

## **PHYSICS (Common Syllabus for all Diploma Holders in Engineering)**

**Unit-1: Units and dimensions:** Physical quantity-fundamental and derived physical quantities-units-fundamental and derived units-SI units-multiples and sub-multiples in SI units-advantages of SI units-dimensions and dimensional formulae-dimensionless quantities-applications and limitations of dimensional analysis-problems.

### **Unit-2: Elements of vectors:**

Scalar and vector quantities-examples-graphical representation of a vector-types of vectors-addition and subtraction of vectors-triangle law-parallelogram law and its cases-polygon law-resolution of a vector-unit vectors (i, j, k)-dot product and cross product of two vectors-characteristics of dot and cross products-examples-problems.

### **Unit-3: Kinematics and Friction**

Equations of motion-acceleration due to gravity-equations of motion under gravity-expressions for maximum height, time of ascent, time of descent, time of flight, velocity on reaching the point of projection-motion of a body projected from the top of a tower-projectile motion-examples-horizontal and oblique projections-expressions for maximum height, time of ascent, time of flight, horizontal range, magnitude and direction of resultant velocity-problems.

Friction-normal reaction-laws of friction-coefficients of friction-angle of friction-methods of reducing friction-advantages and disadvantages of friction-motion of a body over a smooth inclined plane and a rough inclined plane-problems.

### **Unit-4: Work, Power and Energy**

Work, power and energy-definitions and units-potential and kinetic energies-examples and expressions-law of conservation of energy-problems-renewable and non-renewable sources of energy (solar, wind, biogas, tidal, nuclear energies etc)

### **Unit-5: Simple harmonic motion and acoustics**

Definition-conditions of SHM-examples of SHM-expressions for displacement, velocity, acceleration, time period, frequency and phase of SHM-time period of a simple pendulum-seconds pendulum-problems. Sound-musical sound and noise-noise pollution-Effects and methods of control of Noise Pollution-Beats and echoe-problems-Doppler effect – Explanation, cases and Applications Acoustics of buildings-Reverberation-Sabines' formula-characteristics of a good building-problems.

### **Unit-6: Heat and Thermodynamics**

Expansion of gases-Boyle's law-Absolute scale of temperature-charle's laws-Ideal gas equation-Universal gas constant and its value-SI Units-problems-external work done by a gas-isothermal process-adiabatic process-first law of thermodynamics and its applications to isothermal process and adiabatic process-two specific heats of a gas-relation between  $C_p$  and  $C_v$ -problems-second law of thermodynamics and its applications.

### **Unit-7 Modern Physics**

Photoelectric effect – explanation and its laws-applications of photoelectric effect (photocell) – critical angle and total internal reflection – optical fibers - principle, working , types and applications-concept of super conductivity – its properties and applications.

### Number of Questions to be Set Unit Wise (TOTAL 25)

UNIT NO	TOPICS	MARKS
I	Units and Dimensions	02
II	Elements of Vectors	02
III	Kinematics and Friction	06
IV	Work, Power and Energy	03
V	Simple Harmonic Motion and Acoustics	05
VI	Heat and Thermodynamics	05
VII	Modern Physics	02
Total		25

### ANNEXURE III

#### MODEL QUESTIONS FOR PHYSICS

- If young's modulus 'Y', surface tension 'S' and velocity 'V' are chosen as fundamental quantities, the dimensional formula for force is
  - $Y^{-5}V^{-4}S^6$
  - $Y^{-3}V^5S^5$
  - $Y^{-5}V^{-4}S^5$
  - $Y^{-3}V^{-4}S^6$
- A ballon moves up with constant velocity 10m/s. An object is dropped from it when it is at a height of 100 m above the ground. The distance between the object and the ballon after 5 sec is ( $g=10\text{m/s}^2$ )
  - 120 m
  - 125 m
  - 100 m
  - 150 m
- The time period of an oscillating simple pendulum is 'T'. If its length is increased by 5 cm then the time period is 'T<sub>1</sub>' and the time period is 'T<sub>2</sub>' if the length is reduced by 5 cm. The relationship among T, T<sub>1</sub>, T<sub>2</sub>
  - $T^2 = T_1^2 + T_2^2$
  - $T^2/2 = T_1^2 + T_2^2$
  - $2T^2 = T_1^2 + T_2^2$
  - $3T^2 = T_1^2 + T_2^2$
- A gas is heated through 4 K in a closed vessel. If its pressure is increased by 0.8%, the initial temperature of the gas is
  - 227 K
  - 454 K
  - 454 °C
  - 227 °C
- If light travels through two media with velocities  $2.5 \times 10^8 \text{ m/s}$  and  $2 \times 10^8 \text{ m/s}$  respectively, the critical angle for the combination of the two media is
  - $\sin^{-1}(4/5)$
  - $\sin^{-1}(3/5)$
  - $\sin^{-1}(2/5)$
  - $\sin^{-1}(1/5)$