



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FIRST SEMESTER – NOVEMBER 2016

PH 1503/PH 1502/PH 1501/PH 1500 – PROPERTIES OF MATTER & ACOUSTICS

Date: 05-11-2016

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

PART-A

Answer **ALL** questions

(10 x 2 =20 marks)

1. Define stress.
2. Calculate the Poisson's ratio for the material given $Y = 12.25 \times 10^{10} \text{ N/m}^2$ and $n = 4.55 \times 10^{10} \text{ N/m}^2$.
3. Define stream line and turbulent motion.
4. Write any two advantages of Knudsen Gauge.
5. Define surface tension and surface energy.
6. Give any two examples for capillarity.
7. What are transverse and longitudinal waves?
8. Explain Doppler Effect.
9. A quartz crystal of thickness 0.001m is in resonance. Calculate the fundamental frequency. Given $E = 7.9 \times 10^{10} \text{ N/m}^2$ and $\rho = 2650 \text{ kgm}^{-3}$.
10. State the importance of maintaining low Reverberation time of Auditorium.

PART -B

Answer any **FOUR** questions

(4 x 7.5 =30 marks)

11. a) Define shear stress, shear strain and rigidity modulus. **(2)**
b) Obtain an expression for the twisting couple of a cylinder. **(5.5)**
12. Explain the working of a rotation viscometer. **(7.5)**
13. a) Describe Jaeger's method for determining the surface tension of a liquid. **(4)**
b) Derive excess pressure inside a liquid drop. **(3.5)**
14. a) Discuss the vibrations of an air column in an open organ pipe. **(3.5)**
b) Two open pipes of lengths of 50 cm and 50.5 cm produce 3 beats/second. Calculate the velocity of sound in air. **(4)**
15. a) Describe the piezoelectric method of producing ultrasonic waves. **(4)**
b) Mention few applications of ultrasonic waves. **(3.5)**
- 16) Define coefficient of Viscosity. Explain how you would compare viscosities of two liquids. **(7.5)**

PART -C

Answer any **FOUR** questions

(4x12.5=50 marks)

17. With necessary diagram describe Koenig's method for the determination of Young's modulus of a beam. **(12.5)**
18. a) Derive an expression for the rate of flow of a viscous fluid through a capillary tube. **(5.5)**
b) Explain the principle and working of Rotary oil pump. **(7)**
19. a) The pressure of air in a soap bubble of 7×10^{-3} m diameter is 8×10^{-3} m of water above the atmospheric pressure. Calculate the surface tension of the soap solution. **(3)**
b) Describe Quincke's method to determine the surface tension and angle of contact of mercury. **(9.5)**
20. Deduce the expression for the velocity of longitudinal wave in a solid rod. **(12.5)**
21. a) Derive Sabine's formula for reverberation time. **(7.5)**
b) What are the different methods employed to detect ultrasonic waves. **(5)**
- 22) a) Establish the relation between three moduli of elasticity. **(8)**
b) Show that the energy stored per unit volume in a wire is $\frac{1}{2}$ stress X strain. **(4.5)**
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