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Question Paper Code: 41013

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2015.

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 beams over simply supported beams?
5. What are the assumptions made in double integration method?
6. Write down the formula to find the slope and deflection of any section of a given beam by conjugate beam method?
7. Write the expression for finding the crippling load when the both ends of the column are hinged.
8. Write the expression for the determination of circumferential stress or hoop stress in thin cylinder.
9. Define shear center.
10. Define unsymmetrical bending

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 simply supported beam of span L is carrying a concentrated load W at the centre and a uniformly distributed load of intensity of w per unit length. Show that Maxwell's reciprocal theorem holds good at the center of the beam. (16)
12. (a) A fixed beam AB of length $6m$ carries point load of $160 kN$ and $120 kN$ at a distance of $2m$ and $4m$ from the left end A . Find the fixed end moments and the reactions at the supports. (16)

Or

- (b) A continuous beam ABC covers two consecutive span AB and BC of lengths $4m$ and $6m$, carrying uniformly distributed loads of $6kN/m$ and $10kN/m$ respectively. If the ends A and C are simply supported, find the support moments at A , B and C . Also draw also B.M.D and S.F.D. (16)
13. (a) A cantilever of length $4m$ carries an u.d.l of $12kN/m$ for a length of $2.5m$ from fixed end and a point load of $10kN$ at free end. Determine the maximum slope and deflection using moment area method. Take $EI = 6.3 \times 10^4 kN/m^2$. (16)

Or

- (b) A simply supported beam is carrying a load W at the center. Calculate the slopes at its ends and the central deflection, using conjugate beam method. (16)
14. (a) Derive the expression for crippling load when both ends of the column are fixed. (16)

Or

- (b) A cylindrical shell $3m$ long, $1m$ in diameter and $10 mm$ thick is subjected to an internal pressure of $2 Mpa$. Calculate the change in dimensions of the shell and the maximum shear stress induced $E = 2 \times 10^5 M Pa$, $\mu = 0.3$. (16)
15. (a) Derive the formula for the deflection of beams due to unsymmetrical bending. (16)

Or

- (b) A thick steel cylinder having an internal diameter of $100 mm$ an external diameter of $200 mm$ is subjected to an internal pressure of $55 M Pa$ and an external pressure of $7 M Pa$. Find the maximum hoop stress. (16)