

# PHYSICAL SCIENCE - SYLLABUS

## 8th CLASS

### 1. Force

#### 1.1 What is force ?

##### 1.1.1 Identifying push or pull through different actions

#### 1.2 Types of forces

##### 1.2.1 Contact forces

###### 1.2.1.1 Muscular Force

- Preparing a list of instances where muscular force is used.
- Observing the muscle while working

###### 1.2.1.2 Force of Friction (Frictional force)

- Observing the motion of a ball on different surfaces
- Observing the motion of objects on an inclined plane

###### 1.2.1.3 Normal Force

###### 1.2.1.4 Tension

Lab Activity : To find the limiting force that can be borne by a string

##### 1.2.2 Forces acting at a distance (Field Forces)

###### 1.2.2.1 Magnetic Force

- Observing the magnetic force

###### 1.2.2.2 Electrostatic Force

- Observing electrostatic force

##### 1.2.2.3 Gravitational Force

- Explaining the force acting at a distance :  
Concept of field
- Visualizing magnetic field

#### 1.3 Net force

- Effects of net force acting on a table
- Effects of stretched rubber bands on fingers

##### 1.3.1 Calculating Net force from Free Body Diagrams (FBD)

#### 1.4 Effect of force on change of the state of motion of an object and its direction

##### 1.4.1 Effects of net force on direction of moving object

##### 1.4.2 Effects of force on the shape of an object

#### 1.5 Pressure

- Change in effect of force with area of contact
- What is pressure ?
- Identifying effects of force

### 2. Friction

#### 2.1 Force of friction - Types

- Identifying forces acting on a body and the effect of frictional force.

##### 2.1.1 To understand the nature of friction and the concept of static friction

- Definitions of friction, sliding friction, static friction
- Observing the variations in frictional force

- 2.2 Factors affecting friction
  - 2.2.1 Effect of rough surface on frictional force
  - 2.2.2 Effect of area of contact on frictional force
  - 2.2.3 Effect of Normal force on friction
- 2.3 Is friction necessary ?
  - 2.3.1 Friction produces heat
- 2.4 Increasing the decreasing friction
  - 2.4.1 How to reduce friction ?
  - 2.4.2 Effect of rollers on friction
  - 2.4.3 Understanding the principle of ball bearings
- 2.5 Fluid friction
  - Observing fluid friction
  - 2.5.1 Identifying factors influencing the fluid friction

### 3. Synthetic Fibres and Plastics

- 3.1 Clothes made from Natural fibres
- 3.2 What is synthetic fibre ?
  - 3.2.1 Concepts of monomer and polymer
- 3.3 Identifying synthetic fibres
  - 3.3.1 identifying synthetic fibres by burning test
- 3.4 Some of the synthetic fibres / examples for synthetic fibres
  - 3.4.1 Nylon
    - How is nylon made ?
    - How strong is nylon ?
  - 3.4.2 Rayon
    - How is rayon prepared ?
    - Why are different synthetic fibres mixed ?

- 3.4.3 Acrylic
- 3.4.4 Why synthetic fibres ?
- 3.4.5 Polyesters
  - How can you say a bottle is PET bottle ?
  - Identification of various articles with recycling codes
- 3.5 Plastics around us
  - 3.5.1 What is a plastic ?
  - 3.5.2 Types of plastics
    - Identifying thermoplastic and thermo setting plastic by flame test.
    - 3.5.2.1 Thermoplastics
    - 3.5.2.2 Thermo setting plastics
  - 3.5.3 Why do we prefer plastics ?
  - 3.5.4 Plastics and Environment
- 3.6 Bio degradable and non-bio degradable substances
- 3.7 Principle of 4R (Reduce, Recycle, Reuse and Recover)
  - 3.7.1 Reduce
  - 3.7.2 Reuse
  - 3.7.3 Recycle
    - Recycling code
    - Role of codes in Recycling process
    - Uncoded plastics
  - 3.7.4 Recover

