

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – PHYSICS

FIRST SEMESTER – NOVEMBER 2019

UPH 1501 – PROPERTIES OF MATTER AND ACOUSTICS

Date: 30-10-2019

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

Part A

Answer All Questions:

(10 x 2 = 20 marks)

1. Define Poisson's ratio.
2. What is meant by neutral axis?
3. What is equation of continuity?
4. Define terminal velocity.
5. Distinguish between adhesive and cohesive forces.
6. Define angle of contact.
7. Give the relation between wave velocity and particle velocity.
8. Give any two properties of longitudinal waves.
9. What is meant by intensity level?
10. Define reverberation.

Part B

Answer any Four Questions:

(4 x 7.5 = 30 marks)

11. Give the expression for work done in stretching a wire. Derive an expression for couple per unit twist. **(2+5.5)**
12. Define coefficient of viscosity. Discuss Meyer's modification of Poiseuille's formula for the flow of a gas through a capillary tube. **(2+5.5)**
13. Define surface tension of a liquid and give its dimensions. Obtain an expression for excess pressure inside a curved liquid surface. **(2+5.5)**
14. Derive the differential equation for Simple Harmonic Motion. Discuss about its graphical representation. **(3+4.5)**
15. What are ultrasonic waves? Outline the magnetostriction method of producing ultrasonic waves.
16. Write a note on the factors affecting acoustics of buildings.

Part C

Answer any Four Questions:

(4 x 12.5 = 50 marks)

17. (a) Explain Stress-Strain diagram. **(5)**.
(b) Describe with theory the determination of rigidity modulus of a wire by using torsion pendulum using two identical masses. **(7.5)**.
18. State and prove Bernoulli's theorem for fluid motion. Discuss one of its applications. **(7.5+5)**
19. (a) Describe Jaeger's method for measuring the surface tension of a liquid. What are the advantages of this method? **(8.5)**
(b) Explain the variation of surface tension with temperature. **(4)**
20. (a) Discuss Doppler effect in sound. **(5)**
(b) Obtain an expression for the apparent frequency of the note (i) when the source and the listener are moving towards each other and (ii) moving away from each other. **(7.5)**
21. Derive Sabine's formula for reverberation time.
22. Define a cantilever. Obtain an expression for the depression produced at the loaded end. **(8.5)**
(b) Calculate the depression at the free end of a rectangular cantilever of length 0.6 m, breadth 0.02 m, thickness 0.02 m loaded with 0.2 kg. Young's modulus of the material of the beam is $1 \times 10^{10} \text{ Nm}^{-2}$. **(4)**