

ESKPXI-XXVI (I)
PHYSICS PART-I

Time: 2 Hours 40 Minutes

SECTION "B"

Marks: 40

Note: Give short answers to any TEN (10) questions. All questions carry equal marks.

- Q.1.** Define error and distinguish between instrumental and personal errors. How can these errors be minimized? 1+1+1+1
- Q.2.** Show that the equation $K.E = P^2/2m$ is correct using the principle of dimensional homogeneity. 1+1+1+1
- Q.3.** Define moment of force (torque). Name three factors that affect the magnitude of torque while opening a nut using wrench. 1+1+1+1
- Q.4.** What is scalar product? Give one example of scalar product. Also prove that scalar product obeys the commutative law. 1+1+2
- Q.5.** Differentiate conservative and non-conservative forces by giving two examples of each type. 1+1+1+1
- Q.6.** Mathematically prove that gravitational field is an example of conservative field. 1+1+1+1
- Q.7.** State Bernoulli equation for the flow of an ideal fluid and explain the working of atomizer based on the equation. 2+2
- Q.8.** A garden hose pipe of inner radius 3cm carries water at 4m/s. The nozzle at the end has a radius 1.2cm. Calculate the speed of water emerging through the nozzle. 1+1+1+1
- Q.9.** Define the following terms in the context of waves. 1+1+1+1
- a). nodes
 - b). antinodes
 - c). amplitude
 - d). wavelength
- Q.10.** Define transverse stationary waves and show that fundamental frequency of vibration of a stretched string of length L fixed at both ends is $V/2L$. 1+3
- Q.11.** What is Doppler effect? Why the pitch of sound appears to be high when a listener moves towards a sounding source? 1+3
- Q.12.** Explain why different colours can be seen on the surface of slightly oily water when white light is incident on it. 4
- Q.13.** Monochromatic light of wavelength 550 nm is incident on a grating having 4000 lines per cm. Calculate the angle for the first order diffraction maximum. 1+1+1+1

SECTION "C"

Marks: 27

Note: Attempt any THREE (03) questions from the following. Each question carries equal marks.

- Q.14.** a) What is projectile in motion? Derive the mathematical expression for the range of a projectile in terms of initial velocity V_0 and angle θ with the horizontal. 1+1+1+1+1
- b) Distinguish between the following terms of kinematics. 1+1+1+1
- i. Positive and negative acceleration
 - ii. Uniform and variable acceleration
- Q.15.** a) State the law of conservation of angular momentum. Explain this law with the help of a suitable example. 2+2+1
- b) A circular disk starts from rest and attains angular velocity of 30 rev/min in 2s. Calculate the average angular acceleration of the disk. 1+1+1+1
- Q.16.** a) A body (P) moves in a circle of radius (r) with uniform speed (v). Prove that its projection (Q) executes simple harmonic motion on the diameter of the circle. 1+1+1+1+1
- b) A pendulum suspended from a fixed rigid support on earth's surface completes one vibration in 10s. Calculate the length of simple pendulum. 1+1+1+1
- Q.17.** a) What is heat engine? Describe parts and working principle of a heat engine by drawing its schematic diagram. 1+2+2
- b) Write Lord Kelvin and Rudolf Clausius statements of the second law of thermodynamics. 2+2