#### 4. Metals and Non metals

- 4.1 Metals and non metals - an introduction
- 4.2 Physical properties of metals and non metals
  - 4.2.1 Appearance - Lustrous nature
    - Observing appearance and colour of materials
  - 4.2.2 Sonarity
    - Listening sound produced by some materials
  - 4.2.3 Malleability
    - Identifying malleability of material
  - 4.2.4 Ductility
  - 4.2.5 Electrical conductivity
    - Identifying electrical conductivity of a material
  - 4.2.6 Conductivity of Heat
    - Observing conductivity of heat of metals
- 4.3 Chemical properties of metals and non metals
  - 4.3.1 Reaction with oxygen
    - Rusting of metals
  - 4.3.2 Reaction with water
  - 4.3.3 Reaction with acids
- 4.4 Reactivity of metals
- 4.5 Some uses of non metals
- 4.6 Some uses of metals

#### 5. Sound

- 5.1 Production of sound
  - listening sound and predicting source
  - identifying different sounds

- 5.1.1 Vibrating bodies produce sound
  - Observing sound produced by a vibrating body
- 5.2 Sound has energy
- 5.3 Musical instruments
  - producing sounds that resembles sound of rainfall
  - observing changes in sound
- 5.4 Sounds produced by human
  - 5.4.1 Structure of voice box
    - Observing movements of vocal cords during speech
- 5.5 Sound propagation
  - 5.5.1 Sound needs medium to propagate
  - 5.5.2 Propagation of sound in different media
    - Observing sound propagation in Solids
    - Observing sound propagation in liquids
  - 5.5.3 Is sound propagate without medium
- 5.6 How do we hear sound
  - 5.6.1 Structure and function of eardrum
- 5.7 Characteristics of sound
  - 5.7.1 Loudness - Feebleness
    - Observing relationship between the intensity of sound produced and vibrations of a body
  - 5.7.2 Pitch
    - Identifying pitch or shrillness of a sound
- 5.8 Normal sound consists of mixed frequencies
- 5.9 Noise and music
- 5.10 Audible range

- 5.11 Sound pollution
  - 5.11.1 Effects of sound pollution
  - 5.11.2 Controlling measures

## 6. Reflection of Light at plane surfaces

- 6.1 Formation of image by a Pin hole camera
- 6.2 Fermat principle
- 6.3 Plane mirror
- 6.4 Reflection – its laws
  - 6.4.1 Plane of reflection
- 6.5 Plane mirrors – image formation
  - 6.5.1 Characteristics of an image formed by a plane mirror

## 7. Coal and Petroleum

- 7.1 Sources of materials
- 7.2 Exhaustible and inexhaustible resources
- 7.3 Fuels - Coal, Petroleum, Natural Gas
  - 7.3.1 Production of petroleum
  - 7.3.2 Natural gas is an important source
  - 7.3.3 Uses of coal, petroleum, natural gas
  - 7.3.4 various uses of petroleum
  - 7.3.5 Coal and its products
    - Coke
    - Coal gas
    - Coaltar
  - 7.3.6 Uses of coal products
    - Observing gases evolved in burning of coal
- 7.4 Some petrochemical products
- 7.5 Natural gas and petrochemicals
- 7.6 Formation of coal, petroleum
- 7.7 Versatile nature of coal and petroleum

- 7.8 Conserving coal and petroleum
- 7.9 Misuse of energy resources
  - 7.9.1 Harmful effects of fuels

## 8. Combustion, Fuels and flame

- 8.1 Do all materials burn ?
- 8.2 What is required for the process of combustion ?
  - 8.2.1 Testing of necessity of air for burning
  - 8.2.2 Oxygen helps in burning
- 8.3 Ignition temperature
  - 8.3.1 Burning paper with sun rays
  - 8.3.2 Understanding ignition temperature
- 8.4 Types of Combustion
- 8.5 Fuels
- 8.6 Fire controll
- 8.7 Flame
  - 8.7.1 Observing behaviour of different solid fuels
  - 8.7.2 Structure of flame
  - 8.7.3 Observing situations, happens in different zones of candle flame

## 9. Electrical Conductivity of Liquids

- 9.1 Testing the material to know which allows electric current to pass through it.
- 9.2 Electrical conductivity of liquids
  - 9.2.1 Testing the electrical conductivity of liquids
  - 9.2.2 When do liquids conduct electricity - electric conductivity of electrolyte.
- 9.3 Chemical effects of electric current
  - Testing the effect of electric current on potato.

