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SET 4 – Mechanical Properties of Solids

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1. The property by virtue of which a body opposes deformation is called —
(a) Rigidity
(b) Elasticity
(c) Plasticity
(d) Brittleness

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2. When a deforming force is removed and the body regains its original shape, the behavior is —
(a) Elastic
(b) Plastic
(c) Brittle
(d) Flexible

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3. Stress is defined as —
(a) Force per unit area
(b) Area per unit force
(c) Force × area
(d) Force × displacement

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4. Strain is defined as —
(a) Change in dimension/original dimension
(b) Force/area
(c) Stress × strain
(d) Area × force

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5. The unit of stress is —
(a) N/m^2
(b) J/m^3
(c) N/m
(d) m/s^2

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6. The unit of strain is —
(a) Dimensionless
(b) N/m^2
(c) J/m^3
(d) m/N

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7. Hooke's law states —
(a) Stress ∝ Strain within elastic limit
(b) Stress ∝ Strain²
(c) Stress ∝ 1/Strain
(d) Stress = constant

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8. The slope of the stress–strain curve gives —
(a) Young's modulus
(b) Bulk modulus
(c) Poisson's ratio
(d) Shear modulus

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9. The point up to which Hooke's law is valid is —
(a) Proportional limit
(b) Elastic limit
(c) Yield point
(d) Breaking point

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10. The maximum stress up to which the material returns to its original shape is —
(a) Elastic limit
(b) Yield point
(c) Proportional limit
(d) Ultimate point

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11. The stress corresponding to permanent deformation is —
(a) Yield stress
(b) Elastic stress
(c) Breaking stress
(d) Limiting stress

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12. The stress corresponding to breaking of a material is —
(a) Breaking stress
(b) Yield stress
(c) Limiting stress
(d) Critical stress

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13. The slope of the linear part of stress–strain curve is —
(a) Modulus of Elasticity
(b) Bulk modulus
(c) Modulus of rigidity
(d) Poisson's ratio

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14. The work done per unit volume to stretch a wire is —
(a) ½ × Stress × Strain
(b) Stress × Strain
(c) Stress / Strain
(d) Strain / Stress

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15. If a wire of length *L* and cross-section *A* is stretched by a force *F*, the longitudinal stress is —
(a) F/A
(b) A/F
(c) F/L
(d) F×L

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16. The ratio of lateral strain to longitudinal strain is —
(a) Poisson's ratio
(b) Bulk modulus
(c) Modulus of rigidity
(d) Elastic limit

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17. The maximum value of Poisson's ratio is —
(a) 0.5
(b) 1
(c) 0
(d) 2

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18. The Poisson's ratio for cork is nearly —
(a) 0
(b) 0.5
(c) 0.25
(d) 1

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19. A body is said to be perfectly rigid if —
(a) Its deformation is zero
(b) It is flexible
(c) It has zero mass
(d) It has infinite strain

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20. A perfectly plastic body has —
(a) Zero modulus of elasticity
(b) Infinite modulus of elasticity
(c) Constant modulus
(d) Finite modulus

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21. The ratio of stress to strain is —
(a) Modulus of Elasticity
(b) Bulk modulus
(c) Shear modulus
(d) Poisson's ratio

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22. The unit of Young's modulus is —
(a) N/m^2
(b) N/m^3
(c) J/m^3
(d) m^2/N

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23. The dimensional formula of stress is —
(a) $[ML^{-1}T^{-2}]$
(b) $[MLT^{-2}]$
(c) $[M^{-1}L^3T^{-2}]$
(d) $[M^0L^0T^0]$

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24. The Young's modulus of steel is approximately —
(a) 2×10^{11} N/m^2
(b) 2×10^9 N/m^2
(c) 2×10^7 N/m^2
(d) 2×10^5 N/m^2

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25. Steel is more elastic than rubber because —
(a) Y of steel is greater
(b) Y of rubber is smaller
(c) Both (a) and (b)
(d) None

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26. Bulk modulus is defined as —
(a) Volume stress / Volume strain
(b) Stress / Strain
(c) Shear stress / Shear strain
(d) Force / Area

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27. For a fluid, the modulus of rigidity is —
(a) Zero
(b) Infinite
(c) Finite
(d) None

