

# Physics Syllabus for 9th & 10th / O - Level

## Chapter 1: Physical Quantities and Measurement

### 1.1: Introduction to Physics

- Introduction to Physics
- Branches of Physics
- More on Branches of Physics

### 1.2: Physical Quantities

- Physical Quantities
- Problem on Physical Quantities

### 1.3: International System of Units

- International Systems of Base Units
- Standard of length-metre
- Standard of Time-Second
- Standard of Mass-Kilogram

### 1.4: Prefixes

- Introduction to Prefixes
- Problem on Introduction to Prefixes

### 1.5: Scientific Notation

- Scientific Notation
- Problem on Scientific Notation

### 1.6: Measuring Instruments

- Measuring with Meter Rule and Measuring Tape
- Introduction to Vernier Calipers
- Measuring with Vernier Calipers
- problem on Measuring with Vernier Calipers
- Introduction to Screw Gauge
- Measuring with Screw Gauge
- Problem on Measuring with Screw Gauge
- Mass measuring by Physical Balance
- Mass measuring by Lever Balance
- Electronic Balance

- Measuring Time by Stopwatch
- Measuring Volume by Cylinder
- Measuring Volume of Irregular Shaped Solid
- Laboratory Safety

### **1.7: Significant Figures**

- Introduction to Significant Figures
- Problem on Introduction to Significant Figures
- Rules to find the Significant Digits in a measurement
- Problem on Rules to Find the Significant Digits in a Measurement
- Zero as a significant figure
- Addition and Subtraction of Significant figures
- Multiplication and Division with Significant figures
- Problem on Multiplication and Division with Significant Figures
- Rounding Off the numbers
- Problem on Rounding Off the Numbers

## **Chapter 2: Kinematics**

### **2.1: Rest and Motion**

- Introduction to Mechanics
- Rest and Motion

### **2.2: Types of Motion**

- Translatory Motion
- Rotatory Motion
- Vibratory Motion

### **2.3: Scalars and Vectors**

- Scalars and Vectors
- Representation of vectors
- problem on Representation of Vectors

### **2.4: Terms Associated with Motion**

- Position of an Object
- Difference between Distance and Displacement
- Introduction to velocity
- Problem on Introduction to Velocity
- Introduction to speed

- Problem on Introduction to Speed
- Difference between Speed and velocity
- Difference between Uniform Speed and Uniform Velocity
- Introduction to Acceleration
- Problem on Introduction to Acceleration

### **2.5: Graphical Analysis of Motion**

- Graphical Analysis of Motion
- Problem 1 on Distance - Time Graph
- Speed-time Graph
- Problem on Speed-Time Graph
- The Displacement-Time Graph

### **2.6: Equations of Motion**

- First Equation of Motion
- Problem 1 on First Equation of Motion
- Second Equation of Motion
- Problem 1 on Second Equation of Motion
- Third Equation of Motion
- Problem on Third Equation of Motion

### **2.7: Motion of Freely Falling Bodies**

- The motion of Freely Falling Bodies
- Problem on Motion of Freely Falling Bodies

## **Chapter 3: Dynamics**

### **3.1: Force, Inertia and Momentum**

- Introduction to Force
- Introduction to Inertia
- Introduction to Momentum
- Problem on Introduction to Momentum

### **3.2: Newton's Laws of Motion**

- First Law of Newton
- Second Law of Newton
- Problem on the Second Law of Newton
- Difference Between Mass and Weight

- Third Law of Newton
- Tension and Acceleration for Vertical Motion of Two Bodies
- Problem on Tension and Acceleration for Vertical Motion of Two Bodies
- Tension and Acceleration for Horizontal and Vertical Motion
- Problem on Tension and Acceleration for Horizontal and Vertical Motion
- Relation Between Force and Momentum
- Problem on Relation Between Force and Momentum
- Law of Conservation of Momentum

### **3.3: Friction**

- Introduction to Friction
- Problem on Introduction to Friction
- Rolling Friction
- Breaking and Skidding
- Advantages and Disadvantages of Friction
- Method of Reducing Friction

### **3.4: Uniform Circular Motion**

- Uniform Circular Motion
- Centripetal and Centrifugal Force
- Derivation of Formula for Centripetal Force and Centrifugal Force
- Problem on Derivation of Formula for Centripetal Force and Centrifuga
- Applications of Centripetal Force
- More on Applications of Centripetal Force