- 9.4 Electrolytic cell
  - 9.4.1 Making of an electric cell
- 9.5 Electroplating
  - 9.5.1 Electroplating procedure
  - 9.5.2 Uses of electroplating

## 10. Some natural phenomena

- 10.1 Lightning
  - 10.1.1 Sparks - that the greeks know about
- 10.2 Charging by rubbing
  - 10.2.1 Effects of rubbing
  - 10.2.2 Effects of charged bodies
- 10.3 Types of charges and their interaction
  - 10.3.1 Finding the presence of charge on a body
  - 10.3.2 Transfer of charge
- 10.4 Story of Lightning - Safety measures
  - 10.4.1 Lightning conductor
- 10.5 Earthquakes
  - 10.5.1 Collecting information about earthquake damages
  - 10.5.2 What is earthquake
  - 10.5.3 Causes of earthquake
  - 10.5.4 Earthquakes - safety measures
  - 10.5.5 Earthquakes in Telangana

## 11. Stars and the Solar system

- 11.1 Observing changes in length of shadow
- 11.2 Understanding the North - South movement of Sun
- 11.3 Sun-dail
- 11.4 Phases of moon

- 11.4.1 Why moon shape changed
- 11.4.2 Moon surface
- 11.5 Solar eclipse
  - 11.5.1 Types of Solar eclipse
- 11.6 Lunar eclipse
  - 11.6.1 Types of lunar eclipse
- 11.7 Know about stars
  - 11.7.1 Observing movements of constellation
  - 11.7.2 Why polar star appears fixed at a point
- 11.8 The Solar System
  - 11.8.1 Sun
  - 11.8.2 The Planets
  - 11.8.3 Some other members of Solar system
    - Asteroids
    - Comets
    - Meteors and Meteorites
- 11.9 Artificial Satellites
- 11.10 How people know earth is spherical
  - 11.10.1 How people know earth rotates on its own axis

## 12. Graphs of Motion

- 12.1 Motion, Graphs - Introduction
- 12.2 Graph is not a map
- 12.3 Graphs of uniform motion
  - 12.3.1 Slope of Graph - Velocity
  - 12.3.2 Graphs of Stationary Objects
- 12.4 Graphs of non-uniform motion

# PHYSICAL SCIENCE SYLLABUS

## 9th CLASS

### 1. Matter around us

- 1.1 States of matter
- 1.2 Properties of solids, liquids and gases
  - 1.2.1 Shape and volume
  - 1.2.2 Identifying the shape and volume of liquids
  - 1.2.3 Do the gases have definite shape and fixed volume
  - 1.2.4 Compressibility
  - 1.2.5 Observing compressibility of different materials
- 1.3 Diffusion
  - 1.3.1 Observing diffusion of gases
  - 1.3.2 Observing the diffusion of liquids
  - 1.3.3 Observing diffusion of particles of solids into liquids
  - 1.3.4 Diffusion of two gases
- 1.4 Can matter change its state ?
- 1.5 What is matter made up of
  - 1.5.1 How small are the particles of matter
  - 1.5.2 Space between particles
- 1.6 Particles of matter attract each other
  - 1.6.1 Observing the force of attraction between the particles of matter.
- 1.7 How diffusion takes place
- 1.8 Effect of temperature on change of state
- 1.9 Effects of change of pressure on change of state

### 1.10 Evaporation

- 1.10.1 Effects of surface area, humidity and wind speed on evaporation
- 1.10.2 Experience with evaporation

