Roll No. | | | | | | | | | | |

B.E/B.TECH (FULL TIME) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2013
(COMMON TO MECHANICAL ENGINEERING AND MECHANICAL ENGINEERING TAMIL MEDIUM)
IV SEMESTER
CE9213 STRENGTH OF MATERIALS
(Regulation 2008)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What is meant by Poisson's ratio?
2. What does the radius of Mohr's Circle denote?
3. A 8 m simply supported beam is carrying a central anti-clockwise moment of 6 kNm. Sketch the bending moment diagram.
4. Draw the bending and shear stress distribution for a T-section.
5. Write down the equation for torsional moment carrying capacity of a solid shaft.
6. Define stiffness of a spring.
7. What is the deflection at mid-span of a cantilever beam carrying a central point load W?
8. A 8 m cantilever beam carries a point load of 10 kN at its centre. Draw the conjugate beam.
9. Explain the failure of a thin cylinder subjected to internal pressure.
10. Write any two assumptions made in Lame's theory.

Part – B (5 x 16 = 80 marks)

11. Prove that the hollow shaft is stronger and stiffer than the solid shaft of same material, length and weight.

12. a) A rod of 2 m length and 40 mm diameter is subjected to a pull of 30 kN. The extension in length is 0.3 mm and the decrease in diameter is 0.0018 mm. Find the three moduli and Poisson's ratio.

(OR)

b) A block with dimensions 500 mm x 30 mm x 50 mm is subjected to (i) 40 kN tension on 30 mm x 50 mm face. (ii) 200 kN tension on 30 mm x 500 mm face and (iii) 300 kN compression on 50 mm x 500 mm face. If E = 2 x 10^5 MPa and Poisson's ratio = 0.3, determine the change in volume of the block.

13. a) Draw S.F.D, B.M.D and locate the point of contraflexure for the beam given in Fig. 13 (a).

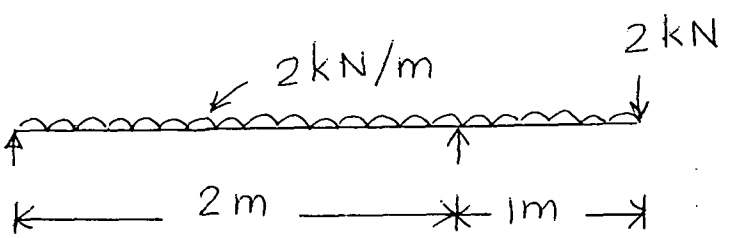

Fig 13.a.

(OR)

b) A beam is having a T-shaped cross section with flange width 125 mm, flange thickness 25 mm, depth of web 175 mm and thickness of web 25 mm. If a bending moment of 2.5 kNm is acting at the section, draw the bending stress distribution.

14. a) Using Macaulay's method, determine the slope at the supports and deflection at C and D for the beam given in 14 (a). E = 210 x 10^6 kN/m^2 and I = 200 x 10^{-4} m^4.

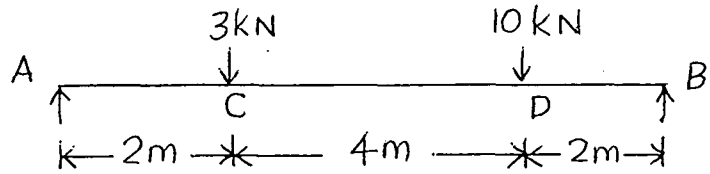

Fig 14.a.

(OR)

b) Using conjugate beam method, determine the slope at the supports and deflection at C and D for the beam given in Fig 14 (b). E = 200 x 10^6 kN/m^2 and I = 300 x 10^{-4} m^4.

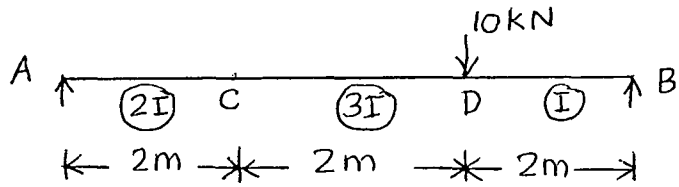

Fig 14.b.

15. a) Derive the relations for changes in the dimensions of a thin cylindrical shell subjected to an internal fluid pressure.

(OR)

b) A thick cylinder having 300 mm internal diameter and 70 mm thickness is subjected to a fluid pressure of 70 N/mm^2. Determine the maximum and minimum intensity of radial stress. Also sketch the radial pressure distribution and radial stress distribution across the cross section.