## **Chapter 4: Turning Effect of Forces**

### **4.1: Like and Unlike Parallel Forces**

- Like and Unlike Parallel Forces

### **4.2: Addition of Forces**

- Addition of Forces

### **4.3: Resolution of Forces**

- Resolution of Forces
- Problem on Resolution of Forces
- Determination of a Force from its Perpendicular Components

### **4.4: Torque or Moment of a Force**

- Axis of Rotation
- Introduction to Torque or Moment of a Force

#### **4.5: Principle of Moments**

- Principle of Moment
- Problem on Principle of Moments

#### **4.6: Centre of Mass**

- Center of Mass

#### **4.7: Centre of Gravity**

- Center of Gravity
- Center of Gravity of Irregular Shape

#### **4.8: Couple**

- Introduction to Couple

#### **4.9: Equilibrium**

- Introduction to Equilibrium
- Equilibrium of Bodies Under the Action of Coplanar Forces
- Conditions for Equilibrium
- States of Equilibrium

#### **4.10: Stability and Position of Centre of Mass**

- Stability and Position of Center of Mass

## **Chapter 5: Gravitation**

### **5.1: The Force of Gravitation**

- Law of Gravitation
- Law of Gravitation and Newton Third Law of Motion
- Problem on Law of Gravitation and Newton Third Law of Motion
- Gravitational Field

### **5.2: Mass of the Earth**

- Mass of the Earth

### **5.3: Variation of $g$ with Altitude**

- Variation of  $g$  with Altitudes

- Problem on Variation of  $g$  with Altitudes

#### **5.4: Artificial Satellites**

- Artificial Satellites
- The motion of Artificial Satellite
- problem on Motion of Artificial Satellite

## **Chapter 6: Work and Energy**

### **6.1: Work**

- Introduction to Work
- More on Introduction to Work
- Problem on Introduction to Work

### **6.2: Energy**

- Introduction to Energy

### **6.3: Kinetic Energy**

- Problem on Law of Conservation of Energy
- Problem on Kinetic Energy

### **6.4: Potential Energy**

- Potential Energy
- Problem on Potential Energy

### **6.5: Forms of Energy**

- Forms of Energy

### **6.6: Interconversion of Energy**

- Interconversion of Energy
- Problem on the interconversion of K.E and P.E

### **6.7: Major Sources of Energy**

- Energy from Non-Renewable Sources
- Energy from Renewable Sources
- More on Energy from Renewable Sources
- Mass Energy Equation
- Electricity from Fossil Fuels

- Energy and Environment
- Flow-Diagram of Energy Converter

### **6.8: Efficiency**

- Introduction to Efficiency

### **6.9: Power**

- Introduction to Power
- Problem on Introduction to Power

## **Chapter 7: Properties of Matter**

### **7.1: Kinetic Molecular Model of Matter**

- Kinetic Molecular Model of Matter
- Plasma-the Fourth State of Matter

### **7.2: Density**

- Introduction to Density
- Problem on Introduction to Density
- Problem 2 on Introduction to Density
- Problem 3 on Introduction to Density

### **7.3: Pressure**

- Introduction to Pressure
- Problem on Introduction to Pressure

### **7.4: Atmospheric Pressure**

- Atmospheric Pressure
- Measuring Atmospheric Pressure
- Variation in Atmospheric Pressure

### **7.5: Pressure in Liquids**

- Pressure in Liquids
- Problem on Pressure in Liquids
- Pascal's Law
- Hydraulic Press
- Problem on Hydraulic Press
- Braking System in Vehicles

### **7.6: Archimedes Principle**

- Archimedes Principle
- Problem on Archimedes Principle
- The density of an Object by Archimedes Principle
- Problem on Density of an Object by Archimedes Principle

### **7.7: Principle of Floatation**

- Principle of Floatation
- Problem on Principle of Floatation
- Applications of Archimedes Principle

### **7.8: Elasticity**

- Elasticity

### **7.9: Hooke's Law**

- Hooks Law
- Problem on Hook's Law
- Youngs Modulus
- Problem on Youngs Modulus
- Problem 2 on Youngs Modulus

