LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION - **PHYSICS**

FIRST SEMESTER – NOVEMBER 2015

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

Date : 04/11/2015 Dept. No. Max. : 100 Marks
Time : 01:00-04:00

PART – A

Answer ALL questions: **[10 x 2 = 20 marks]**

1. State and Explain Hooke's law.
2. A bar of length 1 m and cross-section $5x10^{-3}$ m^2 is supported at its two ends and loaded in the middle. The depression observed in the middle is $1.96x10^{-3}$m when a load of 0.1 kg is placed. Calculate the Young's modulus of the material.
3. What is the effect of temperature on the viscosity of a liquid?
4. Write the principle used in vacuum pumps.
5. Define surface tension of a liquid. What are its dimensions?
6. Explain the variation of surface tension with temperature.
7. What is the difference between transverse and longitudinal waves? Are sound waves in air transverse or longitudinal?
8. What are beats?
9. What are ultrasonic waves? Give its frequency range
10. Define "absorption co-efficient of a material" and "reverberation time".

PART – B

Answer any FOUR questions: **[4 x 7.5 = 30 marks]**

11. a) Define a cantilever. (2)

    b) Obtain an expression for the depression produced at its free end when the weight of the beam is negligible. (5.5)

12. a) Define co-efficient of viscosity. (2)

    b) How the co-efficient of viscosities of two liquids are compared using Oswald viscometer? (5.5)

13. What is the excess pressure inside over outside in the case of a) spherical bubble b) cylindrical bubble and c) spherical drop. (7.5)

14. Discuss the phenomenon of sharpness of resonance and show how it depends upon the damping factor. (7.5)

15. a) Explain how ultrasonic waves are produced in a magnetostriction oscillator. (5)

    b) Mention the properties of ultrasonic waves. (2.5)

16. Describe the Quinke's method of determining the surface tension of mercury. (7.5)

PART – C

Answer any FOUR questions. **[4 x 12.5 = 50 marks]**

17. Describe, with necessary theory, how to determine the rigidity modulus of a wire experimentally by using the torsional pendulum.

18. a) Explain the principle and working of Knudsen gauge.

    b) What are its particular advantages over the other forms of gauges? (7+5.5)

19. a) Describe Jaeger's method of studying the variation of surface tension of water with temperature.

    b) What are the factors affecting the surface tension of a liquid? (9+3.5)

20. a) What is Doppler effect?

    b) Derive expressions for the apparent frequency of a note when

    (i) Observer is at rest and source is in motion (ii) observer is in motion and source is at rest

    and (iii) both observer and source are in motion. (2+10.5)

21. a) Define reverberation.

    b) Derive Sabine's formula for reverberation time. Explain its significance. (2+10.5)

22. Discuss the factors, reverberation, resonance, echelon effect, focusing and reflection that affect the acoustics in hall and the remedies for them.

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