

**TELANGANA STATE BOARD OF INTERMEDIATE  
EDUCATION, HYDERABAD**

**PHYSICS - I**

**SYLLABUS**

**(w.e.f. 2012-13)**

**CHAPTER – 1: PHYSICAL WORLD**

- 1.1. What is Physics ?
- 1.2. Scope and excitement of physics
- 1.3. Physics, technology and society
- 1.4. Fundamental forces in nature
- 1.5. Nature of physical laws

**CHAPTER –2: UNITS AND MEASUREMENTS**

- 2.1 Introduction
- 2.2 The International system of units
- 2.3 Measurement of length, Measurement of Large Distances, Estimation of Very Small Distances: Size of Molecule, Range of Lengths
- 2.4 Measurement of Mass, Range of Mass
- 2.5 Measurement of Time
- 2.6 Accuracy, precision of instruments and errors in measurement, Systematic errors, random errors, least count error, Absolute Error, Relative Error and Percentage Error, Combination of Errors
- 2.7 Significant Figures, Rules for Arithmetic Operations with Significant Figures, Rounding off the Uncertain Digits, Rules for Determining the Uncertainty in the Results of Arithmetic Calculations
- 2.8 Dimensions of Physical Quantities
- 2.9 Dimensional Formulae and dimensional equations
- 2.10 Dimensional Analysis and its Applications, Checking the Dimensional Consistency of Equations, Deducing Relation among the Physical Quantities

### **Chapter-3: MOTION IN A STRAIGHT LINE**

- 3.1 Introduction
- 3.2 Position, Path Length and Displacement
- 3.3 Average Velocity and Average Speed
- 3.4 Instantaneous Velocity and Speed
- 3.5 Acceleration
- 3.6 Kinematic equations for uniformly accelerated motion
- 3.7 Relative velocity
- Elements of Calculus

### **Chapter -4: MOTION IN A PLANE**

- 4.1 Introduction
- 4.2 Scalars and Vectors, Position and Displacement Vectors, Equality of Vectors
- 4.3 Multiplication of Vectors by real members
- 4.4 Addition and Subtraction of Vectors - graphical method
- 4.5 Resolution of vectors
- 4.6 Vector addition Analytical method
- 4.7 Motion in a plane, Position Vector and Displacement, Velocity, Acceleration
- 4.8 Motion in a plane with constant acceleration
- 4.9 Relative velocity in two dimensions
- 4.10 Projectile Motion, Equation of path of a projectile, Time of Maximum height, Maximum height of a projectile, Horizontal range of projectile
- 4.11 Uniform circular motion

### **Chapter-5: LAWS OF MOTION**

- 5.1 Introduction
- 5.2 Aristotle's fallacy
- 5.3 The law of inertia
- 5.4 Newton's first law of Motion
- 5.5 Newton's second law of Motion
- 5.6 Newton's third law of Motion, Impulse
- 5.7 Conservation of momentum
- 5.8 Equilibrium of a particle
- 5.9 Common forces in Mechanics, Friction

- 5.10 Circular Motion, Motion of a car on a level road, Motion of a car on a banked road
- 5.11 Solving problems in Mechanics

## **Chapter –6: WORK, ENERGY AND POWER**

- 6.1 Introduction
- 6.2 Notions of Work and Kinetic Energy: The work-energy theorem.
- 6.3 Work
- 6.4 Kinetic Energy
- 6.5 Work done by a variable force
- 6.6 The work-energy theorem for a variable force
- 6.7 The concept of Potential Energy
- 6.8 The conservation of Mechanical Energy
- 6.9 The Potential Energy of a spring
- 6.10 Various forms of energy: the law of conservation of Energy. Heat, Chemical Energy, Electrical Energy, The Equivalence of a Mass and Energy, Nuclear Energy, The Principle of Conservation of Energy.
- 6.11 Power
- 6.12 Collisions, Elastic and Inelastic Collisions, Collisions in one dimension, Coefficient – Power consumption in walking

## **Chapter-7: SYSTEM OF PARTICLES AND ROTATIONAL MOTION**

- 7.1 Introduction, What kind of motion can a rigid body have?
- 7.2 Centre of mass. Centre of gravity
- 7.3 Motion of Centre of Mass
- 7.4 Linear momentum of a System of particles
- 7.5 Vector product of Two Vectors
- 7.6 Angular Velocity and its relation with linear velocity, Angular acceleration, kinematics of Rotational motion about a fixed axis.
- 7.7 Torque and angular Momentum, Moment of force (Torque), Angular momentum of a particle, Torque and angular momentum for a system of a particles, conservation of angular momentum
- 7.8 Equilibrium of a Rigid Body, Principle of moments
- 7.9 Moment of Inertia
- 7.10 Theorems of perpendicular and parallel axis, Theorem of perpendicular axes, Theorem of parallel axes
- 7.11 Dynamics of Rotational Motion about a Fixed Axis.

