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Question Paper Code: 34104

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

Fourth Semester

Civil Engineering

01UCE404 - MECHANICS OF SOLIDS II

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Define the term Proof resilience and Modulus of resilience.
2. State the principle of Virtual work.
3. Define statically indeterminate beam.
4. What are the advantages of continuous beam over simply supported beam?
5. Write the formula for deflection of a fixed beam with eccentric point load and uniformly distributed load.
6. Write the formula for deflection of a fixed beam with eccentric point load and uniformly distributed load.
7. What are the assumptions followed in Euler's equation?
8. Write the expression for the determination of circumferential stress or hoop stress in thin cylinder.
9. Define Lamé's theory.
10. What is meant by compound cylinder?

PART - B (5 x 16 = 80 Marks)

11. (a) Derive the expression for strain energy in Linear Elastic Systems for the following cases. (i) Axial loading (ii) Flexural Loading [moment (or) couple] (16)

Or

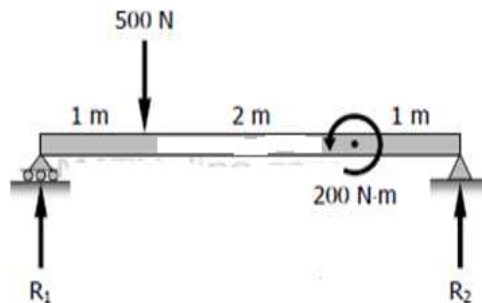
- (b) A beam simply supported over a span of 3m carries a uniformly distributed load of 20 kN/m over the entire span. Taking $EI = 2.25 \text{ MNm}^2$ and using Castiglian's theorem determine the deflection at the center of the beam. (16)
12. (a) Find the fixing moments for a fixed beam of span 9 m, carries a point load of 180 kN at 3 m from left end, a torque of 160 kNm at 3m from right end and draw the bending moment diagram the support B sinks by 10 mm. Take $E = 200 \text{ kN/mm}^2$ and $I = 2.75 \times 10^7 \text{ mm}^4$. (16)

Or

- (b) A cantilever of span 2m carries an UDL of 18 kN/m. Determine the slope and deflection at free end of the cantilever. Take $E = 1 \times 10^5 \text{ N/mm}^2$ and $I = 2 \times 10^7 \text{ mm}^4$. (16)
13. (a) A beam ABCD is simply supported at A and D over a span of 10 m. The beam carries point loads 60 kN and 40 kN at distances 3 m and 6 m from the end A. Neglecting the weight of the beam. Find the slopes at A, B, C and D Also find the deflections at C and D. Take $I = 12 \times 10^8 \text{ mm}^4$ and $E = 200 \text{ kN/mm}^2$ by using conjugate beam method. (16)

Or

- (b) Find the value of deflection at the point of application of the 200 N·m couple in figure by conjugate method. (16)



14. (a) A cylindrical air drum is 2.25 m in diameter with plates 1.2 cm thick. The efficiencies of the longitudinal and circumferential joints are respectively 75% and 40%. If the tensile stress in the plating is to be limited to 120 MN/m^2 find the maximum safe air pressure. (16)

Or

- (b) A hollow tube 5m long with external and internal diameter 40mm & 25mm respectively was found to extend 6.4mm under a tensile load of 60kN. Find the buckling load for the tube when used as columns with both ends fixed. Also find the safe load for the tube taking a factor of safety 4. (16)
15. (a) Find the thickness of the metal necessary for a steel cylindrical shell of internal diameter 200mm to withstand an internal pressure of 50 N/mm^2 . The maximum hoop stress in the section is not to exceed 150 N/mm^2 . (16)

Or

- (b) A pipe of 200 mm internal diameter of radial pressure and 100 mm thickness contains a fluid at a pressure of 6 N/mm^2 . Find the maximum and the minimum hoop stress across the section. (16)
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