

SECTION – I

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 $P = \vec{F} \cdot \vec{V}$
- (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 :

- (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 $g = 9.8 \text{ ms}^{-2}$? 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