LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2022**

UPH 1501 – PROPERTIES OF MATTER AND ACOUSTICS

Date: 24-11-2022 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

	SECTION A		
Answer ALL the Questions			
1.	**Answer the following**		**(5 x 1 = 5)**
a)	State Hooke's law.	K1	CO1
b)	Define streamline motion.	K1	CO1
c)	Write down the unit and dimension of surface tension.	K1	CO1
d)	Define SHM.	K1	CO1
e)	List out the three properties of sound waves	K1	CO1
2.	**Fill in the blanks**		**(5 x 1 = 5)**
a)	The unit of stress is_____	K1	CO1
b)	Surface tension of liquids generally _____ with temperatures.	K1	CO1
c)	The SI unit of viscosity is _____	K1	CO1
d)	Sound waves are _____ waves.	K1	CO1
e)	Intensity of sound is measured in _____	K1	CO1
3.	**State True or False**		**(5 x 1 = 5)**
a)	The Young's modulus of rubber is greater than that of steel.	K2	CO1
b)	The liquids are less viscous than the gases.	K2	CO1
c)	Water and benzene have the same surface tension.	K2	CO1
d)	Sound can only be produced by vibrating bodies.	K2	CO1
e)	Ultrasound waves are harmful for humans.	K2	CO1
4.	**Match the following**		**(5 x 1 = 5)**
a)	Elasticity : Rain drops	K2	CO1
b)	Surface tension : Radar	K2	CO1
c)	Viscosity : Sonography	K2	CO1
d)	Doppler effect : Honey	K2	CO1
e)	Ultrasonics : Steel	K2	CO1
	SECTION B		
Answer any TWO of the following in 100 words			**(2 x 10 = 20)**
5.	(a) Derive the expression for energy stored in a stretched wire. (5 marks) (b) A 2 m long wire with diameter 2 mm is stretched by 3.5 mm by a load of 50 kg. Calculate a) the stress b) the strain and the Young's modulus. (5 marks)	K3	CO2
6.	Explain the method of producing ultrasonic waves using piezoelectric oscillator.	K3	CO2

7.	Obtain the expressions for the excess of pressure inside a spherical soap bubble and a spherical liquid drop.	K3	CO2
8.	Write a note on the factors affecting the acoustics of buildings.	K3	CO2
	SECTION C		
Answer any TWO of the following in 100 words			**(2 x 10 = 20)**
9.	(a) What is a beam? (2.5 marks) (b) Derive an expression for the bending moment of a beam. (8.5 marks)	K4	CO3
10.	Derive the differential equation for SHM. Plot the displacement, velocity and acceleration versus displacement from the mean position of a simple harmonic oscillator.	K4	CO3
11.	Derive an expression to find the rate of flow of liquid through a capillary tube by Poiseiulle's formula.	K4	CO3
12.	Discuss how the angle of contact of mercury can be determined.	K4	CO3
	SECTION D		
Answer any ONE of the following in 250 words			**(1 x 20 = 20)**
13.	Summarize the relation connecting Young's modulus, rigidity modulus, bulk modulus and Poisson's ratio of a material.	K5	CO4
14.	(a) Explain the drop weight method experiment to determine the surface tension of a liquid. (10 marks) (b)With necessary theory, describe an experiment to determine the interfacial surface tension between water and kerosene. (10 marks)	K5	CO4
	SECTION E		
Answer any ONE of the following in 250 words			**(1 x 20 = 20)**
15.	a) State Doppler effect and write an expression for the apparent frequency of the note for the following cases. (i) Observer at rest and source in motion (7 marks) (ii) Source at rest and observer in motion and (7 marks) (iii) Both source and observer are in relative motion (6 marks) b) How the coefficient of viscosities of two liquids is compared using Ostwald viscometer? (10 marks)	K6	CO5
16.	Describe reverberation and formulate Sabine's formula for reverberation time.	K6	CO5

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