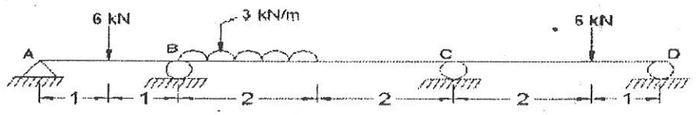
PART C — (1 × 15 = 15 marks)

16. (a) A continuous beam ABCD in shown in Fig. 16(a). Draw the SFD and BMD indicating the salient points.



(EI constant throughout)

Fig. 16(a)

Or

(b) Explain derive and express the Williot Mohr's diagram.

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15/6/23 - AN

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

Question Paper Code : 50337

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Fourth Semester

Civil Engineering

CE 8402 – STRENGTH OF MATERIALS – II

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Maxwell's reciprocal theorem.

2. Give the significance of the principal of virtual work.

3. What is a fixed beam?

4. Define Flexural rigidity of beams.

5. What is thick cylinder?

6. Define core of a section.

7. Define principal plane and principal stress.

8. Define volumetric strain.

9. What is stress concentration?

10. Define shear centre.

PART B — (5 × 13 = 65 marks)

11. (a) For the beam shown in Fig. 11(a) find the deflection at C and slope at D. Take I = 40 × 10^7 mm^4, E = 200 GPa.

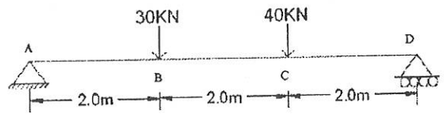

Fig. 11(a)

Or

(b) For the truss shown in Fig. 11(b) find the total strain energy stored.

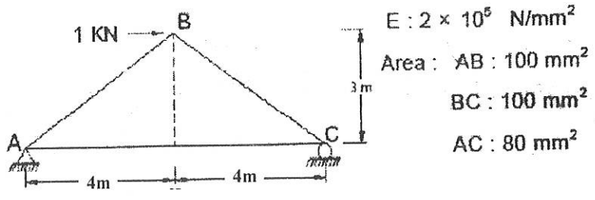

Fig. 11(b)

12. (a) For the fixed beam shown in Fig. 12(a) draw the SFD and BMD.

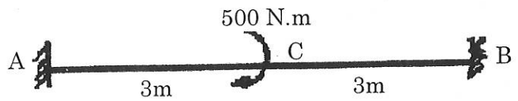

Fig. 12(a)

Or

(b) For the continuous beam shown in Fig. 12(a) draw the SFD and BMD all the supports are at same level.

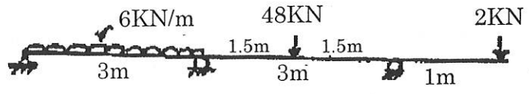

Fig. 12(b)

13. (a) A 1.5m long cast iron column has a circular cross section of 50mm diameter. One end of the column is fixed in direction and position and the other is free. Taking factor of safety as 3, calculate the safe load using Rankine-Gordon formula. Take yield stress as 560 MPa and constant α=1/1600.

Or

(b) A pipe of 200mm internal diameter and 50mm thickness carries a fluid at a pressure of 10 MPa. Calculate the maximum and minimum intensities of circumferential stress across the section. Also sketch the radial stress distribution and circumferential stress distribution across the section.

14. (a) A circular shaft has to take a bending moment of 9000 N/m and torque 6750 N/m. The stress at elastic limit of the material is 207 × 10^6 N/m^2 both in tension and compression. $E = 207 \times 10^6$ KPa and $\mu = 0.25$. Determine the diameter of the shaft, using octahedral shear stress theory and the maximum shear stress theory. Factor of safety : 2.

Or

(b) The normal stress in two mutually perpendicular directions are 600 N/mm^2 and 300 N/mm^2 both tensile. The complimentary shear stresses in these directions are of intensity 450 N/mm^2. Find the normal and tangential stresses in the planes which are equally inclined to the planes carrying the normal stresses mentioned above.

15. (a) Write brief technical note on :

(i) Unsymmetrical bending of beams

(ii) Curved beams

(iii) Symmetrical beams (5 + 4 + 4)

Or

(b) Explain the following :

(i) Winkler Bach formula

(ii) Stresses in hooks (7 + 6)