



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**B.Sc. DEGREE EXAMINATION – PHYSICS**

**FIRST SEMESTER – APRIL 2017**

**PH 1503 / PH 1502 / PH 1501 / PH 1500- PROPERTIES OF MATTER & ACOUSTICS**

Date: 26-04-2017  
09:00-12:00

Dept. No.

Max. : 100 Marks

**PART-A (10 x 2 = 20 marks)**

**Answer ALL questions**

1. Define Poisson ratio with its limiting values.
2. What is Torsional pendulum?
3. State Newton's law of viscosity.
4. Briefly state the principle of Pirani gauge.
5. Write about the characteristics of molecular forces.
6. What are obtuse and acute angles?
7. Distinguish transverse and longitudinal waves.
8. What is meant by organ pipes?
9. State Piezoelectric effect.
10. Write a short note on sound insulation.

**PART-B (4 x 7.5 = 30 marks)**

**Answer ANY FOUR questions**

11. Define modulus of elasticity Obtain relation between elastic constants. **( 2 + 5.5 marks )**
12. Deduce expressions for bending moment of (a) rectangular and (b) cylindrical beams.
13. (a) Obtain Poiseuille's relation for rate of flow of liquid. **( 5.5 + 2 marks )**  
(b) Write a short note on effect of temperature on viscosity.
14. Describe Jaeger's method to determine the surface tension of a liquid. Also explain the effect of temperature on it.
15. The equation of a progressive wave is given by  $Y = 10 \sin(0.5x - 200t)$  where x and y are in cm and t is in seconds. Calculate amplitude, frequency and velocity of the wave.
16. Define magnetostriction effect. Explain the construction and operation of magnetostriction oscillator for Ultrasonic waves.

**PART-C (4 x 12.5 = 50 marks)**  
**Answer ANY FOUR questions**

17. (a) A bar of length 1 m and cross-section  $5 \times 10^{-3} \text{sq.m}$  is supported at its two ends and loaded in the middle. The depression observed in the middle is  $1.96 \times 10^{-3} \text{ m}$  when a load of 0.1 kg is placed.  
Calculate the Young's modulus of the material. **( 5 + 7.5 Marks)**
- (b) Describe the Koenig method to determine the Young's modulus of material of a beam.
18. Deduce an expression for couple per unit twist. Also explain the torsional pendulum method to determine the rigidity modulus of a wire.
19. (a) Describe the Oswald viscometer for comparison of viscosities of two liquids. **(7.5 +5 Marks)**
- (b) Write a note on working principle of mercury diffusion pump.
20. (a) Obtain the condition for excess pressure inside a liquid drop. **( 6.5 + 6 marks)**
- (b) Describe the Quincke's mercury drop method to determine surface tension.
21. (a) Calculate the velocity of sound in a gas in which two waves of lengths 0.8 m and 0.81 m produce 5 beats per second. **(5 + 7.5 marks)**
- (b) Obtain wave equation for simple harmonic motion.
22. Define absorption coefficient. Deduce Sabine formula for determination of absorption coefficient. A hall of volume  $5500 \text{ m}^3$  is found to have a reverberation time of 2.3 s. The sound absorbing surface of the hall has an area of  $750 \text{ m}^2$ . Calculate the average absorption coefficient. **( 2+ 5.5+5 marks)**

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