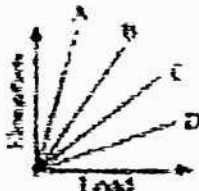


Unit 1: Properties of Solids
Question Bank

S.NO	QUESTIONS	CO	K level
1	The modulus of elasticity is dimensionally equivalent to (a) Strain (b) Stress (c) Surface tension (d) Poisson's ratio	CO1.1	K2
2	If applying a force, the shape of a body is changed, then the corresponding stress is known as (a) Tensile stress (b) Bulk stress (c) Shearing stress (d) Compressive stress	CO1.1	K2
3	According to Hooke's law of elasticity, within elastic limits, if the stress is increased, the ratio of stress to strain (a) Increases (b) Decreases (c) Becomes zero (d) remains constant	CO1.1	K1
4	Hooke's law defines (a) Stress (b) Strain (c) Yield point (d) Elastic limit	CO1.1	K1
5	The bulk modulus of a fluid is inversely proportional to the (a) Change in pressure (b) Volume of the fluid (c) Density of the fluid (d) Change in its volume	CO1.1	K1
6	Shearing strain is given by (a) Deforming force (b) Shape of shear (c) Angle of shear (d) Change in volume of the body	CO1.1	K1
7	If a wire having initial diameter of 2 mm produced the longitudinal strain of 0.1%, then the final diameter of wire will be (a) 2.002 mm (b) 1.998 mm (c) 1.999 mm (d) 2.001 mm	CO1.1	K3
8	The ratio of the change in dimension at right angles to the applied force to the initial dimension is known as (a) Young's modulus (b) Poisson's ratio (c) Lateral strain (d) Shearing strain	CO1.1	K1
9	Which of the following is dimensionless quantity? (a) Stress (b) Young's modulus (c) Strain (d) Pressure	CO1.1	K1
10	Out of the following materials, whose elasticity is independent of temperature? (a) Copper (b) Invar steel (c) Brass (d) Silver	CO1.1	K1
11	Strain has (a) No units but only dimensions (b) Only units but no dimensions (c) No units, no dimensions but a constant value (d) No units, no dimensions but a variable value	CO1.1	K1

12	The change in the shape of a regular body is due to (a) Bulk strain (b) Shearing strain (c) Longitudinal strain (d) Volume strain	CO1.1	K2
13	Longitudinal strain is possible in the case of----- (a) Gases (b) Liquid (c) Only solids (d) Only gases & liquids	CO1.1	K2
14	Which of the following is correct statement from the given graph plotted, for four wires of same material and same thickness  (a) A has largest length (b) D has largest length (c) C has largest length (d) B has largest length	CO1.1	K2
15	When the intermolecular distance increases due to tensile force, then (a) There is no force between the molecules (b) There is a repulsive force between the molecules (c) There is an attractive force between the molecules (d) There is zero resultant force between the molecules	CO1.1	K2
16	Which of the following materials has higher elasticity? (a) Lime stone (b) Steel (c) copper (d) Quartz	CO1.1	K1
17	What will happen to the elastic nature of gold, when potassium is added to gold? (a) Elasticity of gold decreases (b) Elasticity of gold increases (c) Remains constant (d) Elasticity of potassium decreases	CO1.1	K2
18	For a constant force, a rope breaks due to stress. Which of the following is useful to reduce the stress? (a) By increasing the rope length (b) Applying small amount force (c) Increasing the area of the rope (d) use different material of rope	CO1.1	K2
19	Which of the following has higher elasticity? (a) Steel (b) Copper (c) Rubber (d) Aluminum	CO1.1	K1
20	Which of the following material is the nearest approach to perfectly elastic body? (a) Quartz fibre (b) Rubber (c) Iron (d) silicon	CO1.1	K1
21	The point at which the material loses its elasticity is known as a) yield point (b) elastic range c) Tensile strength (d) none of the above	CO1.1	K2
22	The substance which shows practically no elastic effect is (a) Quartz (b) Copper (c) Silk (d) Rubber	CO1.1	K2
23	If a material is heated and annealed, then its elasticity is (a) Increased (b) Decreased (c) No change (d) becomes zero	CO1.2	K1

