LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **PHYSICS**

FIRST SEMESTER – **NOVEMBER 2014**

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

Date : 07/11/2014 Dept. No. Max. : 100 Marks
Time : 01:00-04:00

PART – A

Answer ALL questions: (10x2=20 marks)

1. Define a beam.
2. Calculate Poisson's ratio of a material. Given, $q=11.25x10^{10}N/m^2$ and $n=4.25x10^{10}N/m^2$.
3. Define coefficient of viscosity. Give its SI unit.
4. The receiver of an air pump has a capacity of 1.5 litres and the pressure of air of 76 cm of Hg. If the barrel has a capacity of 500cc, find the pressure after 3 strokes.
5. Explain surface tension and surface energy.
6. What is angle of contact?
7. If the frequency of a tuning fork is 400 Hz and the velocity of sound in air is 330 m/s, find the distance travelled by sound after 3 vibrations.
8. What are beats?
9. What is Piezoelectric effect?
10. Define reverberation time.

PART – B

Answer any FOUR questions: (4x7.5=30 marks)

11. a) Calculate the workdone in twisting a wire.
    b) Obtain an expression for the twisting couple of a cylinder. (2.5+5)

12. a) How the coefficient of viscosities of two liquids are compared using Ostwald viscometer?
    b) What are the advantages of Ostwald viscometer? (5+2.5)

13. a) Describe Jaeger's method for determining the surface tension of a liquid.
    b) Discuss the advantages of this method. (5+2.5)

14. 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. (5+2.5)

15. a) What are ultrasonics?
    b) Discuss any two applications of ultrasonics. (2.5+5)

16. Derive an expression for the depression at the free end of a cantilever.

PART – C

Answer any FOUR questions: (4x12.5=50 marks)

17. a) Define the three types of elastic modulii.
    b) Obtain the relation connecting them. (4.5+8)

18. a) Derive an expression for the rate of flow of a viscous fluid through a capillary tube.
    b) Discuss the Mayer's modification of Poiseuille's formula. (8.5+4)

19. a) Using Quinke's method, how the surface tension of mercury is determined?
    b) Calculate the difference in vapour pressure of water for a plane surface and for a drop of radius 0.2 mm. Density of water vapour=$6x10^{-4}$ g/cm^3 and surface tension of water 0.07 N/m. (9+3.5)

20. a) Explain Doppler effect.
    b) Find an expression for the change in frequency when both the source of sound and the observer are in motion. (2.5+10)

21. a) Describe the method of producing ultrasonics using Piezo electric method.
    b) List out the properties of ultrasonics. (6.5+6)

22. Discuss the conditions for a good acoustical design of an auditorium.

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