

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – PHYSICS

FIRST SEMESTER – NOVEMBER 2019

18/17/16UPH1MC01 – PROPERTIES OF MATTER AND ACOUSTICS

Date: 30-10-2019

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

PART-A

Answer ALL the Questions

(10x2=20 Marks)

1. What is Poisson's ratio?
2. Differentiate uniform bending from non-uniform bending.
3. Define coefficient of viscosity.
4. State Torricelli's theorem.
5. Give the unit and dimension of surface tension.
6. Define angle of contact.
7. Distinguish between transverse and longitudinal waves.
8. What are standing waves?
9. Define Intensity of sound.
10. State Magnetostriction effect

PART-B

Answer Any Four Questions

(4x7.5=30Marks)

11. Define three elastic constants. Establish the relations between them.
12. Explain Oswald's method of comparing the co-efficient of viscosities of two liquids.
13. Obtain an expression for the excess of pressure inside a spherical liquid drop and a spherical soap bubble.
14. Derive the general differential equation of SHM and sketch the graphical representation of SHM for displacement, velocity and acceleration.
15. Write a short note on the factors affecting the acoustics of buildings.
16. (a) Explain the experimental determination of rigidity modulus of the material of the wire by torsion pendulum.
(b) A uniform metal disc of diameter 0.1 m and mass 1.2 kg is fixed symmetrically to the lower end of a torsion wire (length 1m and diameter 1.44×10^{-3} m), the upper end of which is fixed. The time period of torsional oscillations is 1.98 s. Calculate the rigidity modulus of the material of the wire. **(4+3.5)**

PART-C

Answer Any Four Questions

(4x12.5=50)

17. With relevant theory, explain Koenig's method for the determination of Young's modulus of a beam.
18. (a) Derive the Poiseuille's formula for the flow of a liquid through a capillary tube.
(b) Describe the working of Venturimeter. **(7.5+5.0)**
19. (a) Describe the drop weight method to determine the surface tension of a liquid.
(b) Explain the experiment to determine the interfacial surface tension between water and kerosene. **(7.5+5.0)**
20. State Doppler effect and derive an expression for the apparent frequency of the note for the following cases.
(i) Observer at rest and source in motion
(ii) Source at rest and observer in motion and
(iii) Both source and observer are in relative motion
21. (a) Derive Sabine's reverberation formula.
(b) The volume of room is 600 m^3 . The wall area of the room is 220 m^2 , the floor area is 120 m^2 and the ceiling area is 120 m^2 . The average sound absorption coefficient (i) for the wall is 0.03, (ii) for the ceiling is 0.08, and (iii) for the floor is 0.06. Calculate the average sound absorption coefficient and the reverberation time. **(8.5+4.0)**
22. (a) Describe Piezoelectric method of producing Ultrasonic waves.
(b) Write the Industrial applications of Ultrasonic waves. **(6.5+6.0)**

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