24	Theoretical value of Poisson's ratio lies between (a) -1 to 0.5 (b) 1 to 2 (c) 0.5 to 1 (d) None	CO1.2	K1
25	What is the effect of Hammering process on elasticity? (a) No effect on elasticity (b) decrease the elasticity (c) Increase the elasticity (d) No change	CO1.2	K1
26	In which material, the elasticity is not affected by temperature? (a) Gold (b) Potassium (c) Lead (d) Invar Steel	CO1.2	K1
27	Which one of the following does not affect the elasticity of a substance? (a) Hammering (b) Adding impurity in the substance (c) Changing the dimensions (d) Change of temperature	CO1.2	K1
28	When impurities are added to an elastic substance, its elasticity (a) Increases (b) Decreases (c) Becomes zero (d) May increase or decrease	CO1.2	K1
29	The moment of inertia for the rectangular body is (a) $bd^3/4$ (b) $bd^3/8$ (c) $bd^3/12$ (d) $b^3d/12$	CO1.3	K1
30	When a mass of 3.14 kg is attached to free end of a suspended wire of diameter 2 mm then stress produce in it is ($g = 9.8 \text{ m/s}^2$) (a) $9.8 \times 10^6 \text{ N/m}^2$ (b) 10^6 N/m^2 (c) $18 \times 10^6 \text{ N/m}^2$ (d) $9.8 \times 10^6 \text{ N/m}^2$	CO1.5	K3
31	The Young's modulus for a plastic body is (a) One (b) Zero (c) Infinity (d) Less than one	CO1.5	K1
32	With rise in temperature, the Young's modulus of elasticity of a material (a) Increases (b) Decreases (c) Does not change (d) May increase or decrease	CO1.5	K2
33	In an experiment to determine the Young's modulus of the material of a wire, the length of the wire and the suspended mass are doubled. Then the Young's modulus of the wire (a) Becomes double (b) Becomes four time (c) Remain unchanged (d) Becomes half	CO1.6	K3
34	The twisting couple per unit twist of wire or cylinder is also called _____ (a) Torsional rigidity (b) young's modulus (c) Bulk modulus (d) none	CO1.7	K1
35	Twisting moment is a product of _____ and the radius. (a) Direction (b) Velocity (c) Force (d) Acceleration	CO1.7	K1
36	The SI units for torsion is _____ (a) N m (b) N (c) N/m (d) m	CO1.7	K1
37	By changing the length of the wire the rigidity modulus of the material _____ (a) increases (b) decreases (c) remains same (d) none of the above	CO1.8	K1
38	When radius of the wire is increased twice what will happen to rigidity modulus (a) increases (b) decreases (c) remains same (d) none of the above	CO1.8	K1
39	The advantage of I shape girder is to	CO1.9	K1

	(a) increase the area of the beam (c) to reduce the expense	(b) minimize the depression of the beam (d) reduce the mass the beam		
	PART-B			
1	Explain the benefits of the stress-strain diagram.		CO1.1	K2
2	Explain Hooke's law and Poisson's ratio.		CO1.1	K2
3	A tensile force 1N is applied on the wire of length 1m and area of cross section is 5 m ² . Find the stress on the wire.		CO1.1	K3
4	Discuss the different types of modulus of elasticity.		CO1.2	K2
5	Interpret the impact of temperature and impurity in various elastic materials.		CO1.2	K2
6	What is neutral axis? and explain with neat diagram		CO1.3	K1
7	Circular and square cantilevers are made of same material and have equal area of cross section and length. Find the ratio of their depression for a given load.		CO1.4	K3
8	Distinguish between uniform and non uniform bending of a beam.		CO1.5	K2
9	A copper wire of 3m length and 1 mm diameter is subjected to a tension of 5N. Calculate the elongation produced in the wire if the Young's modulus of elasticity of copper is 120GPa.		CO1.5	K3
10	A wire 1 m long and 2 mm in diameter, when stretched by weight of 8 Kg has its length increased by 0.24 mm. Find the stress, strain and young's modulus of the material of the wire, $g=9.8m/s^2$		CO1.5	K3
11	Explain the twisting couple on a wire.		CO1.7	K2
12	Explain the application of I -shape girders in terms of elasticity.		CO1.9	K2
	PART-C			
1	Describe the various the factors affecting the elasticity.		CO1.2	K2
2	i) Write an expression for the internal bending moment of beam in terms of radius of curvature ii) A wire of length 1 meter and diameter 1mm is clamped at one of its ends. Calculate the couple required to twist the other end by 90°. Given modulus of rigidity = 298Gpa.		CO1.3 CO1.3	K2 K3
3	Develop an expression for the depression at the loaded end of a cantilever to determine Young's modulus of a beam by cantilever bending.		CO1.4	K3
4	A cantilever of steel fixed horizontally is subjected to a load of 225 gm at its free end. The geometric moment of inertia of the cantilever is $4.5 \times 10^{-11}m^4$. If the length of cantilever and young's modulus of steel are 1m and 200×10^9Pa respectively. Calculate the depression at to loaded end.		CO1.4	K3
5	i. Derive an expression for the elevation at the center of a beam which is loaded at both ends. 8 marks ii. Describe an experiment to determine Young's modulus of a beam by uniform bending method. 4 marks		CO1.5 CO1.5	K3 K2
6	Uniform rectangular bar 1m long, 2cm broad and 0.5 cm thick is supported on its flat face symmetrically on two knife edges 70 cm apart. If loads of 200 g are hung from the two ends, the elevation of the centre of the bar is 48 mm. find young's modulus of the bar.		CO1.5	K3
7	A metal wire 1m long and of 2 mm diameter is stretched by a load of 40 kg. If $Y=7 \times 10^{10} N/m^2$ for the metal. Find the stress, strain and force constant of the material of the wire.		CO1.5	K3

8	Explain with necessary theory and experiment, the method of determining the Young's modulus of the beam of rectangular cross section by non uniform bending	CO1.6	K2
9	Derive an expression for twisting couple on a wire.	CO1.7	K2
10	Determine the stiffness modulus of the wire and the moment of inertia of the circular disc with help of the torsional pendulum theory,	CO1.8	K2