

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – PHYSICS

FIRST SEMESTER – NOVEMBER 2019

PH 1503 – PROPERTIES OF MATTER & ACOUSTICS

Date: 30-10-2019

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

Part A

Answer all questions:

(10 x 2 = 20 marks)

1. What is Poisson's ratio?
2. Calculate the elastic energy stored up in a wire originally 5 metres long and 10^{-3} m in diameter which has been stretched by 3×10^{-4} m due to a load of 10 kg.
3. What is the effect of pressure on the viscosity of a liquid?
4. What is the principle used in vacuum pumps?
5. What is angle of contact?
6. Explain surface energy.
7. If the frequency of a tuning fork is 500 Hz and the velocity of sound in air is 330 m/s, find the distance travelled by sound after 5 vibrations.
8. What is resonance?
9. What are the methods to produce ultrasonic waves?
10. Define Piezo electric effect.

Part B

Answer any four questions:

(4 x 7.5 = 30 marks)

11. a) Derive the relation for energy stored in a wire **(5)**
b) A 2m long wire with diameter 2 mm is stretched by 3.5 mm by a load of 50 kg. Calculate a) stress b) the strain and c) Young's modulus **(2.5)**
12. How the coefficient of viscosities of two liquids is compared using Ostwald viscometer?
13. Obtain the relation for excess pressure over the curved liquid surface.
14. Describe Jaeger's method for determining the surface tension of a liquid.
15. With a neat sketch explain the principle, construction and working of magnetostriction oscillator.
16. Derive the expression to determine the angle of contact using Quinke's tube experiment.

Part C

Answer any four questions

(4 x 12.5 = 50 marks)

17. Derive the relation connecting Young's modulus, Rigidity modulus, Bulk modulus and Poisson's ratio for elasticity of a material.
18. Derive Poiseuille's formula for the rate of flow of liquid through a capillary tube.
19. a) Explain the principle and working of Knudsen gauge and explain the advantages over the other forms of gauges?
20. 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+10.5 marks)**
21. Derive Sabine's formula for reverberation time. Explain its significance
22. Discuss the factors, reverberation, resonance, echelon effect, focusing and reflection that affect the acoustics in hall and the remedies for them.