- 7.12 Angular momentum in case of rotations about a fixed axis, Conservation of angular momentum
- 7.13 Rolling Motion, Kinetic Energy of Rolling Motion

### **Chapter 8: OSCILLATIONS**

- 8.1 Introduction
- 8.2 Periodic and Oscillatory Motions, Period and frequency, Displacement
- 8.3 Simple Harmonic Motions (SHM)
- 8.4 Simple Harmonic Motion and Uniform Circular Motion
- 8.5 Velocity and Acceleration in Simple Harmonic Motion
- 8.6 Force Law for Simple Harmonic Motion
- 8.7 Energy in Simple Harmonic Motion
- 8.8 Some systems executing Simple Harmonic Motion, Oscillations due to a Spring, The Simple Pendulum
- 8.9 Damped Simple Harmonic Motion
- 8.10 Forced Oscillations and Resonance

### **Chapter –9: GRAVITATION**

- 9.1 Introduction
- 9.2 Kepler's Laws
- 9.3 Universal Law of Gravitation
- 9.4 The Gravitational Constant
- 9.5 Acceleration due to Gravity of the Earth
- 9.6 Acceleration due to gravity below and above the surface of Earth
- 9.7 Gravitational Potential Energy
- 9.8 Escape Speed
- 9.9 Earth Satellite
- 9.10 Energy of an orbiting satellite
- 9.11 Geostationary and Polar satellites
- 9.12 Weightlessness

### **Chater –10: MECHANICAL PROPERTIES OF SOLIDS**

- 10.1 Introduction
- 10.2 Elastic behavior of Solids
- 10.3 Stress and Strain

- 10.4 Hook's law
- 10.5 Stress – strain curve
- 10.6 Elastic Moduli, Young's Modulus, Determination of Young's Modulus of the Material of a Wire, Shear Modulus Bulk Modulus, Poisson's Ratio.
- 10.7 Applications of elastic behaviour of Materials.

### **Chapter – 11: MECHANICAL PROPERTIES OF FLUIDS**

- 11.1 Introduction
- 11.2 Pressure, Pascal's Law, Variation of Pressure with Depth, Atmospheric Pressure and Gauge Pressure, Hydraulic Machines
- 11.3 Streamline flow
- 11.4 Bernoulli's principle, Speed of Efflux, Torricelli's Law, Venturi-meter, Blood Flow and Heart Attack, Dynamic Lift
- 11.5 Viscosity, Variation of Viscosity of fluids with temperature, Stoke's Law
- 11.6 Reynolds number
- 11.7 Surface Tension, Surface Energy, Surface Energy and Surface Tension, Angle of Contact, Drops and Bubbles, Capillary Rise, Detergents and Surface Tension; What is blood pressure

### **Chapter – 12: THERMAL PROPERTIES OF MATTER**

- 12.1 Introduction
- 12.2 Temperature and Heat
- 12.3 Measurement of Temperature
- 12.4 Ideal – Gas Equation and Absolute Temperature
- 12.5 Thermal Expansion
- 12.6 Specific Heat Capacity
- 12.7 Calorimetry
- 12.8 Change of State, Regelation, Latent Heat
- 12.9 Heat transfer, Conduction, thermal conductivity, Convection, Radiation, Blackbody Radiation, Greenhouse Effect
- 12.10 Newton's Law of Cooling.

### **Chapter –13: THERMODYNAMICS:**

- 13.1 Introduction
- 13.2 Thermal Equilibrium
- 13.3 Zeroth Law of Thermodynamics

- 13.4 Heat, Internal Energy and Work
- 13.5 First Law of Thermodynamics
- 13.6 Specific Heat Capacity
- 13.7 Thermodynamic State Variables and Equation of State
- 13.8 Thermodynamic Processes, Quasi-static Isothermal Process, Adiabatic Process, Isochoric Process, Cyclic Process.
- 13.9 Heat Engines
- 13.10 Refrigerators and Heat Pumps
- 13.11 Second Law of Thermodynamics
- 13.12 Reversible and Irreversible Processes
- 13.13 Carrot Engine, Carnot's Theorem.

## **CHAPTER – 14: KINETIC THEORY**

- 14.1 Introduction
- 14.2 Molecular Nature of Matter
- 14.3 Behaviour of Gases
- 14.4 Kinetic Theory of an Ideal Gas, Pressure of an Ideal Gas
- 14.5 Laws of equipartition of energy
- 14.6 Specific Heat Capacity, Monatomic Gases, Diatomic Gases, Polyatomic Gases, Specific Heat Capacity of Solids, Specific Heat Capacity of Water
- 14.7 Mean Free Path

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