Q :) 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

Q :) 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

Q :) 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

Q :) The ratio of maximum shear stress developed in a solid shaft of diameter D and a hollow shaft of external diameter D and internal diameter d for the same torque is given by

A. $\frac{D^2+d^2}{D^2}$

B. $\frac{D^2-d^2}{D^2}$

C. $\frac{D^2-d^4}{D^4}$

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

Q :) A solid circular shaft of 6m length is built in a its ends and subjected to an externally applied torque 60kN-m at a distance of 2 m from left end. The reactive torques at the left end and the right end are respectively

a. 20 kN.m and 40 kN.m
b. 40 kN.m and 20 kN.m
c. 15 kN.m and 45 kN.m
d. 30 kN.m and 30 kN.m

Q :) If the internal radius of a hollow shaft is n times the external radius, then ratio of torques carried by the hollow shaft and solid shaft of same cross-section area and subjected to the same maximum shearing stress is

A : $1 - n^2$

B : $\frac{1+n^2}{1+n^2}$

C : $\frac{\sqrt{1+n^2}}{1-n^2}$

D : $\frac{1+n^2}{\sqrt{1-n^2}}$

Q :) If the crushing stress in the material of a mild steel column is 3300 kg/cm^2 , Euler's formula for crippling load is applicable for slenderness ratio equal to/greater than

a. 40
b. 50
c. 60
d. 80

Q :) Match List-I with List – and select the correct

List - I	List – II
A. Shear centre	1. Tension
B. Principal plane	2. Slope
C. Fixed end	3. Shear stress
D. Middle third rule	4. Twisting

Codes:

a. A – 4, B – 3, C – 2, D – 1

b. A – 3, B – 1, C – 4, D – 2

c. A – 4, B – 1, C – 2, D – 3

d. A – 4, B – 2, C – 3, D – 1

Q :) Which one of the following rules ascertains the maximum permissible eccentricity of loads on circular column so that stresses will always be compressive ?

a. Middle fourth rule
b. Middle third rule
c. Middle half rule
d. Middle tow-third rule

Q :) The slenderness Ratio of a compression member in the context of Ramkine's formula is defined as

A. $\frac{\text{length}}{\text{least lateral dim ension}}$

B. $\frac{\text{effective length}}{\text{least radius of gyration}}$

C. $\frac{\text{effective length}}{\text{least lateral dim ension}}$

D. $\frac{\text{length}}{\text{least radius of gyration}}$

Q :) Two closed springs of stiffness ‘K’ and ‘2K’ are arranged in series in one case and in parallel in the other case. The ratio of stiffness of springs connected in series to parallel is

A. 1/3

B. 1/9

C. 2/3

D. 2/9

Q :) A close-coiled helical spring with n coils, mean radius R and diameter d is subjected to an axial load W. what is the compression in the spring?

