course are :

Physics, Chemistry and Biology.

Learning Outcomes :-

The teaching of Science. at this stage, will help the learners to:

- develop a scientific attitude and temper.
- understand scientific concepts, principles and laws.
- acquire the knowledge of scientific terms, facts, definitions and processes.
- develop experimental skills. rational thinking ability to analyse and sharpen their sense of enquiry and creativity.
- develop basic process skills in science like (measurement skills, observational skills and inferences) and to encourage the use of locally available resources.
- inculcate science and technology related values.
- recognize the relationship of science, technology, environment and society.
- appreciate the contribution of science towards development.
- create awareness and concern for a healthy environment and preservation of ecosystem.

GENERAL INSTRUCTIONS :

1. The annual examination will comprise of 100 marks wherein the written exam will be of 80 marks and internal assessment will be of 20 marks.
2. Periodic written tests are restricted to three in number in an academic year. Average of the best two scores in these tests is to be taken for final submission of marks.
3. These written tests are to be conducted by the school at their own level, as per their own schedule.
4. Information given under the headings 'Do you know,' fact sheets, 'Case Study' and 'Something to Do' at the end of the chapters would not be evaluated in any of the written tests.
5. For annual examination, 80 marks assigned for the written test,

would be subdivided as follows :

Physics	30 Marks
Chemistry	25 Marks
Biology	25 Marks

Guidelines for Internal Assessment :

The Internal Assessment, for 20 marks, is to be carried out as given below :

S. No.	Tools of Internal Assessment	Total Weightage out of (20 Marks)
1	**Periodic Tests** Three periodic tests (pen and paper test) will be conducted at school level, as per their own schedule, and the average of the best two scores will be reduced to 5 marks.	5
2	**Subject Enrichment Activity** Ist Activity : Art Integration Activity : Students will be given an activity/ interdisciplinary project in which they will use any form of Art to express/ explain the scientific idea. 2nd Activity : Mobile Lab Kit Making : Students will prepare under teacher's guidance their own mobile lab kit and demonstrate/carry out a sample science activity using it	5

3	**Multiple Assessment Activity** Students will be assessed using multiple tools of observation such as interdisiplinary project, Role play, Group discussion, Debate, Quiz, Oral test, Field work, Bulletin board making, Puzzles etc.	5
4	**Portfolio :** It includes Journal, Notebook work. Assignments/Worksheets. Criteria for Assessing Portfolio : (i) Organisation - Neatness and visual appeal (ii) Completion of work - Focus on specific objectives (iii) Evidence of student growth (iv) Inclusion of relevant work	5

IMPORTANT NOTE :-

Some suggested Art integration activities, Mobile Lab activities and Interdisiciplinary projects are given at the end of the document.

The following six chapters of Science textbook will **Not** be included for assessment in Annual Examination. However, they will be a **Mandatory** part of the internal assessment.

Chapter 8 : Conservation of Plants and Animals
Chapter 9 : Crop Production and its Management
Chapter 17 : Stars and Solar System
Chapter 18 : Earthquakes
Chapter 19 : Pollution of Air
Chapter 20 : Pollution of Water

These chapters may be included in Internal Assessment as follows:

- Include questions from any two of these chapters in each of the periodic tests.
- Give an Art Integration Activity or Interdisciplinary Project on

topics from these chapters.

- Carry out Multiple Assessment based on these chapters.

DETAILED SYLLABUS

The details of the syllabus, i.e., contents, number of periods and marks assigned to each chapter for the three components of the syllabus, are given below:

PHYSICS **(30 Marks)**

Name of the Chapters	No. of Periods Allotted	Marks Assigned
Ch. 4 : Force and Pressure	8	5
Ch. 5 : Friction	10	5
Ch. 10 : Refraction and Dispersion of Light	12	7
Ch. 11 : The Human Eye	6	4
Ch. 12: Sound	6	4
Ch. 16 : Electric Current and Its Chemical Effects	10	5
Ch. 17 : *Stars and Solar System Ch. 18: *Earthquakes	6 6	For internal assessment only
	64	30

CHEMISTRY **(25 Marks)**

Name of the Chapters	No. of Periods Allotted	Marks Assigned
Ch. 3 : Metals and Non-Metals	12	8
Ch 6 : Sources of Energy	6	5
Ch. 7: Combustion	8	7
Ch. 13 : Synthetic Fibres and Plastics	8	5