## **Chapter 8: Thermal Properties of Matter**

### **8.1: Temperature and Heat**

- Temperature and Heat

### **8.2: Thermometer**

- Introduction to Thermometer
- Why Mercury is Used in Glass Thermometer.
- Why Alcohol is Used in Glass Thermometer.
- Conversion of Temperature Among Different Scale

### **8.3: Specific Heat Capacity**

- Specific Heat Capacity
- Problem on Specific Heat Capacity
- Problem 2 on Specific Heat Capacity
- Importance of Large specific Heat Capacity of Water
- Heat Capacity



#### **8.4: Change of State**

- Change of State

#### **8.5: Latent Heat of Fusion**

- Introduction to Latent Heat of Fusion
- Problem on Introduction to Latent Heat of Fusion
- Latent Heat of Fusion of Ice by an Experiment

#### **8.6: Latent Heat of Vaporization**

- Introduction to Latent Heat of Vaporization
- Problem on Introduction to Latent Heat of Vaporization
- Latent Heat of Vaporization of Water by an Experiment

#### **8.7: The Evaporation**

- Introduction to Evaporation
- More on Introduction to Evaporation

#### **8.8: Thermal Expansion**

- Linear Thermal Expansion in Solids
- Problem on Linear Thermal Expansion in Solids
- Volume Thermal Expansion in Solids
- Problem on Volume Thermal Expansion in Solids
- Consequences of Thermal Expansion
- Application of Thermal Expansion
- Thermal Expansion of Liquids

## **Chapter 9: Transfer of Heat**

#### **9.1: Transfer of Heat**

- Transfer of Heat

#### **9.2: Conduction**

- Conduction
- Thermal Conductivity
- Problem on Thermal Conductivity
- Use of Conductors and Non-Conductors

#### **9.3: Convection**

- Convection

- Application of Convection

#### **9.4: Radiation**

- Introduction to Radiations
- Emission and Absorption of Radiations
- Green House Effect

#### **9.5: Application and Consequences of Radiation**

- Application and Consequences of Radiation

## **Chapter 10: Simple Harmonic Motion and Waves**

### **10.1: Simple Harmonic Motion (SHM)**

- Introduction to Simple Harmonic Motion
- Problem 1-Working of Simple Harmonic Motion
- Problem 1-Mass Attached to Spring
- Working of Simple Harmonic Motion
- Basic terms in SHM
- Problem 1-Basic Terms in SHM
- Derivation of Wave Equation
- Problem 1-Derivation of Wave Equation
- Energies Interconversion in the spring-mass system
- Problem-Energies Interconversion in Spring-Mass System
- Ball and Bowl as SHM
- Problem-Ball and Bowl as SHM
- Introduction to simple Pendulum
- Problem-Introduction to Simple Pendulum
- Working of a simple pendulum
- Problem-Working of Simple Pendulum

### **10.2: Damped Oscillations**

### **10.3: Wave Motion**

- Introduction to Wave Motion
- Characteristics of Wave
- Problem 2-Characteristics of Wave
- Mechanical and Electromagnetic Waves

### **10.4: Types of Mechanical Waves**

- Introduction to Transverse and longitudinal waves
- Problem 1-Introduction to Transverse and Longitudinal waves
- Waves as Carriers of Energy

### **10.5: Ripple Tank**

- Introducing Ripple Tank
- Reflection in Water by Ripple Tank
- Problem 1-Introduction to Reflection
- Refraction in Water by Ripple Tank
- Problem 1-Introduction to Refraction
- Diffraction in Water by Ripple Tank
- Interference in Water by Ripple Tank

## **Chapter 11: Sound**

### **11.1: Sound Waves**

- How Sound is Produced and Travel
- More on How Sound is Produced and Travel
- Problem 1-More on How Sound is Produced and Travel

### **11.2: Characteristics of Sound**

- Loudness of Sound
- Quality of Sound
- Pitch of Sound
- Problem 1- Pitch of Sound
- Sound Intensity and Sound Level
- More on Sound Intensity and Sound Level
- Problem 1- Sound Intensity and Sound Level
- How Amplitude is Related With Loudness1
- How Frequency is Related with Pitch1