A. $\frac{64WR^3n}{Cd^3}$

B. $\frac{64WR^3n}{Cd^4}$

C. $\frac{32WR^3n}{Cd^3}$

D $\frac{32WR^3n}{Cd^4}$

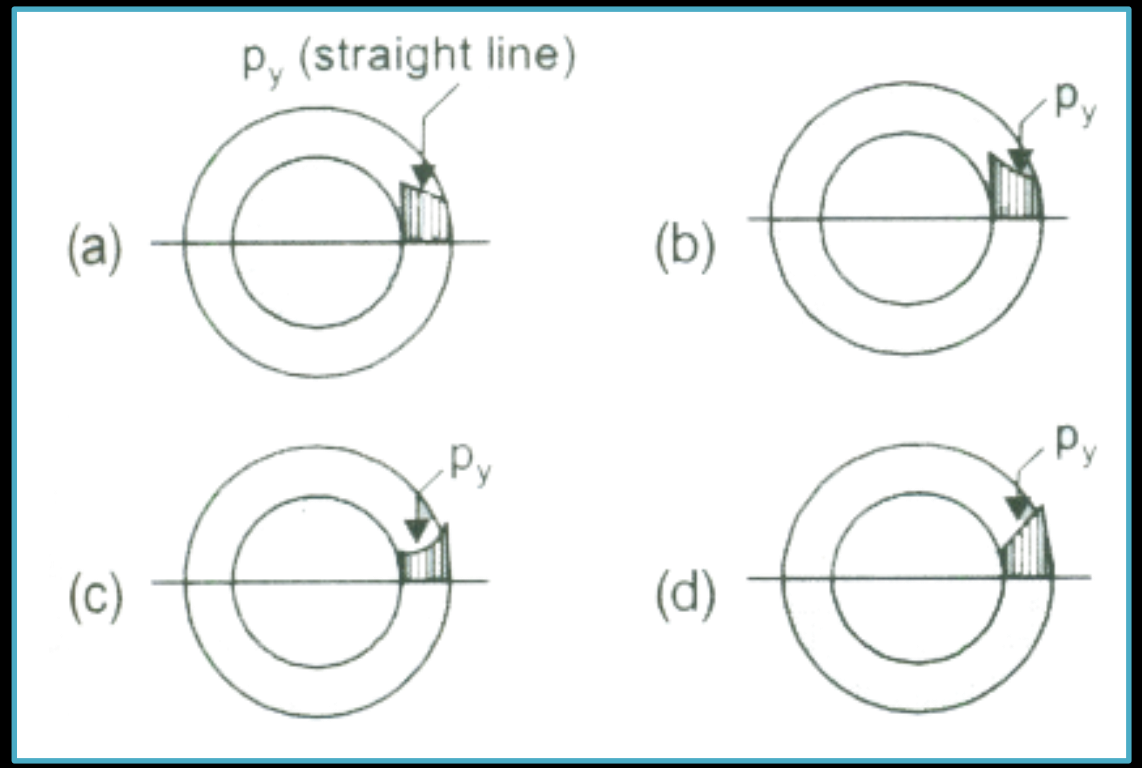
Q :) A close helical spring of 100 mm mean diameter made of 10 mm diameter rod, and has 20 turns . The spring carries an axial load of 200 kN with G = 8.4 x 10^4 N/mm^2 . The stiffness of the spring is nearly

a. 5.25 N/mm
b. 6.50 N/mm
c. 7.25 N/mm
d. 8.50 N/mm

Q :) A closely coiled helical spring of round steel wire 5 mm in diameter having 12 complete coils of 50 mm mean diameter is subjected to an axial load of 100 N. modulus of rigidity of the spring is 80 kN/mm^{2}. what is the deflection of the spring?

a. 12 mm
b. 24 mm
c. 36 mm
d. 48 mm

Q :) Moa thick cylindrical pressure vessel of inner diameter D_1 and outer diameter D_0 is subjected to an internal fluid pressure of intensity p. the variation of the circumferential tensile stress p_y in the thickness of the shell will be



Q :) A thin cylindrical steel pressure vessel of diameter 6 cm and wall thickness 3 mm is subjected to an internal fluid pressure of intensity p. if the ultimate strength of steel is 3600 kg/cm^2 , the bursting pressure will be

a. 18 kg/cm^2
b. 36 kg/cm^2
c. 180 kg/cm^2
d. 360 kg/cm^2

Q :) A thin cylindrical shell of internal diameter ‘D’ and thickness ‘t’ is subjected to internal pressure ‘p’ the change in diameter is given by

A. $\frac{pD^2}{4tE}(2-\mu)$

B. $\frac{pD^2}{4tE}(1-2\mu)$

C. $\frac{pD^2}{2tE}(1-2\mu)$

D. $\frac{pD^2}{2tE}(2-\mu)$

Q :) A cast iron pipe of 1 m diameter is required to withstand a 200 m head of water. If the limiting tensile stress of the pipe material is 20 mpa , Then the thickness of the pipe will be

a. 25 mm
b. 50 mm
c. 75 mm
d. 100 mm

Q :) The ratio of tensile stress developed in the wall of a boiler in the longitudinal direction to the tensile stress in the circumferential direction due to an internal pressure is

