

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BSc DEGREE EXAMINATION MAY 2026
(First Semester)**

Branch - **PHYSICS**

PROPERTIES OF MATTER AND SOUND

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Question No.	Question	K Level	CO
1	What is the unit of modulus of elasticity? a) Nm^3 b) Nm^2 c) Nm^{-2} d) Nm^{-3}	K1	CO1
2	Identify the type of stress, if a force is applied tangentially to the surface. a) normal stress b) shearing stress c) bulk stress d) compressive stress	K2	CO1
3	For which of the following liquid, stoke's method of viscosity determination is not applicable? a) glycerine b) blood c) castor oil d) honey	K1	CO2
4	The viscosity of a fluid in motion is 0.75 poise. What will be its viscosity when the fluid is at rest? a) 0 b) 0.5 poise c) 0.75 poise d) 1 poise	K2	CO2
5	Surface tension of a liquid is independent of a) temperature of a liquid b) area of a liquid surface c) nature of liquid d) impurities present	K1	CO3
6	If the surface of a liquid is plane, then the angle of contact of the liquid with the walls of the container is a) 90° b) 0° c) 140° d) 180°	K2	CO3
7	A particle executes simple harmonic motion along X axis. The force acting on it is a) $F = -AKx$ b) $F = A\cos Kx$ b) $F = AKx$ d) $F = A e^{-Kx}$	K1	CO4
8	What happens to the frequency when tuning fork is loaded? a) increases b) first Increases then decreases c) decreases d) first decreases then increases	K2	CO4
9	The piezo electric transducer consists of a) gold crystal b) diamond crystal b) copper crystal d) quartz crystal	K1	CO5
10	If 'T' is the reverberation time of a hall of Volume 'V' then a) $T \propto 1/V$ b) $T \propto 1/V^2$ c) $T \propto V^2$ d) $T \propto V$	K2	CO5

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SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	A body suspended symmetrically from the lower end of a wire, 1 m long, 1.22×10^{-3} m in diameter, oscillates about the wire as axis with a period of 1.25 seconds. If the modulus of rigidity of the material of the wire is $8 \times 10^{10} \text{ Nm}^{-2}$. Calculate the moment of inertia of the body about the rotation.	K3	CO1
	(OR)		
11.b.	A steel wire of diameter 3.6×10^{-4} m and length 4 m extends by 1.8×10^{-3} m under a load of 1 kg and twists by 1.2 radians when subjected to a total torsional torque of $4 \times 10^{-5} \text{ Nm}$ of one end. Find the values of Young's modulus, Rigidity modulus and Poisson's ratio for steel.		
12.a.	How does Ostwald's viscometer provide accurate viscosity measurements for the comparison of viscosities of two liquids? Analyse the experimental set up.	K4	CO2
	(OR)		
12.b.	Examine Stokes assumptions in arriving the formula for terminal velocity by deriving the same. Also, discuss the experimental method for the determination of coefficient viscosity of a viscous liquid.		
13.a.	Give the theory of Jaeger's method for determining the surface tension of a liquid. Also, discuss the variation of surface tension with temperature.	K2	CO3
	(OR)		
13.b.	Explain the experiment to determine the interfacial tension between water and kerosene.		
14.a.	Analyse the process of interference starting from their displacement wave equation., if two sound waves travel through the same medium	K4	CO4
	(OR)		
14.b.	Discuss the harmonics of open and closed end organ pipe. Compare the harmonic series.		
15.a.	What is Piezo-electric effect? Explain Piezo-electric generator for the production of ultrasonic waves with a neat diagram.	K2	CO5
	(OR)		
15.b.	With a neat diagram, explain the determination of velocity of ultrasonic waves in liquids. Mention the applications of ultrasonic waves.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Question No.	Question	K Level	CO
16	Derive the expression for torque per unit twist of a cylinder by considering the torsion generated in it. Also, derive the rigidity modulus of a torsional pendulum from the time period of its oscillation	K3	CO1
17	Derive the Poiseuilli's formula for the rate of flow of liquid through a capillary tube. Also, discuss two important corrections to be imposed	K2	CO2
18	Break down the Quincke's experimental set up to determine the surface tension of mercury and angle of contact. Examine the necessary mathematical procedures and laboratory practices.	K4	CO3
19	Analyse Doppler effect in sound by comparing the observed frequency in different cases when the observer and the source are in relative motion.	K4	CO4
20	Derive Sabine's formula for reverberation of time.	K2	CO5