LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2024**

UPH 1501 – PROPERTIES OF MATTER AND ACOUSTICS

Date: 09-11-2024   Dept. No.   Max. : 100 Marks
Time: 09:00 am-12:00 pm

	SECTION A - K1 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
1.	**Answer the following**	
a)	Hooke's Law	
b)	Differentiate between streamlined and turbulent flow.	
c)	Why is rain drop nearly spherical?	
d)	Define angle of contact.	
e)	Define Reverberation.	
2.	**Fill in the blanks**	
a)	The density of mercury is _____	
b)	The angle of contact of liquid greater than 90 degree _____	
c)	Bernoulli's theorem is applicable only for _____liquid	
d)	The property of the material due to which it regains its original shape or size when the load is removed is called _____	
e)	SONAR is the abbreviation of _____	
	SECTION A - K2 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
3.	**True or False**	
a)	If the temperature of the wire is increased, then the Young's modulus will decrease.	
b)	Dancing of small piece of camphor on the surface of water is due to surface tension.	
c)	Coefficient of viscosity of the liquid depends upon the nature of the fluids	
d)	Loudness or intensity of sound depends on the *amplitude of sound wave*	
e)	Sound is longitudinal mechanical wave and needs a material medium to travel.	
4.	**Match the following**	
a)	Elasticity - Rain drops	
b)	Surface tension - Periodic motion	
c)	Viscosity - Decibel	
d)	SHM - Friction force in liquid	
e)	Sound - Restoring force	
	SECTION B - K3 (CO2)	
	Answer any TWO of the following in 100 words	**(2 x 10 = 20)**
5.	Define a beam. Derive an expression for bending moment of a beam.	
6.	Explain the drop weight method experiment to determine the interfacial surface tension of liquid.	
7.	(a) State and explain Bernoulli's theorem.	

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	(b) Explain stokes formula and terminal velocity of liquids.
8.	Give some applications of ultrasonic waves.

	SECTION C – K4 (CO3)	
	Answer any TWO of the following in 100 words	**(2 x 10 = 20)**
9.	Derive an expression for the moment of the couple required to twist one end of a cylinder when the other is fixed.	
10.	Obtain an expression for the excess of pressure inside a spherical soap bubble and a spherical liquid drop.	
11.	Derive the general differential equation of SHM and sketch the graphical representation.	
12.	State Piezoelectric effect. Explain the construction and operation of piezoelectric oscillator to produce ultrasonic waves.	
	SECTION D – K5 (CO4)	
	Answer any ONE of the following in 250 words	**(1 x 20 = 20)**
13.	Evaluate the relation connecting Young's modulus, Rigidity modulus, Bulk modulus and Poisson's ratio for elasticity of a material.	
14.	(a) Explain Poiseuille's formula for the rate of flow of a liquid through a capillary tube. (10 Marks) (b)Explain in detail the Rankine's method of determining the coefficient of viscosity of a gas.	
	SECTION E – K6 (CO5)	
	Answer any ONE of the following in 250 words	**(1 x 20 = 20)**

15.	State Doppler effect. Find an expression for the change in frequency of a note
	    (a) When the observer at rest and source in motion.
	    (b) When the source at rest and observer in motion.
	    (c) Both source and observer in relative motion.	

16.	Describe reverberation and derive Sabine's formula for reverberation time.	

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