LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2024**

UPH1MC01 – PROPERTIES OF MATTER AND ACOUSTICS

Date: 09-11-2024 Dept. No. Max. : 100 Marks

Time: 09:00 am-12:00 pm

SECTION A - K1& K2 (CO1)

Q.No	Levels	Answer ALL the Questions (10 x 2 = 20)
1	K1	Define Poisson's Ratio
2		Differentiate Uniform and Non-Uniform Bending.
3		In case of mercury, there is a capillary depression. Why?
4		Less work is needed to bring a molecule from the interior of the liquid to the surface. Give reason.
5		State the Newton's law of viscosity.
6	K2	What is viscoelasticity in fluid mechanics?
7		Write the differential equation of SHM and represent it graphically.
8		Define wave velocity and particle velocity.
9		What are the factors affecting the acoustic quality of a building?
10		Mention any two applications of Ultrasonic's in Science and Engineering.

SECTION B– K3& K4 (CO2)

		Answer ALL the Questions (4 x 10 = 40)
11	K3	Define Elastic constants and obtain the relations connecting them.
		[OR]
12		Describe Quincke's method of finding surface tension. Derive the formula employed.
13		a) State Stoke's formula and derive an expression for terminal velocity. b) On what factors does the terminal velocity of a small body depend? What will happen if the density of the medium is greater than that of a body?
		[OR]
14		a) Illustrate the oscillations of a gas in a cylinder. b) Describe the wave motion and properties of transverse and longitudinal waves
15		Enumerate the features that an auditorium should have good acoustics.
		[OR]
16		Explain how the ultrasonic waves are produced by Magnetostriction effect?

	K4	

17		a) Derive an expression for torque per unit twist. b) A steel wire of diameter 3.6 x 10^{-4} m and length 4m extends by 1.8 x 10^{-3} m under a load of 1kg and twists by 1.2 radians when subjected to a total torsional torque of 4 x 10^{-5} Nm at one end. Find the values of E, G and Poisson's ratio. **[OR]**
18		Determine the surface tension and interfacial surface tension between water and liquid experimentally**.**
	SECTION C – K5 & K6 (CO3)	
	Answer ALL the Questions	**(2 x 20 = 40)**
19	K5	a) What is a cantilever? Obtain an expression for the depression at the free end of a beam clamped horizontally at one end and loaded at the other. b) Describe Koenig's method of non-uniform bending for the determination of Young's modulus of a beam. [OR]
20		a) Derive an expression for the excess pressure inside a curved liquid surface and discuss it for i) spherical and ii) cylindrical drop. b) Derive Poiseuille's formula for the rate of flow of a liquid through a capillary tube and also explain modification of Poiseuille's formula for gases.
21	K6	a.)What is Doppler Effect? Explain the change in frequency of different cases when the source and observer are in motion and at rest. b.) A bike rider approaching a vertical wall observes that the frequency of his bike horn changes from 440 Hz to 480 Hz when it gets reflected from the wall. Find the speed of the bike if the speed of sound is 330 m/s. [OR]
22		Define Reverberation Time. Derive Sabine's formula for reverberation time. Explain its significance.

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