### 2. Motion

- 2.1 What is relative
- 2.2 Motion is relative
  - 2.2.1 Distance and displacement
    - Drawing path and distinguishing between distance and displacement
    - Drawing displacement vectors
- 2.3 Average speed and average velocity
  - 2.3.1 Measuring average speed and average velocity
  - 2.3.2 Speed and velocity
  - 2.3.3 Observing direction of motion of a body
- 2.4 Uniform motion
- 2.5 Non uniform motion
  - 2.5.1 Observing the motion of a ball on an inclined plane
  - 2.5.2 Observing uniform circular motion
  - 2.5.3 Observing motion of an object thrown into air
- 2.6 Acceleration
  - 2.6.1 Equations of uniform accelerated motion
  - 2.6.2 Finding the acceleration and velocity of an object moving on an inclined plane

### 3. Laws of motion

- 3.1 An introduction into laws of motion - thought of Galileo
- 3.2 First law of motion
  - 3.2.1 Observing motion of coin kept on thick paper
  - 3.2.2 Observing motion of the coins hit by a striker
- 3.3 Inertia and mass
  - 3.3.1 Pushing two wooden blocks with same force
- 3.4 Second law of motion
  - 3.4.1 Linear momentum
    - Net force - acceleration
    - Mass - acceleration
    - Atwood machine
- 3.5 Third law of motion
  - 3.5.1 Pulling two spring balances
  - 3.5.2 Balloon rocket
  - 3.5.3 Action and reaction forces acting on two different objects
- 3.6 Conservation of momentum
  - 3.6.1 Dropping eggs on different surfaces - net force on egg

### 4. Refraction of light at plane surface

- 4.1 Refraction
- 4.2 Refractive index
- 4.3 Relative refractive index
  - 4.3.1 Obtaining the relation between angle of incidence and angle of refraction - Snell's law

### 4.3.2 Derivation of Snell's Law

- 4.4 Total internal reflection
  - 4.4.1 Mirages
- 4.5 Applications of total internal reflection
  - 4.5.1 Brilliance of diamonds
  - 4.5.2 Optical Fibres
- 4.6 Reflection through a glass slab
  - 4.6.1 Lateral shift
  - 4.6.2 Vertical shift

### 5. Gravitation

- 5.1 Uniform circular motion
  - 5.1.1 Observing the motion of an object moving in circular path
  - 5.1.2 Drawing velocity vectors in uniform circular motions
  - 5.1.3 Centripetal acceleration, Centripetal Force
- 5.2 Universal law of gravitation
  - 5.2.1 Acceleration is independent of masses
  - 5.2.2 What is the direction of 'g' ?
- 5.3 Weight
  - 5.3.1 Can we measure the weight of free fall body ?
  - 5.3.2 Observing changes during the free fall of a body
- 5.4 Centre of gravity
  - 5.4.1 Balancing objects
  - 5.4.2 Locating centre of gravity

- 5.5 Stability
- 5.6 Shift of the centre of gravity and its effects

## **6 Is matter pure ?**

- 6.1 Is full cream pure ?
- 6.2 What is mixture ?
- 6.3 Types of mixtures (homogenous, heterogeneous)
- 6.4 Solutions
  - 6.4.1 Properties of Solutions
  - 6.4.2 Concentration of Solutions
  - 6.4.3 Preparation of saturated and unsaturated solutions
  - 6.4.4 Factors affecting on the rate of dissolving
- 6.5 Suspensions and colloids
  - 6.5.1 Finding of heterogeneous mixture - suspensions and colloids
- 6.6 Separations of components of a mixture
  - 6.6.1 Sublimation - Separation of mixtures by sublimation
  - 6.6.2 Evaporation - Process of Evaporation of Water
- 6.7 Chromatography - Paper Chromatography
- 6.8 Separation of immiscible and miscible liquids
  - 6.8.1 Separation of immiscible liquids
  - 6.8.2 Separation of mixture of two immiscible liquids
  - 6.8.3 Distillation - Separation of two miscible liquids by distillation
  - 6.8.4 Fractional distillation

- 6.9 Types of pure substances
  - 6.9.1 Can we separate Sulphur and Oxygen from Copper Sulphate
  - 6.9.2 Understanding the nature of elements, compounds and mixtures

