



Final exam

Year: 1st year

Course Code: PH 101

Course Title: Properties of Matter

Model (A)

Examination date: 4/1/2025

Examination Time: 2 hour

Number of Pages: 4 page

Answer the following Questions: (Each question 1.5 mark)

1	What is the relationship between stress and strain for a material within its elastic limit called?	a. Hooke's Law	b. Poisson's Ratio	c. Yield Criterion	d. Fatigue Limit
2	A load of 25 g elongates a spring by 7 cm. If body of mass 250 kg is attached to the spring and is set into vibration with an amplitude of 15 cm, what will be the spring constant	a. 163.3 Nm ⁻¹	b. 350 Nm ⁻¹	c. 35 Nm ⁻¹	d. 3.5 Nm ⁻¹
3	From the previous question, maximum speed of its vibration.	a. 0.0018 m/s	b. 0.018 m/s	c. 0.2 m/s	d. 2 m/s
4	The average depth of Indian Ocean is about 2000 m. Calculate the fractional compression, $\Delta V/V$, of water at the bottom of the ocean, given that the bulk modulus of water is $2.2 \times 10^9 \text{ Nm}^{-2}$. (Take $\rho_w = 1000 \text{ kg/m}^3$, $g = 10 \text{ ms}^{-2}$)	a. 0.0019	b. 110	c. 9.1×10^{-5}	d. 0.0091
5	In a harmonic oscillator, which quantity is conserved?	a. Momentum	b. Energy	c. Displacement	d. Frequency
6	If $M^a L^b T^c$ is the dimensional formula of power, and $M^a L^b T^c$ dimensional formula of energy find the value of $a-x-b+y+cz$	a. -3	b. 1	c. -1	d. 3
7	The dimensions of the refractive index are	a. $M^0 L^0 T^0$	b. $M^0 L^0 T^{-1}$	c. $M^0 L^0 T^1$	d. $M^1 L^{-1} T^{-2}$
8	The bulk modulus (K) measures a material's resistance to:	a. Shear deformation	b. Volumetric deformation	c. Axial deformation	d. Torsional deformation
9	The elastic modulus of a material can be affected by:	a. Temperature	b. Composition	c. Microstructure	d. All of the above
10	A car of mass 1200 kg is constructed using a frame supported by six springs. Each spring has a spring constant 4000 Nm ⁻¹ . If two people are riding in the car have a combined				

	mass of 125 kg, find the period of vibration of the car, when it is driven over a pot hole in the road. Assume the weight is evenly distributed	a. 0.67 s	b. 0.67 s ⁻¹	c. 1.5 s	d. 1.5 s ⁻¹
11	The restoring force of a simple pendulum is due to:	a. Gravity	b. Tension in the string	c. Inertia	d. Friction
12	The dimensions of the Planck constant h are....., where $E=h\nu$, ν is a frequency and E is the energy.	a. $M^0 L^0 T^0$	b. $M^1 L^2 T^{-1}$	c. $M^0 L^2 T^{-1}$	d. $M^1 L^{-1} T^{-2}$
13	What happens to the modulus of elasticity of metals as temperature increases?	a. It increases significantly	b. It decreases	c. It remains constant	d. It becomes negative
14	In a simple harmonic oscillator, the maximum potential energy occurs at:	a. amplitude	b. Equilibrium position	c. Mean position	d. None of the above
15	Which type of elasticity is involved in tangential push on the upper face of a block?	a. Bulk modulus	b. Young's modulus	c. Rigidity modulus	d. Elastic limit
16	In order to double the period of a simple pendulum, the length of the string should be	a. halved	b. quadrupled	c. doubled	d. zero
17	S.I. unit of power is	a. Kg.m ² /sec ²	b. Dyne.cm/sec	c. gm.cm ² /sec ³	d. N.m/sec
18	What is the maximum acceleration of the particle executing the simple harmonic motion, $y = 4\sin[(4\pi t/2)+\phi]$, where y is in cm?	a. $\pi/2 \text{ cm/s}^2$	b. $\pi^2/2 \text{ cm/s}^2$	c. $8\pi^2/4 \text{ cm/s}^2$	d. $16\pi^2 \text{ cm/s}^2$
19	A substance breaks down by a stress of 10^5 N/m^2 . If the density of the material of the wire is $2 \times 10^3 \text{ kg/m}^3$, then the length of the wire of the substance which will break under its own weight when suspended vertically will be	a. 2.6 m	b. 20.6m	c. 2.2m	d. 22.2 m
20	Suppose $A=BC$, where A has dimensions L/M, and C has dimensions L/T. Then B has the dimension:	a. T/M	b. L ² /TM	c. TM/L ²	d. L ² T/M