Ch. 19 : *Pollution of Air Ch. 20 : *Pollution of Water	6	*For internal assessment only
	46	25

BIOLOGY **(25 Marks)**

Name of the Chapters	No. of Periods Allotted	Marks Assigned
Ch. 1 : The Cell–Its Structure and Functions	8	5
Ch. 2: Microorganisms–Friends and Foes	9	6
Ch. 8 : *Conservation of Plants and Animals Ch. 9 : *Crop Production and its Management	6 7	*For internal assessment only
Ch. 14 : Reproduction in Animals	10	7
Ch. 15 : Reaching the Age of Adolescence	10	7
	50	25

* Please refer to the IMPORTANT NOTE for 'Guidelines for Internal Assessment.'

Chapter-1 : The Cell-its Structure and Functions **(5 Marks)**

- Discovery of the cell (8 periods)
- The Cell-variation in cell number, shape and size in living organisms
- Parts of cell
- Levels of organisation in an organism
- Comparison between plant cell and animal cell
- Well labelled diagrams of plant cell and animal cell

Learning Outcomes :

The Learner will be able to :

1. comprehend and understand the basic unit of life.
2. differentiate between plant cell and animal cell
3. describe various cell-organelles and their functions in the cell.

Chapter-2 : Micro/organisms-Friends or Foes **(6 Marks)**
(9 periods)

- Introduction
- Types of microorganisms
- Viruses are unique
- Where do microorganisms live?
- Role of microorganisms in our life
- Microorganisms as our friends
- Microorganisms - The Foes
- Food poisoning
- Food preservation

Learning Outcomes :

The learner will be able to :

1. know about the different types of micro-organisms and their habitats.
2. compare the role of microorganisms as friends and foes.
3. understand the concept of food preservation and apply its techniques.

Chapter-3 : Metals and Non-metals **(8 Marks)**
(12 periods)

- Classification of elements
- Occurrence of elements
- Minerals and ores
- Physical Properties
- Chemical Properties
- Reaction with oxygen, water, acids and alkalies
- Reactivity of metals
- Displacement reactions
- Noble Metals
- Uses of metals and non-metals
- Alloys - Composition and uses of alloys

Learning Outcomes :

The learner will be able to :

1. classify elements and learn about their occurrence in nature.
2. understand the different physical properties of metals and non-metals and their applications (based on these properties).
3. differentiate between chemical behavior of metals and non-metals towards air. water and acids.
4. relate displacement reaction of metals with reactivity series.
5. comment upon noble metals and uses of metals. non-metals and alloys.

Chapter-4 : Force and Pressure **(5 Marks)**
(8 periods)

- Force
- Effects of force
- Factors associated with magnitude of force needed
- Balanced and unbalanced forces
- Types of forces Contact and non contact forces
- Pressure
- Applications of the concept of pressure in daily life
- Liquid pressure
- Properties of liquid pressure
- Atmospheric pressure
- Variation in air pressure
- Importance of atmospheric pressure
- Force and pressure : concept map

Learning Outcomes :

The Learners will be able to :

1. define, identify and classify force and its types.
2. understand the concept of pressure and its applications.

Chapter-5 : Friction **(5 Marks)**
(10 periods)

- Concept of Friction
- Cause of friction
- Factors affecting friction
- Types of friction-static, sliding and rolling
- Friction - A necessity
- Friction - An evil or nuisance
- Increasing / Reducing friction
- Fluid friction

Learning Outcomes :

The learners will be able to :

1. Identify various types of friction.
2. appreciate that friction is a necessity as well as a nuisance.
3. understand methods of increasing and decreasing friction.

Chapter-6 : Sources of Energy **(5 Marks)**

(6 periods)

- Classification of sources of energy : On the basis of occurrence, physical state and availability.
- Fossil fuels
- Wood as a fuel
- Coal : occurrence, formation and types
- Destructive distillation and its products- coke, coal-tar and coal gas
- Petroleum
  - Occurrence of petroleum
  - Refining of petroleum
  - Petroleum products and their uses
  - Natural gas
  - Uses of natural gas
- Cleaner fuels

Learning Outcomes :

The learner will be able to :

1. classify the sources of energy on the basis of their occurrence, physical state and availability.
2. understand what are fossil fuels, their occurrence in nature and their processing.
3. know about different types of fuels.
4. understand the importance of cleaner fuels and alternative sources of energy.