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28. Bulk modulus of an incompressible liquid is —
(a) Infinite
(b) Zero
(c) Small
(d) Constant

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29. The SI unit of bulk modulus is —
(a) N/m^2
(b) J/m^3
(c) N/m^3
(d) m^2/N

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30. The relationship between Y, K, and G is —
(a) $Y = 9KG / (3K + G)$
(b) $Y = 3KG / (3K + G)$
(c) $Y = 2KG / (3K - G)$
(d) $Y = K + G$

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31. The relationship among Y, K, and Poisson's ratio (σ) is —
(a) $Y = 3K(1 - 2\sigma)$
(b) $Y = K(1 - \sigma)$
(c) $Y = 9K(1 + \sigma)$
(d) $Y = 2K(1 + \sigma)$

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32. The maximum stress a material can bear is called —
(a) Breaking stress
(b) Yield stress
(c) Elastic stress
(d) Ultimate stress

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33. The ratio of change in volume to original volume is —
(a) Volumetric strain
(b) Shear strain
(c) Longitudinal strain
(d) Lateral strain

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34. For gases, bulk modulus is —
(a) Very small
(b) Very large
(c) Infinite
(d) Constant

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35. The area under the stress–strain curve represents —
(a) Energy stored per unit volume
(b) Force per unit area
(c) Pressure per unit volume
(d) Work per unit time

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36. The Poisson's ratio of steel is about —
(a) 0.3
(b) 0.5
(c) 0
(d) 1

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37. The Poisson's ratio for an incompressible material is —
(a) 0.5
(b) 0
(c) 0.25
(d) 1

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38. The modulus of rigidity is also known as —
(a) Shear modulus
(b) Bulk modulus
(c) Tangential modulus
(d) Elastic modulus

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39. Rubber is less elastic because —
(a) It has small Young's modulus
(b) It stretches more for the same stress
(c) It obeys Hooke's law poorly
(d) All of these

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40. Elastic potential energy per unit volume is given by —
(a) ½ × Stress × Strain
(b) Stress / Strain
(c) Strain / Stress
(d) Stress × Strain

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41. The work done per unit volume is maximum at —
(a) Breaking point
(b) Elastic limit
(c) Yield point
(d) Proportional limit

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42. The slope of the linear region of the stress–strain curve gives —
(a) Young's modulus
(b) Shear modulus
(c) Bulk modulus
(d) Poisson's ratio

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43. The region beyond the elastic limit is called —
(a) Plastic region
(b) Elastic region
(c) Proportional region
(d) Yield region

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44. A perfectly rigid body has —
(a) Infinite Young's modulus
(b) Zero Young's modulus
(c) Finite modulus
(d) Constant stress

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45. A perfectly plastic body has —
(a) Zero modulus of elasticity
(b) Infinite modulus of elasticity
(c) Finite modulus
(d) None

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46. Stress and strain are —
(a) Directly proportional within elastic limit
(b) Inversely proportional
(c) Equal always
(d) Independent

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47. The elastic limit of steel is —
(a) High
(b) Low
(c) Zero
(d) Same as copper

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48. The stress–strain curve for brittle material is —
(a) Steep and short
(b) Flat and long
(c) Parabolic
(d) Linear

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49. The slope of stress–strain curve beyond elastic limit —
(a) Decreases
(b) Increases
(c) Constant
(d) Becomes zero

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50. For a small strain, stress is proportional to —
(a) Strain
(b) 1/Strain
(c) Strain²
(d) Constant

✅ Answer Key – SET 4

1 (a)	2 (a)	3 (a)	4 (a)	5 (a)	6 (a)	7 (a)	8 (a)	9 (a)	10 (a)
11 (a)	12 (a)	13 (a)	14 (a)	15 (a)	16 (a)	17 (a)	18 (a)	19 (a)	20 (a)
21 (a)	22 (a)	23 (a)	24 (a)	25 (c)	26 (a)	27 (a)	28 (a)	29 (a)	30 (a)
31 (a)	32 (a)	33 (a)	34 (a)	35 (a)	36 (a)	37 (a)	38 (a)	39 (d)	40 (a)
41 (a)	42 (a)	43 (a)	44 (a)	45 (a)	46 (a)	47 (a)	48 (a)	49 (a)	50 (a)