21	The dimensional formula for the displacement gradient is			
	a. $M^1 L^{-1} T^{-2}$	b. $M^1 L^{-2} T^{-2}$	c. $M^1 L^2 T^{-2}$	d. $M^0 L^0 T^0$
22	The surface of the water in contact with the glass wall is			
	a. Plane	b. Concave	c. Convex	d. Both a and b
23	Kepler's third law is known as			
	a. The Law of orbits	b. The Law of Areas	c. The Law of periods	d. The Law of gravity
24	The energy stored in the spring of a watch is:			
	a. K.E	b. Electrical Energy	c. Elastic P.E	d. Solar Energy
25	The quantity having the same unit in all system of unit is			
	a. mass	b. time	c. length	d. temperature
26	Kepler's laws of planetary motion replaced circular orbits with			
	a. elliptical orbits	b. parabolic orbits	c. conical orbits	d. hyperbolic orbits
27	If the dimensions of a physical quantity are given by $[L^a M^b T^c]$, then the physical quantity will be			
	a. force, if $a = -1, b = 0, c = -2$	b. pressure, if $a = -1, b = 1, c = -2$	c. velocity, if $a = 1, b = 0, c = 1$	d. acceleration, if $a = 1, b = 1, c = -2$
28	On increasing the temperature, the viscosity of the fluid			
	a. Decreases	b. Increases	c. Remains constant	d. None of the mentioned
29	What is the unit of coefficient of viscosity?			
	a. $kg.s.m^{-2}$	b. $kg.m.s^{-2}$	c. $N.m.s^{-2}$	d. $N.s.m^{-2}$
30	Suppose a sphere of radius 'r' is dropped into a viscous liquid of coefficient of viscosity 'η' and its velocity at an instant is 'v'. What is the frictional force according to Stokes law?			
	a. $F = 6\pi r \eta v$	b. $F = 6\pi r^2 \eta v$	c. $F = 4\pi r \eta v$	d. $F = 2\pi r \eta v$
31	The resistance of fluid to flow is due to the _____ between layers of fluid.			

	a. gravitational force	b. velocity gradient	c. Frictional force	d. None of the above
32	A liquid does not wet the surface of a solid if the angle of contact is			
	a. Zero	b. An acute one	c. 45°	d. An obtuse one
33	The unit of surface tension coefficient in the MKS system is			
	a. N/m	b. Kg/cm	c. Dyne/cm	d. Dyne/m
34	Raindrops are spherical in shape because of			
	a. Capillary	b. Surface Tension	c. Downward motion	d. Acceleration due to gravity
35	For a liquid, which is rising in a capillary tube, the angle of contact is			
	a. 90°	b. 180°	c. Acute	d. Obtuse
36	At the boiling point of water, its surface tension			
	a. Is infinite	b. Is zero	c. Is the same as that at room temperature	d. Is maximum
37	The surface of mercury in contact with glass wall is			
	a. Plane	b. concave	c. convex	d. Both b and c
38	The rise of a liquid in a capillary tube does not depend upon			
	a. Angle of contact	b. Density of the liquid	c. Radius of the capillary tube	d. Atmospheric pressure
39	Young's modulus of the material of a wire of length L and radius r is Y N/m ² . if the length is reduced to L/2 and radius to r/2, the Young's modulus will be			
	a. Y	b. 2Y	c. $\frac{Y}{4}$	d. $\frac{Y}{2}$
40	In equation of SHM, the negative sign indicates the direction of motion of particle			
	a. Away from mean position	b. Perpendicular to mean position	c. Towards mean position	d. None of above