Chapter-7 : Combustion **(7 Marks)**

(8 periods)

- *Idea of Combustion*
- *Conditions required for combustion*
- *Types of combustion*

- Fire control
- Imcomplete combustion
- Flame
- Fuel and calorific value
- Characteristics of a good fuel
- Harmful effects of fuels

Learning Outcomes :

The learner will be able to :

1. understand the term combustion and the conditions required for combustion.
2. differentiate between types of combustion and understand the consequences of incomplete combustion.
3. know about various methods used to control fire.
4. understand different zones of flame.
5. appreciate the properties of a good fuel.

Chapter-8 : Conservation of Plant and Animals

(*For Internal Assessment only) **(6 Periods)**

- Domestic consequences of deforestation
- Global consequences of deforestation
- Conservation of forests and wildlife
- Biosphere reserves
  (Map of biodiversity hotspots not to be evaluated)
- National Parks
- Wildlife Sanctuaries
- Flora and fauna
- Endemic species
- Red Data Book
- Migration
- Reforestation
- Recycling of paper

Learning Outcomes :

The learner will be able to :

1. know deforestation and its consequences.
2. understand the importance of migration and biodiversity.

3. know about ways to conserve brodiversity.

Chapter-9 : Crop Production And its Management

(*For Internal Assessment only) **(7 Periods).**

- Food from plants
- Agricultural Practices
  - Preparation of Soil,
  - Sowing,
  - Soil Replenishment,
  - Irrigation,
  - Traditional System of Irrigation,
  - Modern System of Irrigation,
  - Crop Protection,
  - Harvesting,
  - Storage.
- Crop Improvement

Learning Outcomes :

The learner will be able to :

1. understand the various agricultural practices
2. appreciate and analyse the methods of crop improvement & their protection.

Chapter-10 : Refraction and Dispersion of Light **(7 Marks)**

(12 periods)

- Refraction of Light
- Refraction-its cause
- Refractive index, optical density
- Rules of refraction
- Refraction of light by a glass slab
- Dispersion of white light by a glass prism
- Rainbow
- Lenses- spherical lenses
- Basic terms related to lenses
- Three special rays for lenses
- Image formation by convex and concave lenses
- Application of lenses

Learning Outcomes :

The learners will be able to :

1. Understand the concept of refraction using various optical devices and its causes.
2. Draw and identify images formed by concave and convex lens for different positions of the object.
3. Appreciate the importance of lenses in daily life.

Chapter-11 : The Hyman Eye **(4 Marks)**

(6 periods)

- Structure of human eye
- Function of various parts of the human eye .
- The blind spot
- How do we see colours?
- Working of the human eye
- Range of vision
- Defects of vision
- Care of the eyes
- Visually challenged persons
- Help for visually challenged persons
- Braille system

Learning Outcomes :

The learner will be able to :

1. draw the structure and appreciate the function of the human eye.
2. understand the various defects of vision and ways to take care of eyes.
3. be sensitized towards visually challenged persons.

Chapter-12 : Sound **(4 Marks)**

(6 periods)

- Sound and vibrations
- Sounds produced by humans
- Sounds produced by animals
- Propagation of sound
- Light propagates faster than sound
- Amplitude, time period and frequency of a vibration
- Loudness and pitch of a sound

- Audible and inaudible sounds
- Noise and music
- Noise pollution : sources and effects
- Measures to limit noise pollution
- Hearing impairment

Learning Outcomes :

The learner will be able to :

1. know the mechanism of production of sound by humans and various animals.
2. understand the mechanism of propagation of sound.
3. identify causes and effects of noise pollution and ways to limit noise pollution.

Chapter-13 : Synthetic Fibres and Plastics **(5 Marks)**

(8 periods)

- Natural fibres and synthetic fibres
- Different synthetic fibers.
  - Rayon or Artificial Silk,
  - Nylon,
  - Terylene,
  - Polyethene tetraphthalate (PET)
  - Acrylic fibres
- Advantages and disadvantages of synthetic fibres
- Plastics
- Characteristics of synthetic plastics
- Types of synthetic plastics
- Thermosetting
- Thermoplastics
- Plastics and the Environment
- Damage caused by plastic waste
- Measures to control the damage caused by plastic waste

Learning Outcomes :

The learner will be able to :

1. understand the meaning of the term 'synthetic fibres'.
2. know about different types of synthetic fibres and plastics and their properties, advantages and disadvantages.

