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Question Paper Code: 33104

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Third Semester

Civil Engineering

01UCE304 - MECHANICS OF SOLIDS - I

(Regulation 2013)

Duration: One hour

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Within elastic limit in a loaded material, stress is_____
 - (a) inversely proportional to
 - (b) directly proportional to strain
 - (c) equal to strain
 - (d) not equal to strain
2. Strain energy is the
 - (a) energy stored in a body when strained within elastic limits
 - (b) energy stored in a body when strained up to the breaking of a specimen
 - (c) maximum strain energy which can be stored in a body
 - (d) proof resilience per unit volume of a material
3. A perfect frame should satisfy the relation_____
 - (a) $m=2j+3$
 - (b) $m=3j-4$
 - (c) $m= 2j-3$
 - (d) $m=3j-2$
4. Moment of inertia of a circle of diameter d about its centroidal X axis is _____
 - (a) $\pi d^4 / 64$
 - (b) $\pi d^4 / 50$
 - (c) $\pi r^4 / 64$
 - (d) $\pi r^4 / 35$

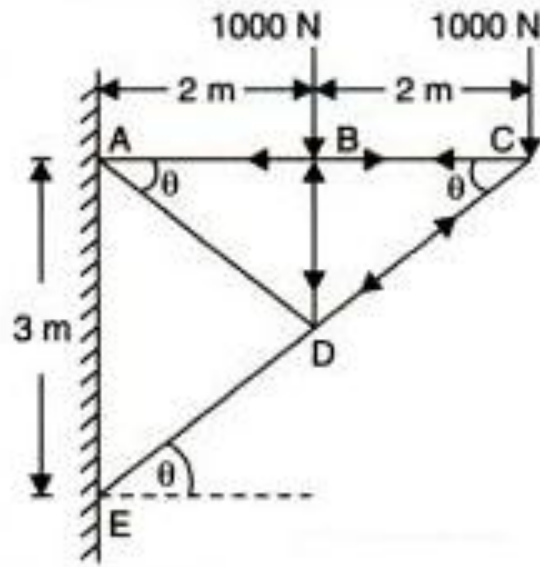
5. If a cantilever beam of span (L) carries a point load (W) at free end of the beam then the shear force diagram will be
- (a) rectangle (b) two equal and opposite rectangle
(c) right angled triangle (d) two equal and opposite triangle
6. The shear stress required to cause plastic deformation of solid metal is called
- (a) proof stress (b) flow stress (c) rupture stress (d) ultimate stress
7. Strain energy is the
- (a) energy stored in a body when strained within elastic limits
(b) energy stored in a body when strained up to the breaking of a specimen
(c) maximum strain energy which can be stored in a body
(d) proof resilience per unit volume of a material
8. In the torsion equation, the term J/R is called as
- (a) shear modulus (b) section modulus (c) polar modulus (d) none of these
9. In Mohr's circle of stress, the diameter represents
- (a) maximum shear stress (b) deviator stress
(c) major principal stress (d) minor principal stress
10. Mohr's circle is used to determine the stresses on an oblique section of a body subjected to
- (a) direct tensile stress in one plane accompanied by a shear stress
(b) direct tensile stress in two mutually perpendicular directions
(c) direct tensile stress in two mutually perpendicular directions accompanied by a simple shear stress
(d) all of the above

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. A bar of cross section $8 \text{ mm} \times 8 \text{ mm}$ is subjected to an axial pull of 7 KN . The lateral dimension of the bar is found to be changed to $7.9985 \text{ mm} \times 7.9985 \text{ mm}$. If the modulus of rigidity of the material is $0.8 \times 10^5 \text{ N/mm}^2$, determine the Poisson's ratio and modulus of elasticity. (8)

12. Determine the forces in all the members of a cantilever truss shown in fig. (8)



13. Draw the shear force and bending moment diagram for a simply supported beam of length 9 m and carrying a uniformly distributed load of 10 kN/m from a distance of 6 m from the left end. Also calculate the maximum B.M on the section. (8)
14. A hollow shaft, having an inside diameter 60% of its outer diameter, is to replace a solid shaft transmitting the same power at the same speed. Calculate the % saving in material, if the material to be used is also the same. (8)
15. The normal stress in two mutually perpendicular directions are 600 N/mm^2 and 300 N/mm^2 both tensile. The complimentary shear stresses in these directions are of intensity 450 N/mm^2 . Find the normal and tangential stresses on the two planes which are equally inclined to the planes carrying the normal stresses mentioned above. (8)