a. 4

b. 2

c. 1 / 4

d. 1 / 2

Q :) A thin cylindrical tube with closed ends is subjected to

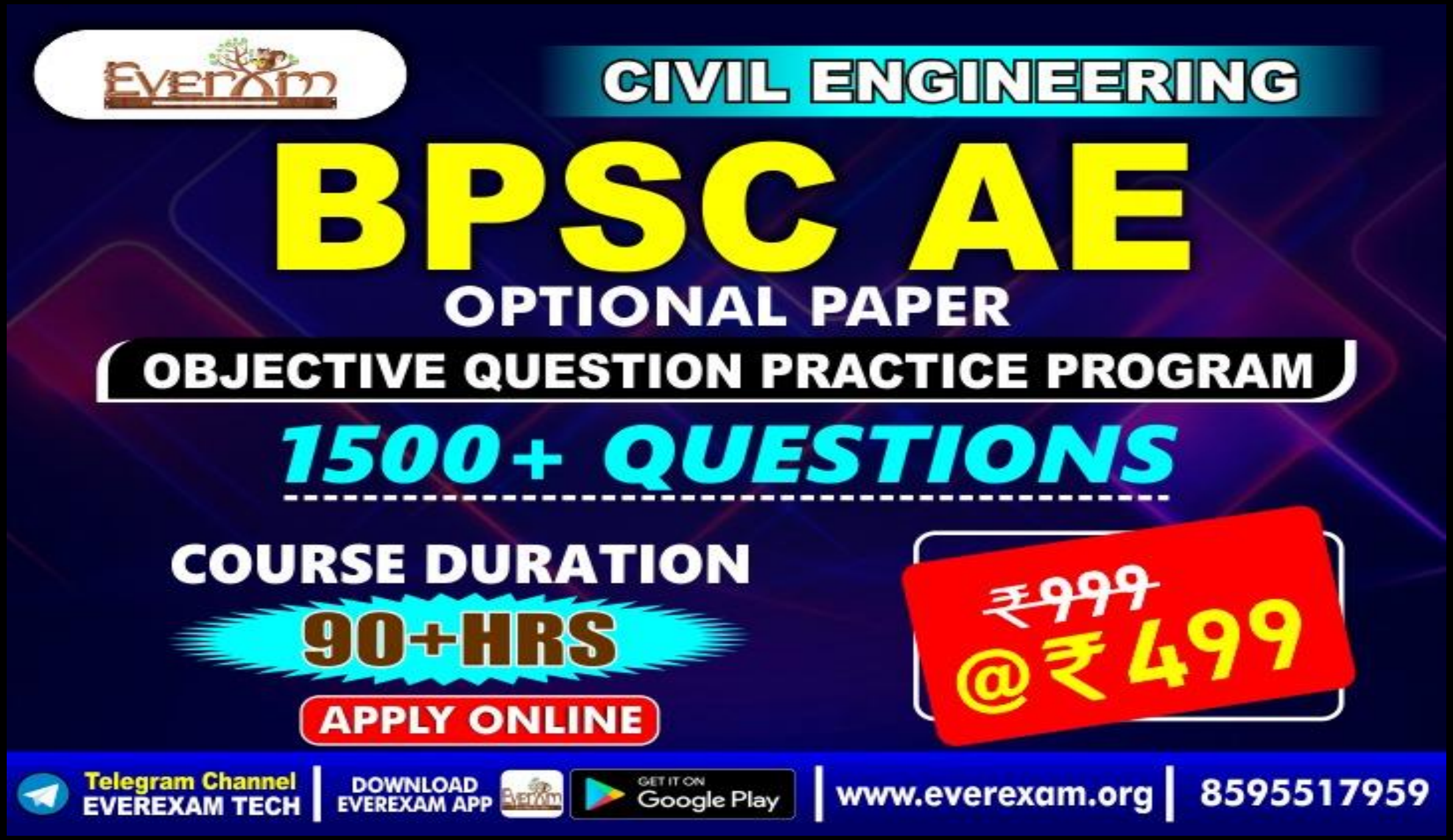
1. Longitudinal stress σ_1 = 14 N / mm
2. Hoop stress σ_2 = 2 N / mm
3. Shearing stress τ = 8 N / mm

Then the maximum shearing stress is

a. 14 N / mm^2 h
b. 12 N / mm^2 h
c. 10 N / mm^2 h
d. 8 N / mm^2 h

Q :) A cylindrical of 100 cm diameter made of mild steel plate to be subjected to an internal pressure of 10 kg/cm^2 . If the material yields at a stress of 200 kg/cm^2 , assuming factor of safety as 4 and using maximum principal stress theory, the requisite thickness of the

a. 8 mm
b. 10 mm
c. 12 mm
d. 15 mm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