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

Question Paper Code: 41144

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

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 vertical distance between the axis of the beam before and after loading at a point is called as

   (a) deformation (b) deflection
   (c) slope (d) None of these

2. In cantilever beam, slope and deflection at free end is

   (a) Zero (b) Maximum (c) Minimum (d) Two

3. Deflection due to shear force as compared to bending moment will be

   (a) Equal (b) Less (c) More (d) None of these

4. A continuous beam is one which is

   (a) fixed at both ends
   (b) fixed at one end and free at the other end
   (c) supported on more than two supports
   (d) extending beyond the supports

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 neutral axis of the cross-section a beam is that axis at which the bending stress is

(a) Equal (b) Less (c) More (d) infinity

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. Describe the basic assumption made in slope deflection method.

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

14. Define equivalent joint load forces.

15. Define unsymmetrical bending.

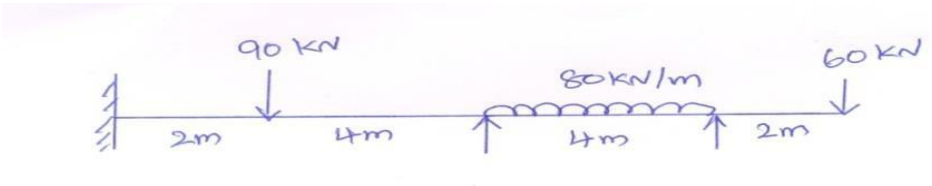
PART - C (5 x 16 = 80 Marks)

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

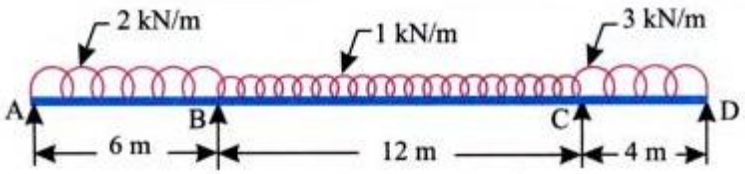
(b) A beam of 4 m length is simply supported at the ends and carries a uniformly distributed load of 6 kN/m length. Find the strain energy and hence deflection. Take E = 200 GPa and I = 1440 cm^4 . Use Strain energy method. (16)

17. (a) Analysis the given continuous beam shown in Figure .1 and draw its BMD and SFD using Theorem of three moment equation method. EI=Constant. (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 cantilever 150 mm wide and 200 mm deep projects 2 m out of a wall, and is carrying a point load of 40 kN at the free end. Determine the slope and deflection of the cantilever at the free end. Take E = 2.1×10^5 N/mm^2. (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) Find the Euler's crippling load for a hollow cylindrical steel column of 38 mm external diameter and 2.5 mm thick. Take length of the column as 2.3 m and hinged at its both ends. Take E = 205 kN/mm^2. Also determine the crippling load by Rankine's formula using fc = 335N/mm^2 and a = 1/7500. (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 tube is composed of 250 mm internal diameter and 25 mm thick shrunk on tube of 250 mm external diameter and 25 mm thick. The radial pressure at the junction is 8 N/mm^2. Find the variation of hoop stress over the wall of the compound tube. (16)