1. STATE True / False:

i) The Young's modulus of rubber is greater than of steel.

ii) The stretching of a coil is determined by its shear modulus.

2. A steel wire of length 4.7m and cross-sectional area $3.0 \times 10^{-5} m^2$ stretches by the same amount as a copper wire of length 3.5m and cross sectional area of $4.0 \times 10^{-5} m^2$ under a given load. What is the ratio of the Young's modulus of steel to that of copper?

(a) 179 : 100 (b) 47 : 100 (c) 1 : 100 (d) NOTA.

3. In equation $\left(P + \frac{a}{V^2}\right)(V-b) = RT$, the dimensional formula of a is

(a) ML^3T (b) $ML^{-3}T^{-2}$ (c) ML^3T^{-2} (d) ML^2T^{-2}

4. 'Pascal second' is a unit of (a) Energy (b) Young's modulus (c) Stress (d) Viscosity.

5. If $P = \frac{a - t^2}{bx}$, where P = pressure, x = distance, t = time the dimensions of $\frac{a}{b}$ are

(a) MT^{-2} (b) M^2LT^{-3} (c) ML^3T^{-1} (d) LT^{-3}

6. Which of the following is dimensionless? (a) $\frac{V^2}{rg}$ (b) $\frac{V^2g}{r}$ (c) $\frac{Vg}{r}$ (d) V^2rg

7. If the error in the measurement of radius of a sphere is 2%, then the error in determining the volume of the sphere will be
(a) 8% (b) 2% (c) 4% (d) 6%

8. The velocity of a particle at an instant is $V = at + bt^2$ then the dimension of b is
(a) 1 (b) LT^{-1} (c) LT^{-2} (d) LT^{-3}

9. What is the % error in measurement of 'T' of pendulum if maximum errors in measurements of length and 'g' are 2% and 4% respectively?
(a) 6% (b) 3% (c) 4% (d) 5%

10. The velocity of a particle at time t is $V = at + \frac{b}{t+c}$
The dimensions of a, b, c are respectively —
(a) LT^{-2}, L, T (b) L^2, T and LT^2 (c) LT^2, LT and L , (d) L, LT and T^2

11. The velocity of a body which has fallen under gravity varies as $g^a h^b$, where g is acc. due to gravity and h = height.
The values of a and b are —
(a) 1, $\frac{1}{2}$ (b) 1, 1 (c) $\frac{1}{2}$, 1 (d) $\frac{1}{2}$, $\frac{1}{2}$

12. $X = \frac{ab^2}{c^3}$ where percentage error in a, b, c are ±1%, ±3% and ±2% respectively then percentage error in X will be
(a) ±13% (b) ±7% (c) ±4% (d) ±1%

13. With rise in temperature the Young modulus of elasticity —
(a) decreases (b) changes electrically (c) increases (d) remains unchanged.

14. The Young modulus of a perfectly elastic body
(a) Unity (b) zero (c) infinity (d) NOTA.

15. The property of metals which allows them to be drawn readily into thin wires beyond their elastic limit without rupture is known as —
(a) malleability (b) ductility (c) hardness (d) elasticity.

16. Solids which break or rupture above the elastic limit are known as.
(a) brittle (b) elastic (c) ductile (d) malleable.

17. The relation between Young's modulus (Y), bulk modulus (K) and modulus of rigidity (η) is —
(a) $\frac{3}{Y} = \frac{1}{K} + \frac{3}{\eta}$ (b) $\frac{3}{Y} = \frac{1}{\eta} + \frac{1}{3K}$ (c) $\frac{1}{Y} = \frac{3}{\eta} + \frac{1}{3K}$ (d) $\frac{1}{\eta} = \frac{3}{Y} + \frac{1}{3K}$

18. The length of a metal is l_1 when the tension is T_1 and is l_2 when tension is T_2. The original length of the wire is —
(a) $\frac{l_1+l_2}{2}$ (b) $\frac{l_1T_2 + l_2T_1}{T_1+T_2}$ (c) $\frac{l_1T_2 - l_2T_1}{T_2-T_1}$ (d) $\sqrt{l_1l_2T_1T_2}$

19) A wire ($Y = 2\times10^{11}\ N/m^2$) has length 1m and area $1mm^2$. The work required to increase its length by 2mm is —

(a) 400 J (b) 40 J (c) 4 J (d) 0.4 J

20) The Young's modulus of the material of the wire of length L and radius r is $Y\ N/m^2$. If the length is reduced to $L/2$ and radius $r/2$, the Young's modulus will be —

(a) $\frac{Y}{2}$ (b) Y (c) 2Y (d) 4Y

21) A steel wire is of length 1m, area of cross section $1mm^2$ and $Y = 2\times10^{11}\ N/m^2$. How much energy is required for increasing its length by 1mm will be ——

(a) 0.1 J (b) 5 J (c) 10 J (d) 250 J