

Time: 3:10 hours

Marks: 83

Question No. 2 Write short answers to any EIGHT (8) questions.

(16)

- Give the draw backs to use the period of a pendulum as a time standard.
- Does dimensional analysis give any information on constant of proportionality? Explain.
- Why do we find it useful to have two units for the amount of substance, the kilogram and mole?
- Can a vector have a component greater than the vector's magnitude?
- Can a body rotate about its centre of gravity under the action of its weight?
- Name the three different conditions that could make $\mathbf{A1} \times \mathbf{A2} = \mathbf{O}$.
- If one of the rectangular components of a vector is not zero, can its magnitude be zero? Explain.
- Define impulse? Also show that $I = \Delta P$ where 'I' is impulse and ' ΔP ' change in momentum.
- Can velocity of the object reverse the direction when acceleration is constant? If so give an example.
- At what point or points in its path does a projectile have its minimum speed, its maximum speed?
- In an orbiting space station would the blood pressure in major arteries in the leg even be greater than blood pressure in major arteries in the neck?
- A person is standing near a fast moving train. Is there any danger that he will fall towards it?

Question No. 3 Write short answers to any EIGHT (8) questions.

(16)

- A boy uses a catapult to throw a stone which accidentally smashes green house window. List the possible energy changes.
- What sort of energy is in (a) compressed spring, (b) water in a high dam, (c) a moving car
- Calculate the work done in kilo joules in lifting a mass of 10 kg through a vertical height of 10 m.
- Explain the difference between tangential velocity and the angular velocity if one of these is given for a wheel of known radius, how will you find the other?
- What is meant by moment of inertia? Give its physical significance.
- Explain how many minimum number of geo-stationary satellites are required for global coverage of T.V. transmission.
- Does frequency depends on amplitude for harmonic oscillators?
- If a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop?
- Does acceleration of a simple harmonic oscillator remain constant during its motion? Is the acceleration ever zero? Explain.
- Why does sound wave travel faster in solids than in gases?
- How are beats useful in tuning musical instrument?
- What is the difference between destructive interference and stationary waves?

Question No. 4 Write short answers to any SIX (6) questions.

(12)

- Can visible light produce interference fringes? Explain.
- In the Young's experiment one of the slits is covered with blue filter and the other with red filter. What would be the pattern of light intensity on the screen?
- How is the distance between interference fringes affected by the separation between the slits of Young's experiment? Can fringes disappear?
- Why would it be advantageous to use blue light with a compound microscope?
- One can buy a cheap microscope for use by the children. The images seen in such a microscope have colored edges. Explain.
- What are main sources of power loss in optical fiber
- Can the mechanical energy be converted completely into heat energy? If so give an example.
- Does entropy of a system increase or decrease due to friction?
- Give an example of a natural process that involves increase in entropy.

SECTION – II

Note:- Attempt any three questions.

(8x3) =24

- Q.No. 5(a)** Define and explain dot product of two vectors. Also give its characteristics. (5)
(b) A force (thrust) of 400 N is required to overcome road friction and air resistant in propelling at 80 km/h. What power in kilowatt must the engine develop? (3)
- Q.No.6(a)** Show that P.E. can be converted into K.E. and K.E. can be converted into P.E. but total mechanical energy of a body falling from certain height remains constant (ignore friction). (5)
(b) A 1000 kg car travelling with a speed of 144 km/h round a curve of radius 100m. Find centripetal force. (3)
- Q.No.7(a)** Derive Newton's formula for the speed of sound. How it was corrected by Laplace? (5)
(b) A simple pendulum is 50 cm long. What will be its frequency of vibration at a place where $g=9.8 \text{ m/s}^2$. (3)
- Q.No.8(a)** Explain the construction and image formation by a compound microscope with the help of ray diagram. Also calculate formula for its angular magnification. (5)
(b) A light is incident normally on a grating which has 2500 lines per centimeter. Compute the wavelength of a spectral line for which the deviation in second order is 51.0° (3)
- Q.No.9(a)** Define molar specific heat at constant pressure and constant volume. Also prove that $C_p > C_v$. (5)
(b) What gauge pressure is required in the city mains for a stream from a fire hose connected to e mains to reach a vertical height of 15.0 m? (3)

SECTION – III (PRACTICAL)

Note: Give answers to any four questions.