## **7. Atoms Molecules and Chemical Reaction**

- 7.1 An introduction about atoms
- 7.2 Change of mass in chemical reactions
- 7.3 Law of conservation of mass
- 7.4 Law of constant proportions
- 7.5 Dalton's atomic theory
  - 7.5.1 Atoms and molecules
- 7.6 Why do we name elements ?
- 7.7 Symbols of elements
- 7.8 Some unusual symbols
- 7.9 Elements with more than one atom in their molecules
- 7.10 Atomicity
- 7.11 Valency
- 7.12 What is ion ?
- 7.13 Atomic mass
- 7.14 Molecules of compounds
  - 7.14.1 Chemical formulae of compounds(Criss-Cross method)
- 7.15 Molecular mass



- 7.16 Formula unit mass
- 7.17 Mole concept
  - 7.17.1 Molar mass
- 7.18 Types of Chemical Reactions
  - 7.18.1 Combinations reaction : (Exothermic chemical reactions, Endothermic reactions)
  - 7.18.2 Decomposition reaction : (Thermal, Electrolytic, Photo-chemical reactions- examples only without mentioning names)
  - 7.18.3 Displacement reaction
  - 7.18.4 Double displacement reaction
- 7.19 Oxidation and Reduction
- 7.20 How you observe the effects of Oxidation reactions in dialy life
  - 7.20.1 Corrosion and prevention of corrosion
  - 7.20.2 Combustion
  - 7.20.3 Yeast reaction
  - 7.20.4 Bleaching
  - 7.20.5 Rancidity

## 8. Floating bodies

- 8.1 Can objects sink or float ? (fun activity)
- 8.2 Density - relative density
- 8.3 Relative density of liquids
  - 8.3.1 Making of lactometer

- 8.4 When do objects float on water ?
  - 8.4.1 Do objects denser than water float on it ?
  - 8.4.2 Is the weight of object and weight of water displaced by it equal ?
  - 8.4.3 Making aluminium to float
- 8.5 Upward force in liquids
- 8.6 Pressure of Air
  - 8.6.1 Atmospheric pressure
  - 8.6.2 Measuring atmospheric pressure
- 8.7 Pressure at a depth 'h' in a liquid
  - 8.7.1 Pressure difference at different levels of depth in fluids
- 8.8 Measuring the force of buoyancy
  - 8.8.1 Measuring the weight of the water displaced by the immersed stone
- 8.9 Archimedes' principles
- 8.10 Pascal's principle - Bramah press

## 9. What is inside atom

- 9.1 Sub-atomic particles
  - 9.1.1 Electrons, protons, neutrons
- 9.2 Structure of atom
  - 9.2.1 Sketch the structure of atom as you imagine
- 9.3 Thomson's Model of atom
- 9.4 Rutherford's alpha particles scattering experiment - Rutherford's observations
  - 9.4.1 Nuclear model of an Atom - Limitations of Rutherford's atomic model

- 9.5 Bohr's model of the atom
- 9.6 Distribution of electrons in different orbits (shells)
- 9.7 Valency
  - 9.7.1 Importance of valency
- 9.8 Atomic number
- 9.9 Atomic mass number
- 9.10 Writing symbols of atoms
- 9.11 Isotopes
  - 9.11.1 Applications of isotopes
- 10. Work and Energy**
  - 10.1 Work
    - 10.1.1 Scientific meaning of the work
    - 10.1.2 Definition of work in science
  - 10.2 Energy
    - 10.2.1 Energy transfer and work
    - 10.2.2 Understanding the increase and decrease in energy of an object
  - 10.3 Kinetic energy
    - 10.3.1 Mathematical Expression for Kinetic energy
  - 10.4 Potential energy
    - 10.4.1 Observing energy in stretched rubber band
    - 10.4.2 Observing the energy in an object at some height

