PHYSICS   222-(INTER PART – I)   Time Allowed : 2.40 hours
PAPER – I (Essay Type)   GROUP – II   Maximum Marks : 68

SECTION – I   LHR-G2-22

2. Write short answers to any EIGHT (8) questions :   **16**

(i) Name several repetitive phenomenon occurring in nature which could serve as reasonable time standard.

(ii) The period of simple pendulum is measured by a stopwatch. What type of errors are possible in the time period?

(iii) What choice would have made to take zero as significant figure? Explain your reason.

(iv) What is your opinion to minimize the systematic error? Support your response.

(v) Explain the circumstances in which velocity ' v ' and acceleration ' a ' of a car are :
(a) Parallel.   (b) Anti-parallel.

(vi) An object is thrown upward vertically. Discuss the sign of acceleration due to gravity, relative to velocity, while the object is in air.

(vii) What do you think about the acceleration of 3g or more? Is this acceleration safe for us?

(viii) Water flows out from a pipe at 3kg/s and its velocity changes from 5m/s to zero on striking the ball. Calculate the force of water flow.

(ix) Does the entropy of a system increase or decrease due to friction?

(x) What do you understand by adiabatic process?

(xi) What is the condition for an ideal reversible heat engine?

(xii) What are the four successive processes in a petrol engine?

3. Write short answers to any EIGHT (8) questions :   **16**

(i) The vector sum of three vectors gives a zero resultant. What can be orientation of the vectors?

(ii) Is it possible to add 6 in $4\hat{i}$? Explain.

(iii) If $\vec{A} = 2\hat{i} - 2\hat{j}$, then what will be the orientation of $\vec{A}$?

(iv) An object has 1 J of potential energy. Explain what does it mean?

(v) Prove that $P = \vec{F} . \vec{V}$

(vi) How energy is obtained from direct combustion and fermentation?

(vii) Show that orbital angular momentum $L_o = mvr$

(viii) What is meant by angular momentum? State law of conservation of angular momentum?

(ix) What are banked track? Explain briefly.

(x) Can visible light produce interference fringes? Explain.

(xi) Why the polaroid sunglasses are better than ordinary sunglasses?

(xii) What is difference between interference and diffraction of light waves?

(Turn Over)

4. **Write short answers to any SIX (6) questions :** LHR-G2-22   12

   (i) Why fog droplet appears to be suspended in air?

   (ii) What happens to the period of a simple pendulum if its length is doubled? What happens if suspended mass is doubled?

   (iii) Does the acceleration of a simple harmonic oscillator remains constant during its motion? Is the acceleration ever zero?

   (iv) What is driven harmonic oscillator? Give example.

   (v) What features do longitudinal waves have in common with transverse waves?

   (vi) As a result of a distant explosion, an observer senses a ground tremor and then hear the explosion. Why?

   (vii) What is doppler shift?

   (viii) Could you obtain Newton's rings with transmitted light? If yes, would the pattern be different from that obtained with reflected light?

   (ix) What are the conditions for detectable interference?

SECTION – II

Note : Attempt any THREE questions.

5. (a) Define scalar product of two vectors. Give its any four characteristics.   5

   (b) A diver weighing 750 N dives from a board 10 m above surface of a pool of water. Use the conservation of mechanical energy, to find his speed at a point 5.0 m above the water surface (ignoring friction).   3

6. (a) What is meant by centripetal force? Derive its relation.   5

   (b) Find the angle of projection of a projectile for which its maximum height and horizontal range are equal.   3

7. (a) State and prove Bernoulli's equation in detail.   5

   (b) Two tuning forks exhibit beats at a beat frequency of 3 Hz. The frequency of one fork is 256 Hz. Its frequency is then lowered slightly by adding a bit of wax to one of its prong. The two tuning forks then exhibit a beat frequency of 1 Hz. Determine the frequency of the second tuning fork.   3

8. (a) Explain the Young's double slit experiment by drawing its diagram. How are determine fringe spacing by this method?   5

   (b) A simple pendulum is 50 cm long. What will be its frequency of vibration at a place where $g = 9.8\,ms^{-2}$?   3

9. (a) What is " Carnot Engine"? Derive formula for its efficiency.   5

   (b) An astronomical telescope having magnifying power of 5 consists of two thin lenses 24 cm apart. Find the focal length of the lenses.   3