4x2=8

Q. No. 10(a)

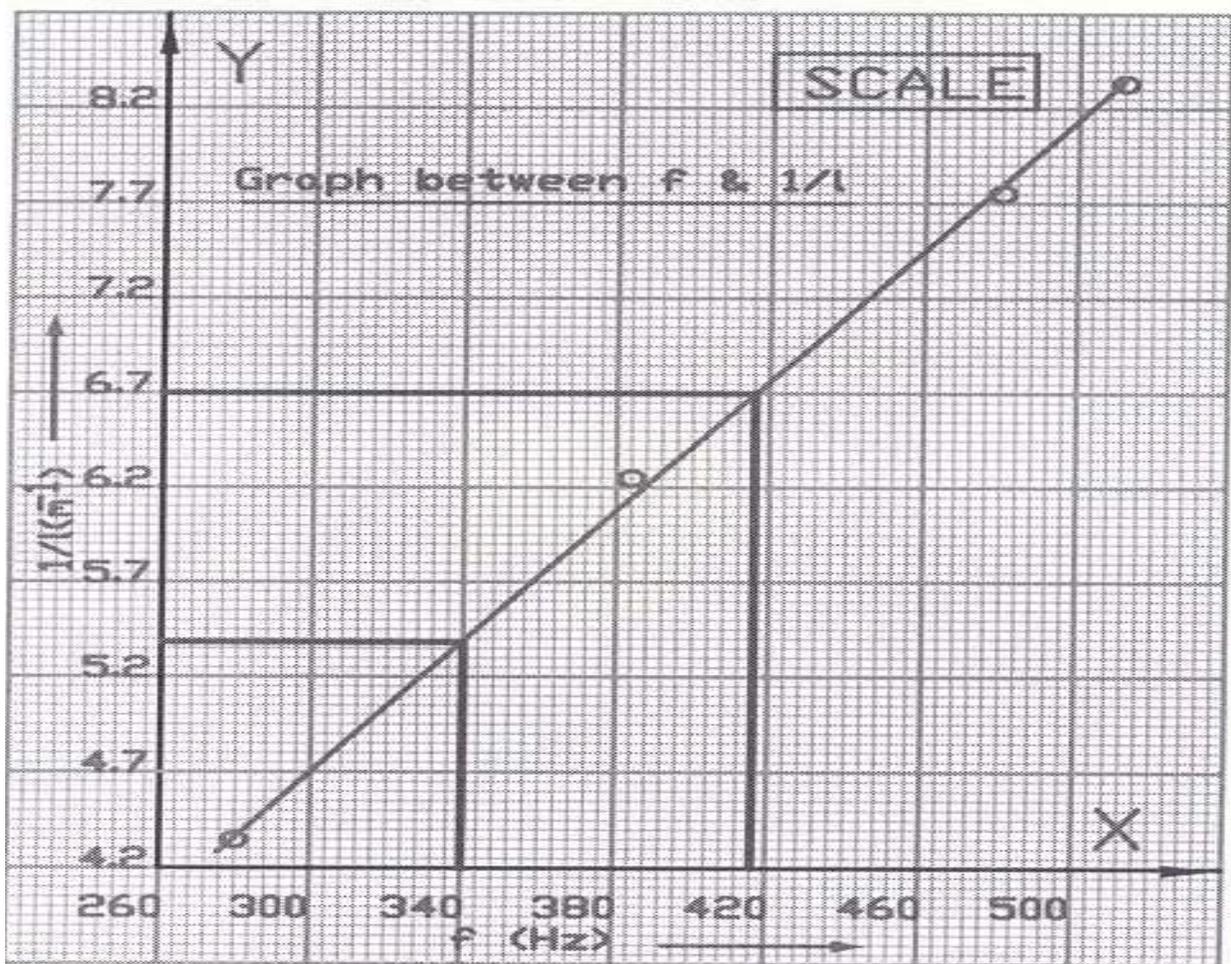
- If length and diameter of a cylinder is 2.15 cm and 0.6 cm respectively, what is the volume of the cylinder?
- Draw ray diagram to find critical angle by means of a prism?
- If diameter of the bob is 1.7 cm and length of thread is including hook is 80 cm. What is length of simple pendulum?
- Define the least count of screw gauge. Also give the formula to measure it.
- What are sources of error while performing the experiment of addition of vectors by Gravesand's apparatus?
- What is difference between g and G ?
- Differentiate between real and virtual image?
- Determine the value of ' g ' if distance between bob and gate switch is 60 cm and time of free fall is 0.35 s.

Q. No. 10(b)

Write down the brief procedure to measure the diameter of a wire with a screw gauge and calculate its area of cross-section. (3) OR
 Write down the brief procedure to show experimentally that time period of simple pendulum is independent of amplitude. (3)

Q. No. 10(c)

Answer the questions on the basis of graph drawn below.



- a. Which law is verified from this graph? State that law. (2)
 b. Find the slope of the given graph. (2)

OR

Answer the following Questions on the basis of graph drawn below.

- a. Find the value of x-intercept and y-intercept from the graph. (2)
 b. Find the focal length of the lens from the graph. (2)

