

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – PHYSICS

FIRST SEMESTER – NOVEMBER 2016

16UPH1MC01 – PROPERTIES OF MATTER AND ACOUSTICS

Date: 05-11-2016

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

PART – A

Answer ALL questions:

(10x2=20 marks)

1. Define Young's modulus.
2. Explain the term neutral axis in a bar.
3. Distinguish streamline and turbulent motions of a liquid.
4. Write down the unit and dimensions of viscosity.
5. Define the terms molecular range and sphere of influence.
6. An air bubble of radius 0.1mm is situated just below the surface of water. Calculate the excess pressure inside the bubble. S.T. of water=0.07 N/m.
7. Define a plane progressive wave.
8. Explain an organ pipe with its types.
9. Define intensity of sound.
10. A hall of volume 5500 m^3 is found to have a reverberation time of 2.3 sec. The sound absorbing surface of the hall has an area of 750 m^2 . Calculate the average absorption coefficient.

PART – B

Answer any FOUR questions:

(4x7.5=30 marks)

11. a) Define a beam. (2.5+5)
b) Derive an expression for bending moment of a beam.
12. a) Define coefficient of viscosity. (2.5+5)
b) Discuss Meyer's modification of Poiseuille's formula for the flow of a gas.
13. Discuss how the angle of contact of mercury is determined.
14. Obtain the general differential equation of a wave motion.
15. Discuss any five applications of ultrasonic.
16. What is piezo-electric effect? Explain the method of producing ultrasonic waves. (2.5+5)

PART – C

Answer any FOUR questions:

(4x12.5=50 marks)

17. Give the theory and experimental method for determining the rigidity modulus of a wire using torsion pendulum. (5+7.5)
18. a) Derive Poiseuille's formula for the rate of flow of liquid through a capillary tube.
b) Discuss the effect of temperature and pressure on viscosity. (8.5+4)
19. a) Describe Jaeger's method of studying the variation of surface tension of water with temperature.
b) Discuss the advantages and disadvantages of the method. (7.5+5)
20. a) Explain Doppler effect.
b) Find an expression for the change in frequency of a note when both the source of sound and the observer are in motion. (2.5+10)
21. Discuss the salient points associated with good acoustics of an auditorium.
22. a) Derive an expression for the depression produced at its free end of a cantilever and hence obtain its period of oscillation. (Assume mass of cantilever is negligible).
b) Calculate the depression at the free end of a rectangular cantilever of length 0.6m loaded with 0.2 kg, breadth of 0.02 m and thickness 0.02 m. Given $E=1 \times 10^{10} \text{ N/m}^2$. (7+3+2.5)