### **11.3: Reflection (ECHO) of Sound**

- Reflection of Sound (Echoes)
- Problem1-Reflection of Sound (Echoes)
- Problem2-Reflection of Sound (Echoes)
- Problem 1-Measuring Speed of Sound by Echo Method

### **11.4: Speed of Sound**

- Measuring Speed of Sound

- More on Measuring Speed of Sound
- Measuring speed of Sound by Echoe Method
- Problem 1-Measuring The Speed of Sound

### **11.5: Noise Pollution**

- Noise Pollution
- Acoustics Protection

### **11.6: Audible Frequency Range**

- Audible Frequency Range

### **11.7: Ultrasound**

- Ultrasounds and its Applications
- Problem 1-Ultrasound and Its Applications
- Problem 2-Ultrasound and its Applications

## **Chapter 12: Geometrical Optics**

### **12.1: Reflection of Light**

- Reflection of Light
- Regular and Irregular Reflection of Light
- Problem 1-Reflection of light by spherical mirrors

### **12.2: Spherical Mirrors**

- Concave and Convex Mirror
- Problem 1-Concave Mirrors
- Problem 2-Convex Mirrors
- Mirror Terminologies
- Problem-Mirror Terminologies
- Images Formed by Plane Mirror
- Problem 1-Images Formed by Plane Mirror

### **12.3: Image Location by Spherical Mirror Form**

- Images by Spherical Mirrors
- Spherical Mirror Formula
- More on Spherical Mirror Formula
- Sign Convention Linear Magnification

### **12.4: Refraction of Light**

- Refraction of Light

- Laws of Refraction
- Problem 1-Laws of Refraction
- Refraction of Light in Water
- Speed of Light in Medium
- Problem 1-Speed of Light in Medium
- Introducing Refractive Index
- Problem 1-Introducing Refractive Index
- Apparent and Real Depth

### **12.5: Total Internal Reflection**

#### **12.6: Refraction Through Prism**

- Refraction of Light Through Prism
- Relationship b/w Refractive Index and Critical Angle
- Problem 1-Relationship b/w Refractive Index and Critical Angle

#### **12.7: Lenses**

- Types of Lenses
- Convergence and Divergence of Lenses
- Lens Terminologies
- Image Formed by Convex Lens
- Problem 1-Image Formed by Convex Lens
- Image Formation by Concave Lens
- Power of a Lens

#### **12.8: Image Formation By Lenses**

- Image Formation in Convex Lenses

#### **12.9: Image Location by Lens Equation**

- Image Location by Lens Formula
- Problem 1-Image Location by Lens Formula
- Linear Magnification of Lenses
- Sign Conventions for Lenses

#### **12.10: Applications of Lenses**

- Introducing Camera
- Slide Projector
- Photograph Enlarger
- Totally Reflecting Prism
- Optical Fiber

### **12.11: Simple Microscope**

- Simple Microscope
- More on Simple Microscope
- Resolving Power and Resolving Limit

### **12.12: Compound Microscope**

- Introduction to Compound Microscope

### **12.13: Telescope**

- Astronomical Telescope

### **12.14: The Human Eye**

### **12.15: Defects of Vision**

- Shortsightedness
- Farsightedness

## **Chapter 13: Electrostatics**

### **13.1: Production of Electric Charges**

- Introduction to Electrostatics
- Production of Electric Charges
- More on Production of Electric Charges
- Problem-Measurement of Electric Charge

### **13.2: Electrostatic Induction**

### **13.3: Electroscope**

- Introduction to Electroscope
- Applications of Electroscope
- Conductors and Insulators

### **13.4: Coulomb's Law**

### **13.5: Electric Field and Electric Field Inten**

- Electric Field and Electric Field Intensity
- Problem-Electric Field and Electric Field Intensity
- Introduction to Electric Field Lines

### **13.6: Electrostatic Potential**

### **13.7: Capacitors and Capacitance**

- Capacitor and Capacitance
- Capacitors in Parallel Combination
- Capacitors in Series Combination

### **13.8: Different Types of Capacitors**

- Different Types of Capacitors
- Uses of Capacitors

### **13.9: Applications of Electrostatics**

- Application of Electrostatics

### **13.10: Some Hazards of Static Electricity**

- Hazards of Static Electricity

## **Chapter 14: Current Electricity**

### **14.1: Electric Current**

- Introduction to Electric Current
- More on Introduction to Electric Current
- Problem-Introduction to Electric Current
- Conventional Current
- Measurement of Current