3. differentiate between thermoplastics and thermosetting plastics.
4. know, and get sensitised, towards the damage caused by plastic waste and measures to control this damage.

Chapter-14 : Reproduction in Animals **(7 Marks)**

(10 periods)

- Definition of reproduction
- Asexual reproduction
- Sexual reproduction
- Reproductive patterns
- Reproductive systems
- Fertilization, development of the embryo
- How do hens lay eggs?
- Viviparous and Oviparous animals
- Journey from young ones to adults (frogs)
- Diagrams of binary fission in Amoeba, multiple fission in *Plasmodium*, budding in *Hydra* and Yeast, male and female reproductive systems and human sperm.

Learning Outcomes :

The learner will be able to :

1. know the various modes of reproduction in animals.
2. differentiate between oviparous and viviparous animals.
3. diferentiate between male and female reproductive system.

Chapter-15 : Reaching the age of Adolescence **(7 Marks)**

(10 periods)

- Adolescence and Puberty
- Changes at puberty
- Sexual development :
  - Development of sex organs,
  - development of secondary sexual characters,
  - change in hormonal balance,
  - the reproductive phase in human beings
- Determination of sex of the child
- The Endocrine system
- Role of hormones in completing the life cycle of insects and frogs
- Reproductive health ; Nutritional needs of adolescents, Personal

hygiene, Physical exercise, Say 'No to Drugs'.

Learning Outcomes :

The learner will be able to :

(1) understand and analyse the problems of adolescence.

(2) understand the emotional and physiological changes that take place during adolescence.

(3) know the importance of hormones in life cycle of different organisms.

Chapter-16 : Electric Current and its Chemical Effects (5 Marks)

– Conductors and Insulators (10 periods)
– Conduction through liquids
– Cause of conductivity of liquids
– Electrolytes
– Conversion of chemical energy into electrical energy
– Chemical effects of electric currents, their applications
– Faraday's discovery
– Electromagnetic induction

Learning Outcomes :

The learner will be able to :

1. understand the concept of electrolyte, cause of conductivity of liquids.
2. know the chemical effects of electric current and its applications
3. know about electromagnetic induction.

Chapter-17 : Stars and Solar System (6 periods)

(*For Internal Assessment only)

– Galaxy-Milky way galaxy
– Stars
– Constellations
– The moon
  • phases of the moon,
  • the moon's surface
– The solar system
  • Sun

  • Planets – Terrestrial and Jovian planets
– Minor bodies in the solar system
– Artificial satellites and their applications

Learning Outcomes :

The learner will be able to :

1. understand various heavenly bodies like stars, planets etc. and their characteristics.
1. appreciate the concept of artificial satellites and their applications.

Chapter-18 : Earthquakes (6 periods)

(*For Internal Assessment only)

– Earthquakes and their effects
– Cause of an earthquake
– The Focus
– Predicting an earthquake
– Measuring an earthquake
– Protection against earthquakes; safety precautions

Learning Outcomes :

The learner will be able to :

1. understand earthquakes, their causes and effects.
2. relate Richter scale readings with intensity of earthquake.
3. acquire skills of disaster management.

Chapter-19 : Pollution of Air (6 periods)

(*For Internal Assessment Only)

– Pollution
– Air pollution; Causes of air pollution;
– Harmful effects of carbon monoxide, nitrogen dioxide smog, chlorofluoro carbons (CFCs)
– Acid rain and its harmful effects
– Green House Effect and Global Warming
– Causes of increase in concentration of green house gases
– Consequences of green house effect
– Global warming and its consequences
– Measures to check global warming

– Methods to control air pollution

Learning Outcomes :

The learner will be able to :

1. understand air pollution and its causes.
2. know about the harmful effects of major air pollutants.
3. understand the phenomenon of green house effect and global warming; their causes and consequences
4. know about different methods of controlling air pollution.

Chapter-20 : Pollution of Water (6 periods)

(*For Internal Assessment Only)

– Water pollution
– Causes of water pollution
– Potable water
– Purification of drinking water
– Methods to make water safe for drinking
– Treatment of major sources of water pollution
– Treatment of sewage
– Treatment of industrial waste
– Conservation of water

Learning Outcomes :

The learner will be able to :

1. understand water pollution and its causes.
2. know about ways of purifying water.
3. appreciate the need for control of water pollution.
4. sensitize themselves and others towards water conservation.

