LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2022**

(19 & 20 BATCH)

UPH 1501 – PROPERTIES OF MATTER AND ACOUSTICS

Date: 24-11-2022 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

PART – A

Answer ALL Questions **(10x 2 = 20 Marks)**

1 Define Poisson's ratio.

2 State Hooke's law.

3 Write down the unit and dimension of coefficient of viscosity.

4 Distinguish between streamline and turbulent motions of a liquid.

5 What are adhesive and cohesive forces?

6 How does surface tension of a liquid vary with temperature?

7 What are transverse and longitudinal waves?

8 Define SHM.

9 Define Intensity of sound.

10 List the applications of ultrasonic waves.

PART – B

Answer any FOUR Questions **(4 x 7.5 = 30 Marks)**

11 (a) Define a beam. **(2 Marks)**

(b) Derive an expression for the bending moment of a beam. **(5.5 Marks)**

12 How can the coefficient of viscosities of two liquids be compared using Ostwald viscometer?

13 (a) Define surface tension. **(2 Marks)**

(b) Describe how the surface tension of a water can be determined by drop weight method. **(5.5 Marks)**

14 Derive the general differential equation of SHM and solve it to get the frequency of oscillations. Plot the variation of kinetic energy and potential energy with displacement.

15 What is piezo-electric effect? Explain the method of producing ultrasonic waves, using a piezo electric crystal.

16 Give the theory and experimental method for determining the rigidity modulus of a wire using torsion pendulum.

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 an elastic material.

18 Obtain the Poiseuille's formula for the rate of flow of liquid through a capillary tube.

19 (a) Describe the Jaeger's method for studying the variation of surface tension of water with temperature. **(8.5 Marks)**

(b) Discuss the advantages and disadvantages of the Jaeger's method. **(4 Marks)**

20 (a) Define Doppler effect. **(2.5 Marks)**

(b) Derive an expression for the apparent frequency of the note for different cases. **(10 Marks)**

21 Derive the Sabine's formula for reverberation time. Explain its significance.

22 **a)** Define a cantilever. **(2.5 Marks)**

b) Obtain an expression for the depression produced at the free end of the beam when the weight of the beam is negligible. **(10 Marks)**

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