- 10.5 Mechanical energy
- 10.6 Conversion of energy
  - 10.6.1 Conservation of mechanical energy
  - 10.6.2 Calculating total energy of free fall at different heights
- 10.7 Power
- 10.8 Sources of Energy
  - 10.8.1 Source of Energy
  - 10.8.2 Fuels
- 10.9 Renuable energy Resources
  - 10.9.1 Solar energy, Solar Cells
  - 10.9.2 Biomass
  - 10.9.3 Biogas
  - 10.9.4 Ocean energy
    - Tidal energy
    - Motion Thermal energy
  - 10.9.5 Geo Thermal energy
  - 10.9.6 Wind energy
  - 10.9.7 Atomic energy
    - Nuclear Fission
    - Nuclear Fusion
- 11. Heat**
  - 11.1 Thermal equilibrium - Heat and Temperature
    - 11.1.1 Heat
    - 11.1.2 Temperature and Kinetic Energy

- 11.2 Specific heat
  - 11.2.1 Applications of Specific Heat capacity
- 11.3 Methods of mixtures
  - 11.3.1 Principle of method of mixtures - Determination of specific heat of a solid
- 11.4 Evaporation, Condensation, Humidity, Dew and Fog, Boiling, Melting, Freezing

## 12. Sound

- 12.1 Sound is a form of energy
- 12.2 Production of sound
  - 12.2.1 Observing the vibration of tuning fork
- 12.3 How does sound travel
  - 12.3.1 Propagation of sound
- 12.4 Types of waves
  - 12.4.1 Transverse waves
  - 12.4.2 Sound waves are Longitudinal waves
- 12.5 Characteristics of sound wave
  - 12.5.1 Wave length
  - 12.5.2 Amplitude
  - 12.5.3 Time period, frequency
  - 12.5.4 Speed of sound wave
- 12.6 Characteristics of musical waves
  - 12.6.1 Pitch

- 12.6.2 Loudness
- 12.6.3 Quality
- 12.7 Reflection of sound
  - 12.7.1 Listening reflected sound - Echo
  - 12.7.2 Reverberation
  - 12.7.3 Uses of multiple reflection of sound
    - Megaphone, Horn
    - Stethoscope
    - Designing of Concert halls and Cinema halls
- 12.8 Range of Hearing
- 12.9 Applications of ultrasounds
  - 12.9.1 Industrial applications
  - 12.9.2 Medical applications
- 12.10 Sonar

# PHYSICAL SCIENCE - SYLLABUS

## 10th CLASS

### 1. Reflection of light at curved surface

- 1.1 Normal to the curved surface
- 1.2 Spherical mirrors, convex, concave mirrors
- 1.3 Pole, Focus, Centre of curvature, principle axis, Radius of curvature, Focal length
- 1.4 Images formed by spherical mirrors
- 1.5 Ray diagrams for spherical mirrors
  - 1.5.1 Rules for Ray diagrams by sign laws of reflection
- 1.6 Formula for spherical mirrors – sign convention
  - 1.6.1 Magnification
- 1.7 Application of reflection - Solar Cooker

### 2. Chemical Equations and Reactions

- 2.1 Some daily life examples of chemical reactions.
- 2.2 Chemical equations – writing chemical equations, skeletal chemical equations, balancing chemical equations
- 2.3 Writing symbols of physical states, Heat changes, gas evolved and precipitate formed
- 2.4 Interpreting a balanced chemical equation
  - 2.4.1 Calculations based on mass, volume, number of molecules and moles

### 3. Acids, Bases and Salts

- 3.1 Chemical properties of acids & bases

- 3.1.1 Acids & Bases in laboratory – Indicators
- 3.1.2 Reaction of Acids & Bases with Metals
- 3.1.3 Reaction of Acids & Bases with Metal Carbonates and Metal hydrogen carbonates
- 3.1.4 Reaction of Acids & Bases with each other (Neutralization)
- 3.1.5 Reaction of Acids with Metallic oxides
- 3.1.6 Reaction of Bases with Non-Metallic oxides
- 3.2 What do acids have in common? What do bases have in common?
- 3.3 Do Acids produce Ions only in Aqueous Solution ?
- 3.4 Reaction of Acid, Base with water
- 3.5 Strength of Acid or Base -  $p^H$  scale
- 3.6 Importance of  $p^H$  in everyday life
  - 3.6.1 Sensitivity of plants and animals to  $p^H$
  - 3.6.2  $p^H$  of soils,  $p^H$  in digestive system,  $p^H$  tooth decay
  - 3.6.3 Self defense by animals and plants through chemical warfare
- 3.7 Salts
  - 3.7.1 Family of salts
  - 3.7.2  $p^H$  of salts
- 3.8 Chemicals from common salt