### **14.2: Potential Difference**

- Potential Difference
- Problem-Potential Difference

### **14.3: Electromotive Force (e.m.f)**

- Electromotive Force
- Measurement of Potential Difference
- Problem 1-Measurement of Potential Difference
- Problem- Potential Divider
- The Measurement of e.m.f
- Problem-Electromotive Force
- Problem- Measurement of e.m.f

### **14.4: OHM'S Law**

### **14.5: Characteristics of Ohmic and Non-Ohmic**

### **14.6: Factors Affecting Resistance**

### **14.7: Conductors**

- Conductors and Insulators
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#### **14.8: Insulators**

- Conductors and Insulators

#### **14.9: Combination of Resistors**

- Series combination of Resistors
- Parallel Combination to Resistors

#### **14.10: Electrical Energy and Joule's Law**

#### **14.11: Electric Power**

- Electric Power
- Kilowatt Hour

#### **14.12: Direct Current and Alternating Current**

- Direct Current
- Alternating Current
- House Wiring

#### **14.13: Hazards of Electricity**

- Insulation Damage and Damp Conditions

#### **14.14: Safe Use of Electricity in Homes**

- Introduction to Fuse
- Introduction to Circuit Breaker
- Introduction to Earth Wire

## **Chapter 15: Electromagnetism**

#### **15.1: Magnetic Effects of a Steady Current**

- Introduction to Electromagnetism
- Magnetic Effects of Steady Current
- Magnetic Field of a Solenoid

#### **15.2: Force on a Current-Carrying Conductor P**

- Force on a Current-Carrying Conductor Place in a Magnetic Field
- Flemings Left Hand Rule



### **15.3: Turning Effect on a Current-Carrying Co**

- Turning Effects on a Current-Carrying Coil in a Magnetic Field

### **15.4: D.C Motor**

### **15.5: Electromagnetic Induction**

- Introduction to Electromagnetic Induction
- Measuring Electromagnetic Induction
- Factors Affecting Induced EMF

### **15.6: Direction of Induced e-m-f-Lenz's Law**

- Lenz's Law

### **15.7: A.C. Generator**

### **15.8: Mutual Induction**

### **15.9: Transformer**

### **15.10: High Voltage Transmission**

- High Voltage Transmission
- Applications of Electromagnet

## **Chapter 16: Basic Electronics**

### **16.1: Thermionic Emission**

- Introduction to Electronics
- Thermionic Emission

### **16.2: Investigating the Properties of Electrons**

- Properties of Electrons

### **16.3: Cathode-Ray Oscilloscope (C.R.O)**

- Cathode Ray Oscilloscope
- Problem- Using the C.R.O

### **16.4: Analogue and Digital Electronics**

### **16.5: Basic Operations of Digital Electronics**

## **Chapter 17: Information and Communication Techn**

### **17.1: Information and Communication Technology**

### **17.2: Components of Computer-Based Information**

### **17.3: Flow of Information**

### **17.4: Transmission of Electric Signal Through Waves**

### **17.5: Transmissions of Radiowaves Through Space**

- Transmission of Radio waves Through Space
- Radio
- Introduction to Fax Machine
- Introduction to Cell Phone
- Photo Phone

### **17.6: Transmission of Light Signals Through Optical Fibers**

- Transmission of Light Signals Through Optical Fibers
- Introduction to Computer
- More on Introduction to Computer

## **Chapter 18: Atomic and Nuclear Physics**

### **18.1: Atom and Atomic Nucleus**

- Introduction to Atom
- Atom and Atomic Nucleus
- Problem-Atom and Atomic Nucleus

### **18.2: Natural Radioactivity**

### **18.3: Background Radiations**

### **18.4: Nuclear Transmutations**

- Nuclear Transmutations
- Nature and Properties of Radiations

### **18.5: Half-Life and its Measurement**

- Half-Life and its Measurements

### **18.6: Radioisotopes and Their Uses**

- Radio Isotopes
- Uses of Radio Isotopes

### **18.7: Fission Reaction**

- Fission Reaction
- More on Fission Reaction

### **18.8: Nuclear Fusion**

