

Time: 2:40 Hours

SUBJECTIVE

Marks: 68

Note: Section I is compulsory. Attempt any THREE (3) questions from Section II.

(SECTION – I)

2. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- i. How the accuracy is increased by decreasing the limit of precision?
- ii. How many expected number of significant figures are in 8000 kg?
- iii. Check the homogeneity of the relation  $V = \sqrt{\frac{F \times \ell}{m}}$ .
- iv. Name the several repetitive phenomena occurring in nature which could serve as reasonable time standards.
- v. Is it necessary, when the acceleration of a body is zero then its velocity is also zero?
- vi. Find angle of projection of a projectile for which its max. height and horizontal range are equal.
- vii. Write down two significance of velocity-time graph.
- viii. Define impulse and show how it is related to linear momentum?
- ix. How can we differentiate between reversible and irreversible processes on the basis of entropy?
- x. Why molar specific heat at constant pressure is greater than molar specific heat at constant volume?
- xi. Why the curve of adiabatic process is steeper than isothermal process?
- xii. If  $PV^r = \text{constant}$ ; prove that  $TV^{r-1} = \text{constant}$ .

3. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- i. How a vector can be determined when rectangular components are known?
- ii. Is it possible to add a vector quantity to a scalar quantity? Explain.
- iii. Describe the method to find the direction of cross product?
- iv. When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?
- v. What sort of energy is in the following:  
(a) Compressed Spring (b) Water in high dam.
- vi. Point out the positions where gravitational potential energy is taken as zero.
- vii. Derive relation between linear and angular velocity.
- viii. Explain how many minimum number of geostationary satellites are required for global coverage of T.V. transmission?
- ix. A disc without slipping rolls down a hill of height 10 meters. If the disc starts from rest at the top of the hill, then what is its speed at the bottom?
- x. Can the visible light produce interference fringes? Explain.
- xi. How would you distinguish between un-polarized and plane polarized light?
- xii. What are Newton's rings? Why is the centre of Newton's rings dark?

4. Write short answers to any SIX questions.

(2 x 6 = 12)

- i. Explain the working of carburetor of a motor car using Bernoulli's principle.
- ii. What are free, forced and damped oscillations?
- iii. Does frequency depend on amplitude for harmonic oscillator?
- iv. Describe some common phenomena in which resonance plays an important role.
- v. State principle of superposition.

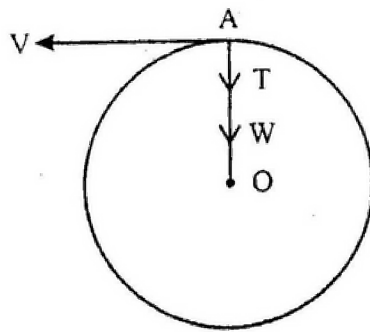
(Turn Over)

- vi. Differentiate between in phase and out of phase points in transverse periodic waves with the help of a diagram.
- vii. How beats are useful in tuning the musical instruments?
- viii. Why it be advantageous to use blue light with a compound microscope?
- ix. If a person was looking through a telescope at full moon, how would the appearance of the moon be changed by covering half of the objective lens.

**(SECTION – II)**

**Note: Attempt any THREE (3) questions from Section II.**

- 5. (a) Define vector product and write down its four characteristics. (5)
- (b) A force of 400 N is required to overcome road friction and air resistance in propelling an automobile at  $80 \text{ kmh}^{-1}$ . What power (KW) must the engine develop? (3)
- 6. (a) Explain velocity-time graph and how would you figure out the slope and distance covered from the graphs. (5)
- (b) A ball tied to the end of a string, is swung in a vertical circle of radius 'r' under the action of gravity as shown in the fig. What will be the tension in the string when the ball is at the point 'A' of the path and speed is 'V' at this point. (3)



- 7. (a) How would you elaborate the effects of pressure and density on the speed of sound in air. Also, derive a relation for the effect of temperature on the speed of sound in air. (5)
- (b) Water flows through a hose, whose internal diameter is 1 cm at a speed of  $1 \text{ m/s}$ . What should be the diameter of the nozzle if the water is to emerge at  $21 \text{ m/s}$ . (3)
- 8. (a) What is simple pendulum? Show that motion of simple pendulum is SHM. Also find relation for its time period and frequency. (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  $15^\circ$ . (3)
- 9. (a) What is spectrometer? Discuss its different parts. Write down its uses. (5)
- (b) The turbine in a steam power plant takes steam from boiler at  $427^\circ$  and exhausts into low temperature reservoir at  $77^\circ \text{C}$ . What is maximum possible efficiency? (3)