Reg. No. : | | | | | | | | | | |

Question Paper Code: 44104

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

Fourth Semester

Civil Engineering

14UCE404 - MECHANICS OF SOLIDS - II

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The strain energy stored by the body within elastic limit when loaded externally is called

   (a) Resilience (b) Proof resilience
   (c) Modulus of resilience (d) None of these

2. In case of solid shaft the strain energy in torsion per unit volume is equal to

   (a) $\tau^2 / 2C$ (b) $\tau^2 / 4C$ (c) $\tau^2 / 6C$ (d) $\tau^2 / 8C$

3. A beam of length 6 m carries a point load 120 kN at its centre. The beam is fixed at both ends. The fixing moment at the ends is

   (a) 40 kNm (b) 90 kNm (c) 120 kNm (d) 150 kNm

4. A continuous beam has

   (a) One support (b)) two support
   (c) more than two supports (d) very long span

5. The maximum deflection of a fixed beam carrying a central point load lies at

   (a) fixed ends (b) centre of beam
   (c) 1/3 from fixed ends (d) none of these

6. According to I.S. code in actual design, maximum permissible deflection is limited to

(a) (span / 200) (b) (span / 325) (c) (span / 525) (d) (span / 500)

7. Euler's formula holds good only for

(a) Short columns (b) Long columns
(c) Weak column (d) Both (A) & (B)

8. The number of points of contra flexure in a simple supported beam carrying uniformly distributed load, is

(a) 0 (b) 1 (c) 3 (d) 2

9. In case of unsymmetrical bending, the direction of neutral axis is

(a) perpendicular to the plane of bending
(b) not perpendicular to plane of bending
(c) either (a) or (b)
(d) none of these

10. A thin spherical shell of diameter (*d*) and thickness (*t*) is subjected to an internal pressure (*p*). The stress in the shell material is

(a) pd/t (b) pd/2t (c) pd/4t (d) pd/8t

PART - B (5 x 2 = 10 Marks)

11. Define strain energy.

12. What is a fixed beam?

13. Name the various methods of determining slope and deflection of a beam.

14. Define 'core' of a section.

15. Give the reasons for an unsymmetrical bending of beams.

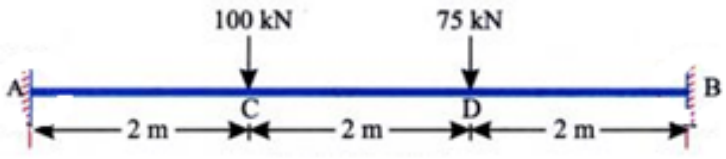
PART - C (5 x 16 = 80 Marks)

16. (a) A beam of simply supported over a span of 3 m carries a uniformly distributed load of 20 KN/m over the entire span. Take EI = 2.25 MN/m^2. Use Castigliano theorem. Find the deflection at the centre of the beam. (16)

Or

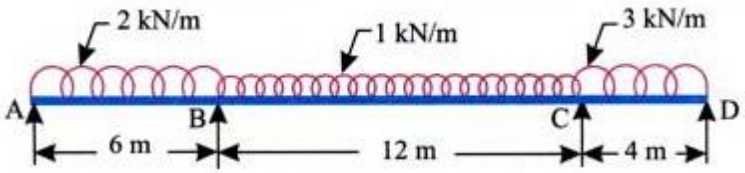
(b) A solid bar is 20 mm dia. And 0.8 m long. It is subjected to a torque of 30 Nm. Calculate the maximum shear stress and the strain energy stored. Take G=90GPa. (16)

17. (a) A fixed beam carries point loads as shown in figure. Analyse the beam and draw the S.F and B.M diagrams. (16)

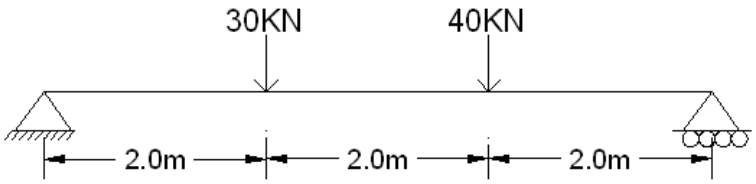


Or

(b) Analyse the beam shown in figure and draw the B.M diagram. (16)



18. (a) For the beam shown in figure, find the deflection at C and slope at D. I = 40 x 10^7 mm^4 , E = 200 GPa. (16)



Or

(b) A beam ABCD is simply supported at its ends A and D over a span of 30 *metres*. It is made up three portions AB,BC, and CD each 10 *metres* in length. The moments of inertia of sections of these portions are I, 3I and 2I respectively, where I = 300 x 10^{-4} m^4. The beam carries a point load of 225 *kN* at B and a point load of 450 *kN* at C. If E = 200 x 10^6 kN/m^2. Calculate (i) slope at A and D. (ii) Deflection at B and C. Neglect the weight of the beam (16)

19. (a) A Cylindrical shell 3 meters long has 1 metre internal diameter and 15 mm metal thickness. Calculate the circumferential and longitudinal stresses induced and also changes in the dimensions of the shell, if it is subjected to an internal pressure of 15 kg/cm^2. Take E = 2.0 × 106 kg/cm^2 and Poisson's ratio = 0.3. (16)

Or

(b) A thin cylindrical shell is 3m long, 1.5m internal diameter and 20mm metal thickness. Calculate the circumferential and longitudinal stresses induced and also change in the dimensions of the shell if it is subjected to an internal pressure of $2N/mm^2$. Take E = $200GN/m^2$ and $\frac{1}{m}$ =0.3. (16)

20. (a) A beam of Tee section having flange of 100 mm x 20 mm and web of 150 mm x 10mm and 3 m long is simply supported at its ends. It carries 4 kN at 30 ° to vertical and passing through the centroid of the section. Calculate the maximum tensile stresses and maximum compressive stresses. E = 200 kN/mm^2. (16)

Or

(b) A compound cylinder is composed of a tube of 250*mm* internal diameter and 25mm wall thickness. It is shrunk on to a tube of 200*mm* internal diameter. The radial pressure at the junction is 8 N/mm^2. Assess the variation of hoop stress across the wall of the compound cylinder, if it is under an internal fluid pressure of 60 N/mm^2. (16)