1. A solid shaft circular cross-section is subjected to a torque T which produces a maximum shear stress f_s in the shaft, the diameter of the shaft should be

A. $\sqrt{\pi f_s/16T}$

B. $3\sqrt{\pi f_s/16T}$

C. $\sqrt{16T/\pi f_S}$

D. $3\sqrt{16T/\pi f_S}$

2. If the diameter of a shaft subjected to torque alone is double, then the horse power P can be increased to

a. 16 P
b. 8 P
c. 4 P
d. 2 P

3. Two shaft of solid circular cross-section are identical except for their diameters 'd_1 ' . They are subjected to the same torque 'T'. The ratio of the strain energies stored U_1 / U_2 will be

A. $\left(\frac{d_1}{d_2}\right)^4$

B. $\left(\frac{d_1}{d_2}\right)^2$

C. $\left(\frac{d_2}{d_1}\right)^2$

D. $\left(\frac{d_2}{d_1}\right)^4$

4. A shaft turns at 150 rpm under a torque of 1500 Nm. Power transmitted is

a. 15 π kw
b. 10 π kw
c. 7.5 π kw
d. 5 π kw

5. A solid circular shaft is subjected to a torque "T" Nm. Which produces a maximum shear stress of f_s N/mm^2 in the shaft. The required diameter of the shaft would be

A. $10\left(\frac{16T}{\pi f_s}\right)^{1/3}$ B. $10\left(\frac{\pi f_s}{16T}\right)^{1/3}$

C. $10\left(\frac{16T}{\pi f_s}\right)^{1/3}$ D. $10\left(\frac{\pi f_s}{16T}\right)^{1/3}$

6. A solid shaft has diameter 80 mm. it is subjected to a torque of 4 kNm. The maximum shear stress induced in the shaft would be

a. 75 /π N / mm^2
b. 150 /π N / mm^2
c. 125 /π N / mm^2
d. 150 /π N / mm^2

7. Two steel shaft 'A' and 'B' are used for transmitting power. The ratio of revolutions of shaft i.e N_A / N_B = 2 . The ratio of torques on shaft i.e T_A / T_B = 1/2 . The ratio of the horse power transmitted by the shaft i.e P_A / P_B

a. 1 / 2
b. 1 / 4
c. 1
d. 2

8. A bar AB of diameter 40 mm and 4 m long is rigidly fixed at its ends. A torque of 600 Nm is applied at a section of the bar, 1 m from end A . The fixing couples T_A and T_B at the supports A and B respectively, are

a. 450 Nm and 150 Nm
b. 200 Nm and 400 Nm
c. 300 Nm and 150 Nm
d. 300 Nm and 100 Nm

9. Strain energy in torsion of a shaft per unit volume is given by (q is shear stress, E- modulus of Elasticity and G is modulus of rigidity)

a. q^2 / 2G
b. q^2 / 2E
c. q^2 / 4G
d. q^2 / 4E

10. The ratio of the torsional moments of resistance of a solid circular shaft if diameter 'D' and a hollow circular
Shaft having external diameter D and internal diameter d is given by

A. $\frac{D^4}{D^4-D^4}$

B. $\frac{D^4-D^4}{D^4}$

C. $\frac{D^3-D^3}{D^3}$

D. $\frac{D^3}{D^3-D^3}$

11. Match List – I with List – II and select the correct answer using the codes given below the lists:

List - I	List – II
A. Torque –twist relationship for a circular shaft B. Strain energy of elastic torsion C. Circumferential shear stress D. Maximum shearing stress due to combined torsion	1. $1/2\sqrt{\sigma^2+4\tau^2}$ 2. Gr θ / l 3. (GJ / 2/) θ^2 4. $\frac{GJ}{l}\theta$
Codes : a. A – 2, B – 3, C – 4, D – 1 b. A – 4, B – 1, C – 2, D – 3 c. A – 2, B – 1, C – 4, D – 3 d. A – 4, B – 3, C – 2, D – 1	

12. A solid circular shaft, ABC has a total length of 3, a' A gear wheel positioned at B, at distance 'a' from the left hand end A, exerts a torque T. if the ends A and C are intsantaneously locked in position by brakes just before the torque is applied , the torsional moments induced in both segments T_1 (AB)and T_2 (BC) are in the ratio

a. 3 : 1
b. 2 : 3
c. 1 : 2
d. 2 : 1

13. Two shafts having same length and material are joined in series and subjected to a torque of 10 kNm. If the ratio of their diameters is 2 : 1 then the ratio of their angles of twist is

a. 16 : 1
b. 2 : 1
c. 1 : 2
d. 1 : 16

14. A solid circular shaft of diameter d is subjected to a twisting moment T. the maximum shear stress in the shaft is proportional to

a. d_2
b. d
c. 1 /d^2
d. 1/ d^3

15. The maximum shear stress produced in a shaft is 5 N/mm^2. the shaft is of 40 mm diameter what is the approximate value of twisting moment ?

a. 628 Nm
b. 63 Nm
c. 126 Nm
d. 251 Nm

16. The failure surface of a standard cast iron torsion specimen, subjected to a torque is along

a. The surface helicoidal at 45° to the axis is the specimen
b. The curved surface at the grips
c. The plane surface perpendicular to the axis of the specimen
d. The curved surface perpendicular to the axis of the specimen