KATIHAR ENGINEERING COLLEGE, KATIHAR

CIVIL ENGINEERING, 2nd Year (Semester-IV)

Subject: Introduction to Solid Mechanics **Max. Marks: 05**

Time Allotted: 90 Minutes **Instructor: Prof. Rashid Mustafa**

Test-II (Set-B)

Q.1 In a tensile test, a test piece of 25 mm diameter is tested over a gauge length of 125 mm. The elongation over this length is 0.0875 mm under a pull of 68725 N. In a torsion test, a test piece was made of the same material and of same diameter, and it twisted 0.025 radians over a length of 250 mm at a torque of 0.3068 kN-m. The value of Poissons's ratio, young's modulus (N/mm^2), shear modulus (N/mm^2) and bulk modulus (N/mm^2) is

(a) 0.45, 2.2 $x10^5$, 1.8 $x10^5$ and 0.33 $x10^5$ (b) 0.35, 2 $x10^5$, 0.95 $x10^5$ and 2.33 $x10^5$

(c) 0.25, 2 $x10^5$, 0.8 $x10^5$ and 1.33 $x10^5$ (d) 0.15, 2.5 $x10^5$, 0.6 $x10^5$ and 1.66 $x10^5$

Q.2 The centre of the Mohr circle in a 2-D body having normal stress σ_x = 30 MPa, σ_y = -10 MPa and shear stress τ_{xy} = 8 MPa is

(a) (20, 0) (b) (10, 0) (c) (15, 0) (d) (30, 0)

Q.3 A solid shaft transmits 200 kW at 100 r.p.m. If the shear stress is not to exceed 70 N/mm^2 and angle of twist 1^0 then the diameter of the shaft (is in mm) ----------and work done by the shaft (in Joule) ----------

Q.4 A simply supported beam AB has 4.0 m span and u.v.l through entire length in which maximum magnitude at support B. The equation of shear force is $3x^2+4$, and then the expression of bending moment is ----------

Q.5 For an elastic metal which of the following relations can hold true

(a) E = N (b) N = K (c) E = K (d) E = N = K

Q.6 The ratio of Young's modulus to modulus of rigidity for a material having Poisson's ratio 0.3 is

(a) 12/5 (b) 5/12 (c) 5/13 (d) 13/5

Q.7 When the strain in a material increases with time under sustained constant stress, the phenomenon is known as ----------

Q.8 The simply supported beam A and B have span L and 2L respectively. Beam A has a cross section of 1x1 units and beam B has a cross section of 2 x 2 units. Beam A is subjected to

concentrated load W at the centre of the span and beam B is subjected to u.d.l w kN/m (W = 2wL) through the entire span 2L. The ratio of the maximum bending stress (A to B) in these beams is ----------

Q.9 Sets of principal stress acting at any point in a stressed body are given below

1. $\{\sigma/2, 0\}$ 2. $\{\sigma,\sigma\}$ 3. $\{\sigma,-\sigma\}$ 4. $\{\sigma, 0\}$

The correct sequence of the ascending order of intensity of the maximum shear stress induced by the above sets will be

(a)1,4,3,2 (b) 2,1,4,3 (c) 1,3,4,2 (d) 2,4,1,3

Q.10 A simply supported beam of uniform cross section is subjected to a maximum bending moment of 4.0 t-m. If it has rectangular cross section with width 15 cm and depth 30 cm, then the maximum bending stress induced in the beam will be

(a) 50 kg/cm^2 (b) 100 kg/cm^2 (c) 150 kg/cm^2 (d) 178 kg/cm^2

Q.11 A 600 mm long and 50 mm diameter rod of steel (E = 200 GPa, α = 12 x 10^{-6} / ^{0}C) is attached to unyielding supports. When the temperature is 30 ^{0}C there is no stress in the rod. After the temperature of the rod drops to -10 ^{0}C, the deformation in the rod will be

(a) 0.39 mm (b) 0.49 mm (c) 0.29 mm (d) 0.19 mm

Q.12 A steel rod of circular section tapers from 3 cm diameter to 1 cm diameter over a length of 100 cm. If the modulus of elasticity of the material is 2x10^6 kg/cm^2, then the increase in length under a pull of 2000 kg will be ----------cm

Q.13 A solid circular shaft is subjected to a bending moment M and twisting moment T. The ratio of maximum bending stress to maximum shear stress is equal to

(a) 2T/M (b) T/2M (c) M/2T (d) 2M/T

Q.14 At a certain cross-section, a circular shaft 90 mm in diameter is subjected to a BM of 5 kN-m and twisting moment of 8 kN-m. The value of minor principal stress (is in N/mm^2) ----------

Q.15 In order to produce a maximum shearing stress of 70 MN/mm^2 in the material of a hollow circular shaft of 35 cm outer diameter and 16.5 cm inside diameter, the torque that should be applied to the shaft is ---------- kN-m

Q.16 A cantilever beam A with a rectangular cross section is subjected to a concentrated load at its free end. If width and depth of another cantilever beam B are twice those of beam A, then the deflection at the free end of beam B as compared to that of A will be ----------%

Q.17 A simply supported beam AB of span L is subjected to a concentrated load W at the centre C of the span. According to Mohr's moment area method, which of the following gives the deflection under the load?

(a) Moment of the area of M/EI diagram between A and C taken about C

(b) Moment of the area of M/EI diagram between A and B taken about B

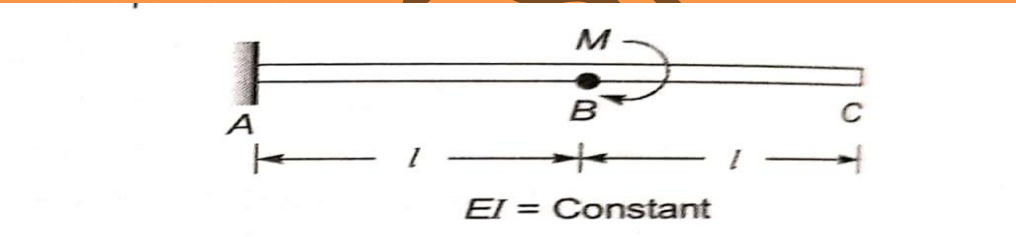
(c) Moment of the area of M/EI diagram between A and C taken about A

(d) Moment of the area of M/EI diagram between A and B taken about A

Q.18 A thin cylindrical pressure pipe with both ends closed has diameter 1000 mm. The pipe is subjected to an internal pressure of 4 N/mm^2. The permissible tensile stress in the material is 100 N/mm^2. The minimum required thickness of the pipe is ----------mm.

Q.19 In a beam of solid circular cross-section the ratio of maximum shear stress to the average shear stress is----------

Q.20 For a cantilever beam shown in the figure, the deflection at C due to a couple M applied at B is



(a)$Ml^2/2EI$ (b) Ml^2/EI (c) $3Ml^2/2EI$ (d) $2Ml^2/EI$

< END OF THE QUESTION >

NOTE: Solution of class test-II will be uploaded on the college website **www.keck.ac.in**