LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FIRST SEMESTER – November 2009

PH 1502/PH 1501 - PROPERTIES OF MATTER & ACOUSTICS

Date & Time: 12/11/2009 / 1:00 - 4:00   Dept. No.   Max. : 100 Marks

PART – A

Answer **ALL** questions   (**10 x 2 =20 marks)**

1. State Hooke's law.

2. Define young modulus.

3. What is the effect of temperature on the viscosity of liquid?

4. What is the practical use of the prain gauge?

5. Define surface tension of a liquid.

6. There is a minute circular hole at the bottom of a small hollow vessel. The vessel has to be immersed in water to a depth of 0.4 m, before any water penetrates inside. Find the radius of the hole, if the surface tension and density of water be 73×10^{-3} Nm^{-1} and 1000 kg m^{-3} respectively.

7. Name two technical applications of sound wave reflection.

8. What are beats?

9. What is piezoelectric effect?

10. Mention two properties of ultrasonic waves.

PART – B

Answer any **FOUR** questions   (**4 x 7.5 =30 marks)**

11. Derive an expression for the moment of the couple required to twist one end of a cylinder when the other is fixed.   (7.5)

12. Derive the Poisecille's formula for the rate of flow of liquid through a capillary tube.
                                                                              (7.5)

13. a) Obtain an expression for the excess of pressure inside (i) a spherical soap bubble, (ii) a spherical liquid drop.   (4.5)

    b) The pressure of air in a soap bubble of 7×10^{-3} m, diameter is 8×10^{-3} m of water above the atmospheric pressure. Calculate the S.T. of the soap solution.   (3)

14. a) Derive the general equation of wave motion.   (4)

    b) Calculate the velocity of sound in a gas in which the waves of wave length 0.50 m and 0.505 m produce 6 beats per second.   (3.5)

15. a) Describe the piezoelectric method of producing ultrasonic waves.   (5.5)

    b) Write any two applications of ultrasonics.   (2)

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PART – C

Answer any **FOUR** questions   (**4 x 12.5 = 50 marks**)

16. a) Find an expression for the work done in stretching a wire.   (3.5)

    b) Derive the relation between the three elastic constants.   (9)

17. Explain the principle and working of the Knudsen gauge. What are its advantages over the other forms of gauges?   (12.5)

18. a) Describe Jaegar's method of studying the variation of surface tension of water with temperature.   (10)

    b) Write the advantages and disadvantages of this method.   (2.5)

19. Explain Doppler Effect. Derive an expression for the change in frequency when
(i) Observer is at rest and source in motion (ii) Observer in motion and source is at rest and
(iii) Observer and source in motion.   (12.5)

20. a) Define the reverberation time. Derive Sabine's formula for reverberation time.   (10)

    b) Explain its significance.   (2.5)

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