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Question Paper Code : 10215

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Third Semester

Civil Engineering

CE 2201/CE 34/CE 1202 A/10111 CE 304/080100010 — MECHANICS OF SOLIDS

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What do you mean by stiffness?
2. With a simple sketch explain lateral strain.
3. What are the advantages of trusses over beams?
4. Define 'tension coefficient'.
5. Derive the relationship between bending moment and shear force.
6. What is meant by section modulus?
7. How do you determine the maximum deflection in a simply supported beam?
8. What is meant by shear can be?
9. Draw the stress distribution for a shaft of circular section subjected to torsion.
10. What are the uses of leaf springs?

PART B — ($5 \times 16 = 80$ marks)

11. (a) (i) Derive a relation for change in length of a bar hanging freely under its own weight. (6)

(ii) Draw stress - strain curve for a mild steel rod subjected to tension and explain about the salient points on it. (10)

Or

(b) (i) Derive the relationship between bulk modulus and young's modulus. (6)

(ii) Derive relations for normal and shear stresses acting on an inclined plane at a point in a stained material subjected to two mutually perpendicular direct stresses. (10)

12. (a) Determine the forces in all the members of the frame shown in fig Q 12a. Use method of joints.

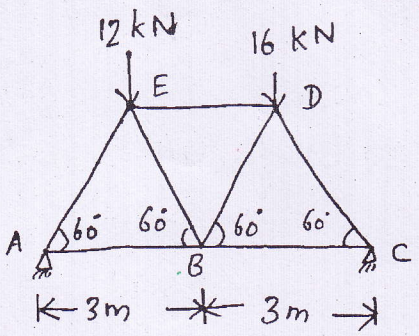

Fig. Q. 12a

Or

(b) Derive relations for change in length, thickness and volume of a thin cylinder subjected to an internal pressure. Also explain the failure of thin cylinders.

13. (a) Draw shear force and bending moment diagram for the beam given in fig Q 13a.

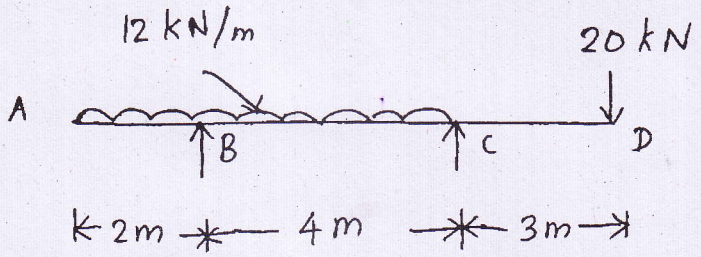

Fig Q. 13 (a)

Or

(b) State the assumptions made in the theory of simple bending and derive the bending formula.

14. (a) Determine the slope at the supports and maximum deflection for the beam given in fig Q. 14a use Macaulay's method.

$E = 2 \times 10^5 N/mm^2$

$I = 20 \times 10^6 \text{ mm}^4$

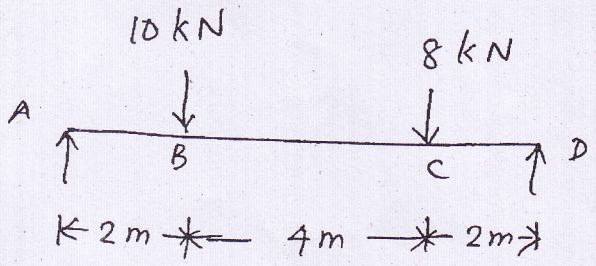

Fig. Q. No. 14a

Or

(b) The cross section of a T-beam is as follows: flange thickness = 10 mm; width of flange = 100 mm; thickness of web = 10 mm; depth of web = 120 mm. If a shear force of 2KN is acting at a particular section of the beam. Draw the shear stress distribution across the cross section.

15. (a) Derive Torsional formula. Also explain how do you analyse the shafts fixed at both ends.

Or

(b) Derive expressions for the deflection bending stress and shear stress induced in an open coiled helical spring subjected to an axial load 'w'.
