

Physics (Subjective)**Group-II****Time: 2:40 hours****Section-I****2. Write short answers of any eight parts from the following:**

(8x2=16)

- i. Write the dimension of (i) Pressure (ii) Density.
- ii. What are the dimension and unit of $\sqrt{\frac{Fx l}{m}}$?
- iii. What are supplementary units? Define only one unit.
- iv. Give the drawbacks to use the period of a pendulum as a time standard.
- v. Two vectors have unequal magnitudes. Can their sum be zero? Explain.
- vi. Under what circumstances would a vector have components that are equal in magnitude?
- vii. If $\vec{A} = 3\hat{i} - 5\hat{j}$, $\vec{B} = 7\hat{k}$ find $(\vec{A} \times \vec{B})$
- viii. What is ballistic missile? Define its trajectory.
- ix. Show that the area between the velocity time graph is numerically equal to the distance covered by the object.
- x. Explain what is meant by projectile motion. Derive expression for the time of flight.
- xi. What is the solar constant and what is its value?
- xii. Calculate the work done in kilo joules in lifting a mass of 10 kg (at a steady velocity) through a vertical height of 10m.

(8x2=16)

3. Write short answers of any eight parts from the following:

- i. Show that orbital angular momentum, $L_0 = mvr$.
- ii. How can you describe angular equations of motion analogous with linear equations of motion?
- iii. Prove that, $\theta = \frac{s}{r}$ radian.
- iv. Can centripetal force perform any work? Explain.
- v. Fog droplet appears to be suspended in air. Why?
- vi. How an airplane is lifted up in the air?
- vii. Does the acceleration of a simple harmonic oscillator remains constant during its motion? Is the acceleration ever zero? Explain.
- viii. Why in S.H.M the acceleration is zero when the velocity is greatest?
- ix. Prove the relation $U = f\lambda$
- x. Calculate the formula of the time period of a mass attached to a spring.
- xi. As a result of a distant explosion an observer senses a ground tremor & then hears the explosion. Explain the time difference.
- xii. What will be effect on speed of sound if the temperature of the gas through which it passes increases to three times keeping the pressure of the gas constant?

(6x2=12)

4. Write short answers of any six parts from the following:

- i. Can visible light produce interference fringes? Explain.
- ii. How would you manage to get more orders of spectra using a diffraction grating?
- iii. When mirror M_1 of Michelson interferometer is moved a distance 0.5 mm, 200 fringes are observed, then calculate the wavelength of light used.
- iv. Explain the difference between angular magnification and resolving power of an optical instrument.
- v. How the power is lost in optical fibre through dispersion? Explain
- vi. What is meant by length of the telescope? Explain.
- vii. Why does the pressure of a gas in a car tyre increase when it is driven through some distance?
- viii. A thermos flask containing milk as a system is shaken rapidly. Does the temperature of milk rise?
- ix. Does the efficiency of Carnot engine depends on the nature of working substance? Explain it.

SECTION-II**Note Attempt any three questions. Each question carries equal marks:**

(8x3=24)

5. (a) Define vector product and also discuss torque as an example of vector product in detail. (5)
- (b) Two blocks of masses 2.0 kg and 0.50 kg are attached at the two ends of a compressed spring. The elastic potential energy is stored in the spring is 10J. Find the velocities of the block if the spring delivers its energy to blocks when released. (3)
6. (a) How would you derive a relation for the effect of temperature on the speed of sound in a gas? (5)
- (b) A 70 kg man runs up a long flight of stairs in 4.0 sec. The vertical height of the stairs is 4.5 m. calculate his power output in watts. (3)
7. (a) Prove that energy is conserved in simple harmonic motion. (5)
- (b) A 1000 kg car travelling with a speed of 144 kmh^{-1} round a curve of radius 100m. Find the necessary centripetal force. (3)
8. (a) State first law of thermodynamics and explain (i) Isothermal process (ii) Adiabatic process. (5)
- (b) Water flows through a hose, whose internal diameter is 1 cm at a speed of 1m/s. What should be the diameter of the nozzle if the water is to emerge at 21 m/s? (3)
9. (a) Explain the construction and working of an astronomical telescope. Also derive a relation for its magnifying power. (5)
- (b) A light is incident normally on a grating which has 2500 lines per centimeter. Compute the wavelength of the spectral line for which the deviation in second order is 15.0° (3)