

Answers with Explanation (Objective)

1. Ans. (d) $\tau = \frac{T \times r}{J} = \frac{16T}{\pi d^3}$

2. Ans. (a)

3. Ans. (a)

4. Ans. (c) $\tau = \frac{16T}{\pi d^3}$ or $T = \frac{\tau \pi d^3}{16}$ for same material $\tau = \text{const.}$

$$\therefore T \propto d^3 \quad \text{or} \quad \frac{T_2}{T_1} = \left(\frac{d_2}{d_1}\right)^3 = \left(\frac{60}{30}\right)^3 = 8$$

5. Ans. (b)

6. Ans. (d)

7. Ans. (b) Shear stress = $\frac{16T}{\pi d^3}$ and normal stress = $\frac{32T}{\pi d^3}$

\therefore Ratio of shear stress and normal stress = 1: 2

8. Ans. (c)

9. Ans. (a) $\tau = \frac{16T}{\pi d^3}$

10. Ans. (c) $\tau = \frac{16T}{\pi d^3}$, $240 = \frac{16T}{\pi d^3}$ if diameter doubled $d' = 2d$, then $\tau' = \frac{16T}{\pi (2d)^3} = \frac{240}{8} = 30 \text{MPa}$

11. Ans. (c) $\tau = \frac{16T}{\pi d^3}$ As T & d both are same τ is same

12. Ans. (d)

13. Ans. (b) $\frac{T}{J} = \frac{\tau}{R}$

14. Ans. (b)

15. Ans. (b) $\frac{T}{J} = \frac{\tau}{R}$ Here T & τ are same, so $\frac{J}{R}$ should be same i.e. polar modulus of section will be same.

16. Ans. (c) $\frac{T}{J} = \frac{\tau}{R} = \frac{G\theta}{L}$ or $\tau = \frac{GR\theta}{L} \therefore \tau \propto \frac{1}{L}$

17. ans. (b) $\frac{T}{J} = \frac{G\theta}{L} = \frac{\tau}{R}$ gives $T = \frac{\tau J}{R} = \frac{\sigma_s \times \frac{\pi}{32} (D^4 - d^4)}{\frac{D}{2}} = \frac{\pi}{16} \sigma_s \frac{(D^4 - d^4)}{D}$

18. Ans. (d) $\frac{T}{J} = \frac{\tau}{r}$ or $T = \frac{\tau J}{r}$

$$\text{or } \frac{\tau J_s}{r_s} = \frac{\tau_h J_h}{r_h}; \left[r_s = r_h = \frac{D}{2} \right]$$