List of Suggested Activities for
Subject Enrichment and Multiple Assessment
(Minimum three activities are to be carried out)

Note* : The list given here is only suggestive in nature. The *teachers/students*, can takeup other projects/ activities in *place of those suggested here. This list is not prescriptive and exhaustive.

1. (a) Prepare a temporary mount of onion peel and cheek cells.

(b) Make a model of plant cell/animal cell using ecofriendly materials.

2. (a) Spotting of different microorganisms—Amoeba, Spirogyra, Paramoecium, Yeast (either slides/ photographs).

   (b) Include a photocopy of your "Vaccination chart" in PORTFOLIO. Prepare a "Survey report" on diseases for which vaccination is done in India.

3. **Laboratory Demonstration** by teacher on different physical and chemical properties of metals and non-metals.

4. (a) **Use pictures/science toons** to show different types of forces.

   (b) **Lab activities** to show relation of-

   (i) force and pressure

   (ii) pressure and area

   (c) demonstration showing properties of liquid pressure.

5. (a) Collection of interesting facts or situations to create Power Point Presentation on-
   (i) Methods to increase or decrease friction in day to day life.
   (ii) Advantages or disadvantages of friction.

   (b) Demonstration of an activity to show that force of friction increases with increase in the weight of the body.

6. (a) **Graphical representation** on Increase in cost of Petrol / Diesel in last ten years.

   (b) **Survey** - Visit a nearby petrol station and collect data for one month about number of vehicles that have undergone pollution check on each day of that month.

7. (a) **Activity** showing different conditions required for combustion.

   (b) **Collect information** on different types of fire extinguishers and write about them in a scrap file with pictures of fire

extinguishers.

(c) Activities showing presence of wax vapours in the innermost zone of candle flame and unburnt particles of carbon in the luminous zone of the candle flame and to show that the non-luminous zone is the hottest part of the candle flame.

8. (a) **Take Out a Rally** to create awareness about "Importance of Trees".

(b) Prepare recycled paper using scrap paper.

(c) **Make a Picture Gallery** on different types of species of plants and animals.

(d) Design a Brochure on National Park/Bio-diversity Park/ Wildlife Sanctuary.

9. (a) Compose a song/poem or jingle to promote organic farming or green manuring.

(b) Design different agricultural implements using clay/ dough.

10. Demonstration/Activity on refraction of light through a glass slab, glass prism and spherical lenses.

11. (a) Model of Human Eye using waste materials.

(b) Survey on "Defects of vision".

12. (a) In a scrap file, paste pictures of different musical instruments and give information about their special characteristics (through a visit to the music room).

(b) **Power Point Presentation** on "Cause and Effects of Noise Pollution" and "Measures to be taken to minimise ill effects of Noise Pollution".

13. (a) Make a doll using waste plastic materials (bottle, caps, straws, etc.) and adorn it using different types of synthetic fibers/fabrics. [click its photograph and place it in the portfolio]

(b) Draw posters and write slogans (self created) on "Say No To

Plastics".

(c) Make an "Eco brick" using used plastic bottles and plastic wrappers.

(d) Make a planter by using a PET bottle/used tyre.

14. (a) **Write up** on "Challenges faced by countries with over population".

(b) **Model** on "Life cycle of a frog".

15. (a) Poster making on **"Say no to drugs"**.

(b) Short film / Skit / Street play/video on **'Gender sensitization'**.

16. (a) To **prepare** a continuity tester to check conduction through liquids.

(b) **Demonstration** of electrolysis of water.

17. (a) **Visit** or collect information about any of the ancient astronomical observatory built by Maharaja Jai Singh and instruments / technique used by astronomers of those times.

(b) To make a **collage** on "Achievements of ISRO" till date. [Sources - newspaper, Science magazine, newsletters, journals, internet etc.]

18. (a) On the **map** of world mark / indicate the place where Tsunami has occured or is most likely to occur. [To be included in port folio.]

(b) **Role play** an "Do's & Dont's during an earthquake."

19. (a) **Report** on 'Smoke Towers".

(b) **Comparative Study** of steps taken by the Government against pollution of three polluted cities of the world.

20. (a) **Street play** "Jal hi Jeevan Hai".

(b) **Case study** on Conservation of water bodies.