PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(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	Which of the following is dimensionless quantity? a) stress b) strain c) pressure d) force	K1	CO1
2	The Young's modulus of a wire of length (L) and radius is (r) is Y. If the length is reduced to L/2 and radius to r/2, then what is the value of Young modulus? a) Y/2 b) 2Y c) Y d) Y/4	K2	CO1
3	Identify the type of liquid flow that doesn't fit with Newton's law of viscosity. a) Turbulent b) laminar c) streamline d) orderly	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? b) 0 b) 0.5 poise c) 0.75 poise d) 1 poise	K2	CO2
5	Which of the following occurs when the soap bubble is charged? a) Remains same b) expands c) contracts d) spread as a thin layer	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	An organ pipe open at both the ends contain a) Longitudinal stationary waves b) Longitudinal travelling waves c) Transverse stationary waves d) transverse travelling waves	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 frequency of ultrasonic wave is a) 20 Hz to 200 kHz b) 200 Hz to 20 kHz b) 20 kHz and above d) 20 kHz and below	K1	CO5
10	If 'T' is the reverberation time of a hall of Volume 'V' then a) $T \alpha {}^{1}/_{V}$ b) $T \alpha {}^{1}/_{V^2}$ c) $T \alpha V^2$ d) $T \alpha V$	K2	CO5

SECTION - B (35 Marks)

Answer **ALL** questions

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

Question No.	Question	K Level	CO
11.a.	A steel wire of diameter 3.6 x 10^{-4} m and length 4 m extends by 1.8 x 10^{-3} m under a load of 1 kg and twists by 1.2 radians when subjected to a total torsional torque of 4 x 10^{-5} Nm of one end. Find the values of Young's modulus, Rigidity modulus and Poisson's ratio for steel.	K3	CO1
	(OR)		

Cont...

11.b.	A metal disc of 0.1 m radius and mass 1 kg is suspended in a horizontal plane by a vertical wire attached to center. If the diameter of the wire is 10^{-3} m, its length 1 m, and the period of torsional vibrations is 4 seconds, find the rigidity modulus of the wire.	K3	CO1
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 drop weight method experiment to determine the surface tension of a liquid		
14.a.	Discuss the harmonics of open and closed end organ pipe. Compare the harmonic series.	K4	CO4
	(OR)		
14.b.	What is Doppler effect in sound? Analyse the effect when the source and the observer are in motion. Also, discuss the effect of wind and velocity.		
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 Magnetostriction oscillator to generate ultrasonic waves. Mention the advantages and limitations of this method.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks $(3 \times 10 = 30)$

Question No.	Question	K Level	CO
16	Derive the expression for the bending moment of a beam. Apply the same to derive the depression of free end of a cantilever fixed at one end and loaded at the other end.	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	How is Quincke's method applied to determine the surface tension of mercury and angle of contact? Explore the necessary mathematical procedures and laboratory practices.	K4	CO3
19	Analyse the acceleration of a particle by considering it in a simple harmonic wave motion by deriving the equation of wave motion. Also, examine differential equation of SHM by deriving the same.	K4	CO4
20	Derive Sabine's formula for reverberation of time. Also, write a relation between absorption coefficient and reverberation time.	K2	CO5

Z-Z-Z END