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

Question Paper Code: 44104

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

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. Area under load-deflection curve gives

   (a) Strain energy (b) Maximum stress
   (c) Rigidity (d) Modulus of elasticity

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. The static indeterminacy value for propped cantilever beam is

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

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. The maximum spacing of contraction joints in rigid pavements is

(a) 2.5 *m* (b) 3.5 *m* (c) 4.5 *m* (d) 5.5*m*

10. Minimum thickness of a layer of fine sand required to cut off capillary rise of water completely, should be

(a) 40 cm (b) 52 cm (c) 64 cm (d) 76 cm

PART - B (5 x 2 = 10 Marks)

11. Define strain energy.

12. Describe the basic assumption made in slope deflection method.

13. What are the advantages of continuous beams over simply supported beams?

14. Define 'core' of a section.

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

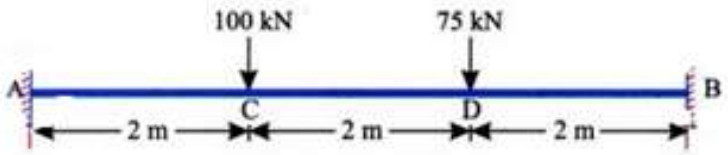
PART - C (5 x 16 = 80 Marks)

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

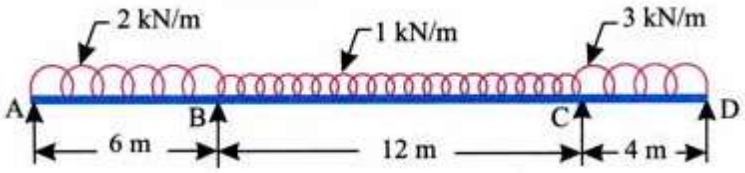
(b) A solid bar is 20 mm dia. And 0.8 m long. It is subjected to a torque of 30 Nm. Calculate the maximum shear stress and the strain energy stored. Take G=90GPa. (16)

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) Find the expression for the slope and deflection of a cantilever of length L, which carries a uniformly distributed load over a length "a" from the fixed end by Moment area method starting from fundamentals. (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) Briefly explain the maintenance management system? (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)