



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FIRST SEMESTER – APRIL 2013

PH 1503/PH 1502/PH 1501 - PROPERTIES OF MATTER & ACOUSTICS

Date: 09/05/2013
Time: 1:00 - 4:00

Dept. No.

Max. : 100 Marks

PART – A

Answer ALL questions:

(10x2=20 marks)

1. Define bulk modulus.
2. Calculate the energy stored in a wire of 4m long and 10^{-3} m diameter when stretched by 2×10^{-4} m by a load of 10kg.
3. Define i) critical velocity and ii) terminal velocity.
4. What is the effect of temperature on the viscosity of a liquid?
5. Define sphere of influence.
6. Mention the unit and dimension of surface tension.
7. List any two properties of light waves?
8. If the frequency of a tuning fork is 400 Hz and the velocity of sound in air is 330m/s, find how far sound travels when the fork completes 10 vibrations.
9. What is piezoelectric effect?
10. Define reverberation time.

PART – B

Answer any FOUR questions:

(4X7.5=30 marks)

11. a) Derive an expression for the period of oscillation of a cantilever.
b) Describe the oscillation method to determine the Young's modulus for the material of a cantilever. (Neglect the mass of the cantilever). (3+4.5)
12. Describe the construction and working of McLeod gauge. (3+4.5)
13. a) Describe Jaeger's method for determining the surface tension of a liquid.
b) If the pressure of air in a soap bubble of 7×10^{-3} m dia is 8×10^{-3} m of water above the atmospheric pressure, calculate the surface tension of the soap solution. (5+2.5)
14. Show that the energy of a plane progressive wave is given by $E=2\pi^2\rho n^2 a^2$.
15. Mention any five properties of ultrasonics.

PART – C

Answer any FOUR questions:

(4X12.5=50 marks)

16. a) Derive an expression for the twisting couple of a cylinder.
b) How can the rigidity modulus be calculated using torsional pendulum? (6+6.5)
17. a) Derive an expression for the rate of flow of a viscous fluid through a capillary tube.
b) A spherical glass ball of mass 1.34×10^{-4} kg and radius 2.2×10^{-3} m falls with a velocity 0.06m/s inside a large volume of oil of density 943 kg/m^3 . Calculate the viscosity of the oil. (8.5+4)

18. a) Derive an expression for the excess pressure inside a curved surface and discuss it for the special cases.
- b) Calculate the surface tension of water, if the height of water in the capillary tube of diameter 1mm, is 3cm. (10+2.5)
19. a) Explain Doppler effect.
- b) Find an expression for the change in frequency when both the source of sound and the observer are in motion. (2.5+10)
20. Give a brief note on any eight applications of ultrasonics.

\$\$\$\$\$\$