- 3.8.1 Common salt – a raw material for other chemicals
- 3.8.2 Preparation of Sodium Hydroxide, Bleaching powder, Baking soda, Washing soda and uses
- 3.8.3 Removing of water of crystallization
- 3.8.4 Plaster of Paris

#### 4. Refraction of light at curved surface

- 4.1 Refraction of light at curved surface
  - 4.1.1 Image formation - Derivation of curved surface formula
- 4.2 Lenses
  - 4.2.1 Focal length of the lens
- 4.3 Rules for Ray diagram
- 4.4 Images formed by the lenses
- 4.5 Formula derived for thin lenses
- 4.6 Focal length of lens depends on surrounding medium
- 4.7 Lens maker formula

#### 5. Human eye and colourful world

- 5.1 Least distance of distinct vision, Angle of vision
- 5.2 Structure of human Eye - Focal length of human Eye lens, accommodation
- 5.3 Common accommodation defects of vision - Myopia, Hypermetropia, presbyopia
  - 5.3.1 Power of lens

- 5.4 Prism
  - 5.4.1 Rerective Index of Prism
  - 5.4.2 Derivation of formula for Rerective Index of Prism
- 5.5 Dispersion
  - 5.5.1 Rainbow
- 5.6 Scattering of light

#### 6. Structure of atom

- 6.1 Spectrum
  - 6.1.1 Wave nature of light
- 6.2 Electromagnetic Spectrum
  - 6.2.1 Planck's theory
- 6.3 Bohr's model of Hydrogen atom and its limitations
  - 6.3.1 Bohr - Sommerfeld model of an Atom
- 6.4 Quantum mechanical model of an Atom
  - 6.4.1 Quantum numbers
  - 6.4.2 Main shells, Sub-shells and orbitals in different sub-shells
  - 6.4.3 Shapes of s, p & d orbitals
- 6.5 Electronic Configuration of elements in their atoms
- 6.6  $n, l, m, s$  rule, Energies of electronic energy levels (n+l) rule ; Aufbau Principle, Paulis principal, Hund's Rule of maximum multiplicity, Stable configurations.

## 7. Classification of Elements - The Periodic Table

- 7.1 Need for arrangement of elements in an organized manner
  - 7.1.1 Historical background of classification of elements
- 7.2 Doberieners Triads - Limitations
- 7.3 Newland's law of Octaves
- 7.4 Mendeleev's Periodic Table (Periodic law, Achievements & Limitations)
- 7.5 Modern Periodic Table.
  - 7.5.1 Position of Elements in Modern Periodic Table
    - Groups
    - Periods
    - Metals and Non-metals
  - 7.5.2 Trends in Modern Periodic Table (Valency, Atomic size, Ionization Energy, Electron Affinity, Electronegativity, Metallic & Non-metallic properties)

## 8. Chemical Bonding

- 8.1 Chemical bond definition (brief explanation)
  - 8.1.1 Lewis Symbols (or) Lewis Dot Structures
- 8.2 Electronic theory of Valence by Lewis and Kossel
  - 8.2.1 Octet Rule
- 8.3 Ionic and Covalent bonds: examples with Lewis Dot formulae
  - 8.3.1 The arrangement of Ions in Ionic compounds
  - 8.3.2 Factors affecting the formation of cation and anion

- 8.4 Shapes, bond lengths and bond energies in molecules
- 8.5 Valence shell electron pair repulsion theory
- 8.6 Valence bond theory – examples like H<sub>2</sub>, Cl<sub>2</sub>, H<sub>2</sub>O, BF<sub>3</sub>, CH<sub>4</sub>, NH<sub>3</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>2</sub>H<sub>2</sub> etc
- 8.7 Hybridisation and explanation of H<sub>2</sub>O, BF<sub>3</sub>, CH<sub>4</sub>, NH<sub>3</sub> etc., molecules
- 8.8 Properties of Ionic and Covalent Compounds

