Questions on Elasticity, Paper 4

1. In a wire, when elongation is 2 cm energy stored is E. if it is stretched by 10 cm, then the energy stored will be **(MHT-CET-2002)**
   (a) E (b) 2 E
   (c) 4 E (d) 25 E
   Answer: (d)

2. Mass of a spring is 100 gm, extension is 10cm then the work done to produce this extension is ($g = 10\ m/s^2$) **(MHT-CET 2006)**
   (a) 0.05 J (b) 10 J
   (c) 0.5 J (d) 5 J
   Answer: (a)

3. Two steel wires of he same radius have their lengths in the ratio of 1:2. if they are stretched by the same force, then the strains produced in the two wires will be in the ratio of
   (a) 1:2 (b) 2:1
   (c) 1:1 (d) 1:4
   Answer: (c)

4. The symbols Y, η and K represent respectively the Young's modulus, rigidity modulus and bulk modulus of a body. If the rigidity modulus is three times the bulk modulus, then **(MHT-CET-2001)**
   (a) Y = 4.5 K (b) Y = 3.5 K
   (c) Y = 9/5 K (d) Y = 18/5 K
   Answer: (a)

5. The Young's modulus of the wire of length L and radius r is Y. if the length is reduced to $(\frac{L}{3})$ and radius to $(\frac{r}{2})$. its Young's modulus will be **(MHT-CET 2001)**
   (a) Y (b) $\frac{4Y}{3}$
   (c) $\frac{3Y}{4}$ (d) 12Y
   Answer: (b)

6. Four Hooke's law to hold good, the intermolecular distance must be _____ as compared to the equilibrium distance
   (a) Much more (b) Zero
   (c) Much less same (d) Approximately
   Answer: (d)

7. Bulk modulus was first defined by **(C.P.M.T 87)**
   (a) Young (b) Bulk
   (c) None of the above (d) Maxwell
   Answer: (c)

8. What is the relation between Y, K and η for some isotropic solid material **(CPMT 92)**
   (a) $\eta = \frac{3KY}{AK + Y}$ (b) $\eta = \frac{3KY}{AK - Y}$
   (c) $\eta = \frac{3KY}{3K - Y}$ (d) $Y = \frac{AK\eta}{3K - \eta}$
   Answer: (c)

9. When a elastic material with Young's modulus 'Y' is subjected to a stretching stress 'S', the elastic energy stored per unit volume of the material is, **(IIT 92, PMT 90 MP)**
   (a) $\frac{YS}{2}$ (b) $\frac{S^2Y}{2}$
   (c) $\frac{S^2}{2Y}$ (d) $\frac{S}{2Y}$
   Answer: (c)

10. A wire is stretched through 2 mm by a certain load. the extension produced in a wire of the same material with double the length and radius with the same load will be
    (a) 2 mm (b) 4 mm
    (c) 1 mm (d) 0.5 mm
    Answer: (c)

11. A wire of length 1 m, cross sectional area 10^{-6} m^2 and negligible mass is kept on a smooth horizontal table with one end fixed. A ball of mass 1 kg is attached to its other end. If the wire and the ball are rotating with an angular velocity of 100 rad/s, the wire breaks. What is the breaking stress?
    (a) $10^9\ N/m^2$ (b) $10^{10}\ N/m^2$
    (c) $3 \times 10^{10}\ N/m^2$ (d) $2 \times 10^9\ N/m^2$
    Answer: (b)

12. In the experiment of finding the Young's modulus of a wire by the Searle's method, the spherometer screw should be rotated always in one direction. This is done to avoid
    (a) The error due to changes in temperature
    (b) Slipping of the wire form the chucks
    (c) Back lash error
    (d) Error due to bending of support
    Answer: (c)

13. The force constant of a wire is K and that of another wire of the same material is 2 K. when both the wires are stretched, then work done is **(MHT-CET-2000)**
    (a) $W_2 = 0.5\ W_1$ (b) $W_2 = W_1$
    (c) $W_2 = 2W$ (d) $W_2 = 2W1^2$
    Answer: (c)

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14. The stress in a wire of diameter 2 mm, if a load of 100 gm is applied to a wire, is **(MHT-CET-2006)**
(a) 3.1×10^5 N/m^2 (b) 6.2×10^5 N/m^2
(c) 1.5×10^5 N/m^2 (d) 12.4×10^5 N/m^2
Answer: (a)

15. Poisson's ratio of a material is 0.5 percentage change in its length is 0.04% what is change in percentage of diameter **(MHT-CET-2008)**
(a) 0.02% (b) 0.03%
(c) 0.4% (d) 0.05%
Answer: (a)

16. Energy in a stretched wire is **(NCERT 81)**
(a) Half of load × strain
(b) Half of stress × strain
(c) Stress × strain
(d) Load × strain
Answer: (a)

17. The energy stored per init volume in copper wire, which produces longitudinal strain of 0.1%, is,
(MHT-CET-2005)
(a) 11×10^3 J/m^3 (b) 5.5×10^4 J/m^3
(c) 5.5×10^3 J/m^3 (d) 11×10^4 J/m^3
Answer: (b)

18. Which of the following have highest elasticity?
(EAM CET)
(a) Steel (b) Copper
(c) Rubber (d) Aluminium
Answer: (a)

19. The substance which shows practically no elastic after effect is **(AFMC 94)**
(a) Quartz (b) Copper
(c) Silk (d) Rubber
Answer: (a)

20. The property due to which then sheets can be prepared from a material is called
(a) Elasticity (b) Brittleness
(c) Malleability (d) Ductility
Answer: (c)

21. Energy density of wire is 0.25 J/m^3, when its extension is 0.2 cm. find energy of wire, when elongation is 1 cm
(MHT-CET-2004)
(a) $\frac{25}{4}$ J / m^3 (b) $\frac{1}{1000}$ J / m^3
(c) $\frac{5}{4}$ J / m^3 (d) $\frac{25}{2}$ J / m^3
Answer: (a)

22. 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
(PMT MP 85)
(a) Y (b) 2Y
(c) $\frac{Y}{4}$ (d) $\frac{Y}{2}$
Answer: (a)

23. The following four wires are made of the same material. Which of these will have the largest extension when the same tension is applied?
(IIT 81)
(a) Length 0.5 m and diameter 0.5×10^{-3} m
(b) Length 1 m and diameter 1×10^{-3} m
(c) Length 2 m and diameter 2×10^{-3} m
(d) Length 3 m and diameter 2×10^{-3} m
Answer: (a)

24. 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
Answer: (b)

25. When the load on a wire is increased slowly from 1kg wt to 2 kg wt the elongation increases from 0.2 mm to 0.3 mm how much work is done during the extension
(g = 9.8m/sec^2) **(MHT-CET-2008)**
(a) 1.96×10^{-3} J (b) 1.96×10^{-3} J
(c) 196×10^{-3} J (d) 0.196×10^{-3} J
Answer: (b)