

**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**



**B.Sc.DEGREE EXAMINATION –PHYSICS**

**FIRST SEMESTER – APRIL 2018**

**PH 1501 / PH 1502 / PH 1503 – PROPERTIES OF MATTER & ACOUSTICS**

Date: 25-04-2018

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

**PART – A**

**Answer ALL questions:**

**(10x2=20 marks)**

1. Calculate Poisson's ratio of a material. Given,  $q=11.25 \times 10^{10} \text{ Nm}^{-2}$  and  $n = 4.25 \times 10^{10} \text{ Nm}^{-2}$
2. Explain the term 'neutral axis' in a bar.
3. What is the effect of temperature on the viscosity of a liquid?
4. The receiver of an air pump has a capacity of 1.5 litres and the pressure of air is 76 cm of Hg. If the barrel has a capacity of 500cc, find the pressure after 3 strokes.
5. Distinguish between cohesive and adhesive forces.
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 is  $0.072 \text{ Nm}^{-1}$ .
7. Mention any two conditions for interference in sound waves.
8. If the frequency of a tuning fork is 400 Hz and the velocity of sound in air is  $330 \text{ ms}^{-1}$ , find how far the sound would have travelled when the fork completes 3 vibrations.
9. Define reverberation and reverberation time.
10. Define intensity of sound.

**PART – B**

**Answer any FOUR questions:**

**(4x7.5=30 marks)**

11. Derive an expression for the moment of the couple required to twist one end of a cylinder through an angle  $\theta$  while the other end is fixed.
12. Derive an expression for the depression at the loaded end of a cantilever.
13. a) Compare the coefficient of viscosities of two liquids using Ostwald Viscometer.  
b) What are the advantages of Ostwald viscometer? **(5+2.5)**
14. Using Quinke's method, determine the angle of contact of mercury.
15. a) Discuss the vibrations of an air column in an open organ pipe.  
b) Compare the fundamental frequencies of an open end and closed end pipes of the same length. **(4.5+3)**
16. Discuss any five applications of ultrasonic waves.

**PART – C**

**Answer any FOUR questions:**

**(4x12.5=50 marks)**

17. Define the various types of elastic constants and obtain the relation connecting them. (4.5+8)

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

b) Discuss Mayor's modification of Poiseuille's formula for the flow of gas through a capillary tube. (8.5+4)

19. Derive an expression for the excess pressure inside a curved surface and discuss the different special cases. (8.5+4)

20. a) Describe Jaeger's method of studying the variation of surface tension of water with temperature.

b) Point out the advantages and disadvantages of the method. (8.5+4)

21. 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 relative motion. (2.5+10)

22. Discuss the salient features associated with good acoustics of an auditorium.

\*\*\*\*\*