PART C — (1 × 15 = 15 marks)

16. (a) A beam of rectangular cross section is to be cut from a circular log of diameter D. What should be ratio of the depth of the beam to its width to resist maximum bending moment?

Or

(b) Determine the slope at the supports and deflection under the load for the beam given in Q 16 b. Use conjugate beam method.

$I = 1 \times 10^8 \text{ mm}^4$. $E = 200 \text{ GN/m}^2$.

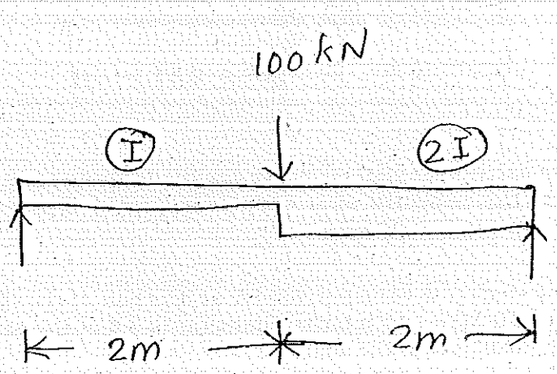


Figure – Q 16 (b)

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

Question Paper Code : 80062

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Third Semester

Civil Engineering

CE 8301 — STRENGTH OF MATERIALS — I

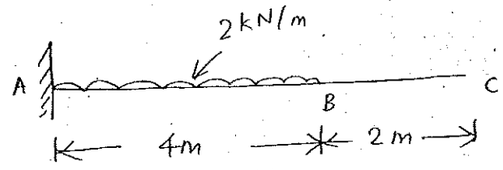
(Regulation 2017)

Time : Three hours Maximum : 100 marks

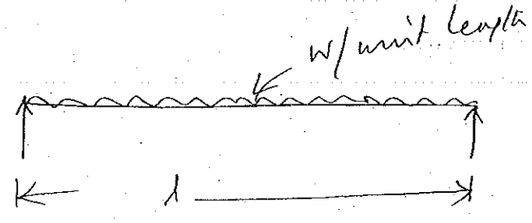
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

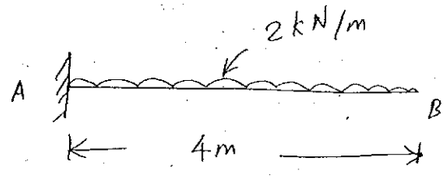
1. Define Poisson's ratio.
2. What is Mohr's Circle?
3. Draw SFD for the beam given below



4. Draw qualitative shear stress distribution for a T-section.
5. What is the maximum deflection for the beam given below



6. Draw Conjugate beam for the beam given below



7. Define stiffness.

8. What is the bending stress induced in a close coiled helical spring subject to axial load?

9. What is redundant frame?

10. Write the advantages of method of section for calculating member forces in a truss.

PART B — (5 × 13 = 65 marks)

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

(ii) Derive a relation for change in length of a bar with uniformly varying diameter and subjected to an axial tensile load 'P' (7)

Or

(b) The rod given in fig Q. 11 (b) is held between rigid supports. Find the stress developed in each material when the temperature is raised by 55°C. Use

$E_s = 2 \times 10^5 N/mm^2$, $\alpha_s = 1.2 \times 10^{-5}/^\circ c$

$E_c = 1.0 \times 10^5 N/mm^2$, $\alpha_c = 1.75 \times 10^{-5}/^\circ c$

$E_A = 0.7 \times 10^5 N/mm^2$, $\alpha_A = 2.2 \times 10^{-5}/^\circ c$.

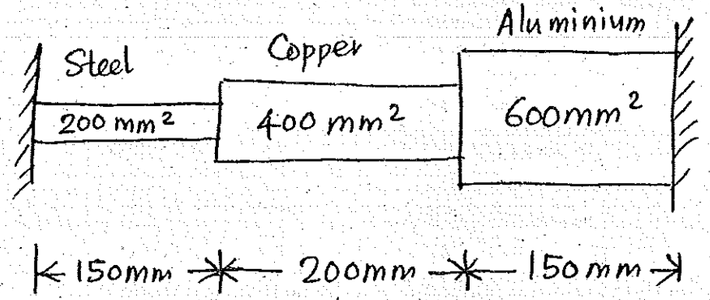


Figure – Q. 11 (b)

12. (a) Draw SFD, BMD for the beam given in fig Q. 12 (a). Also find Maximum BM

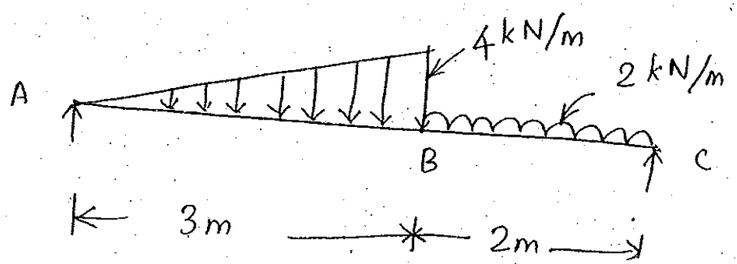


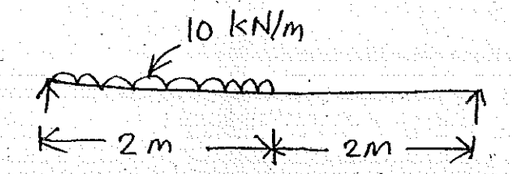
Figure – Q. 12 (a)

Or

(b) A T-beam of flange size 250× 30 *mm* (thickness), web 280 × 40 mm (thickness) is subjects to shear force of 20 kN. Sketch the shear stress distribution.

13. (a) Find the maximum deflection of the beam given in Q. 13 (a). It is of circular cross section with 200 mm as diameter.

Take E = 2 × 10^4 N/mm² use Macaulay's method.



Or

(b) Using moment area method derive equations for maximum deflection and slope at the supports of a simply supported beam carrying U.D.L. distributed over entire span.

14. (a) A hollow shaft is to transmit 200 kw at 80 r.p.m. If the shear stress is not to exceed 60 MPa and internal diameter is 0.6 of the external diameter, find the diameters of the shaft.

Or

(b) Derive the relations for deflection, stiffness of a close coiled helical spring subjected to axial load.

15. (a) Determine the forces in all the members of the truss given in Fig Q. 15 (a). Use method of joints

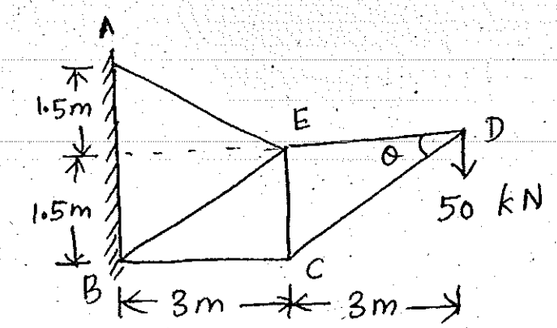


Figure – Q 15 (a)

Or

(b) Using method of sections solve the truss given in Fig Q. 15 (a).