## 9. Electric Current

- 9.1 Electric current
  - 9.1.1  $I = \frac{Q}{t}$
  - 9.1.2  $I = nqAV_d$
- 9.2 Potential difference
- 9.3 How a battery or a cell works
  - 9.3.1 EMF
- 9.4 Ohms law and its limitations, resistance, specific resistance, factors influencing resistance, electric shock
- 9.5 Electric Circuits
  - 9.5.1 Series and parallel connection of resistances
  - 9.5.2 Kirchoff's Laws
- 9.6 Electric power
- 9.7 Safety fuses

## 10. Electromagnetism

- 10.1 Oersted Experiment
- 10.2 Magnetic field – field lines
  - 10.2.1 Magnetic Flux - Magnetic Flux density
- 10.3 Magnetic field due to currents
  - 10.3.1 Due to current carrying straight wire
  - 10.3.2 Due to circular loop
  - 10.3.3 Solenoid
- 10.4 Magnetic force on moving charge and current carrying wire
  - 10.4.1 Right hand rule
- 10.5 Electric motor
- 10.6 Electromagnetic induction – Faraday’s law (including magnetic flux) – Lenz law
  - 10.6.1 Derivation of Faraday’s law
  - 10.6.2 Applications of Faraday’s law of electromagnetic induction
- 10.7 Generators and Alternating – Direct Currents

## 11. Principles of Metallurgy

- 11.1 Occurrence of Metals in nature
- 11.2 Extractions of metals from the Ores – activity series and related metallurgy, flow chart of steps involved in the extraction of metals from ore.

- 11.2.1 Enrichment of ores (Concentration or Dressing)
- 11.2.2 Extraction of Crude metal from the ore
  - Extracting metals low in the activity series
  - Extracting metal in the middle of the activity series
  - Extracting metal in the top of the activity series
- 11.2.3 Refining metals (purification of the crude metal)
  - Electrolytic refining
  - Distillation
  - Poling
  - Liqation

## 11.3 Corrosion – Prevention of Corrosion

## 11.4 Important Processes used in metallurgy

- 11.4.1 Smelting
- 11.4.2 Rosting
- 11.4.3 Calcination

## 11.5 Flux

## 11.6 Furnace

## 12. Carbon and its compounds

- 12.1 Introduction of Carbon compounds
- 12.2 Promotion of an Electron – Bonding in Carbon including Hybridization

- 12.3 Allotropes of Carbon
  - Amorphous Forms
  - Crystalline Forms (Diamond, Graphite, C<sub>60</sub> and Nano tubes)
- 12.4 Versatile nature of carbon
  - 12.4.1 Catenation and tetravalency
- 12.5 Hydrocarbons
  - 12.5.1 Open and Closed Chain Hydrocarbons
  - 12.5.2 Saturated and Unsturated Hydrocarbons
- 12.6 Bonding of carbon with other elements
  - 12.6.1 Functional groups in carbon compounds
- 12.7 Isomerism
- 12.8 Homologous series (Alkanes, Alkenes and Alkynes)
- 12.9 Nomenclature of Carbon compounds
- 12.10 Chemical properties of carbon compounds
  - 12.10.1 Combustion reactions
  - 12.10.2 Oxidation Reaction (Alcohol to Acids)
  - 12.10.3 Addition reactions
  - 12.10.4 Substitution reactions
- 12.11 Important carbon compounds
  - 12.11.1 Ethanol
  - 12.11.2 Properties of Ethanol – General properties, reaction of ethanol with sodium, reaction with hot concentrated sulphuric acid.
  - 12.11.3 Ethanoic acid
  - 12.11.4 Properties of Ethanoic acid – General properties, Reaction with a base, sodium hydroxide, sodium carbonate and sodium hydrogen carbonate
- 12.12 Esterification reactions
- 12.13 Soaps – Saponification, Micelles
  - 12.13.1 Cleansing action of Soap



