

Fourth Semester B.E. Degree Examination, June/July 2023 Analysis of Structures

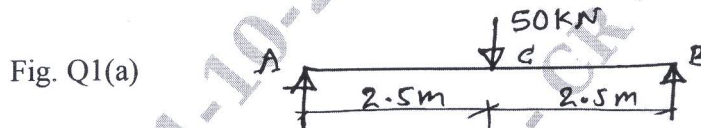
Time: 3 hrs.

Max. Marks: 100

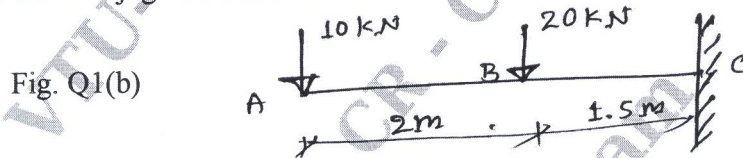
Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Determine maximum slope and maximum deflection for simply supported beam as shown in the Fig. Q1(a). Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 15 \times 10^6 \text{ mm}^4$. Use Moment Area method. (10 Marks)

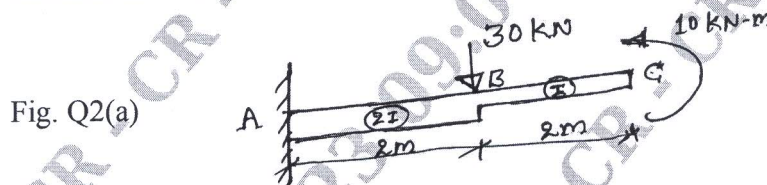


- b. For the beam loaded as shown in Fig. 1(b). Determine the slope and deflection at the free end. Use Conjugate beam method. (10 Marks)

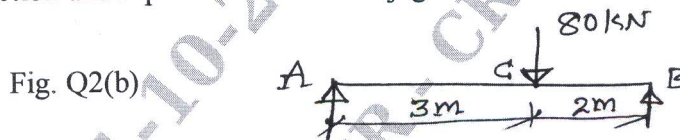


OR

- 2 a. Calculate slope and deflection at free end for the cantilever beam as shown in Fig. Q2(a). Use moment area method. (10 Marks)

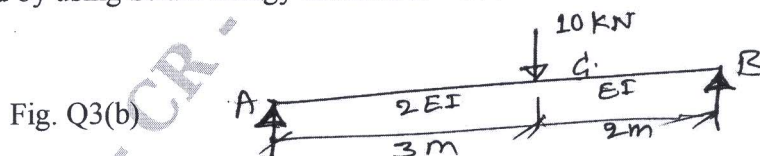


- b. For the beam loaded as shown in the Fig. Q2(b), determine the maximum slope and deflection under point load. Use Conjugate beam method. (10 Marks)



Module-2

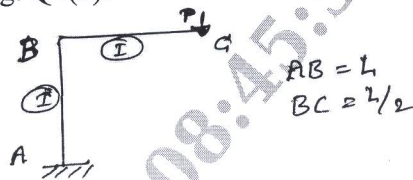
- 3 a. Derive an expression for strain energy due to bending. (08 Marks)
 b. Determine the deflection for a simply supported beam as shown in Fig. Q3(b). Under point load by using Strain energy method. $E = 200 \times 10^6 \text{ kN/m}^2$ & $I = 25 \times 10^6 \text{ m}^4$. (12 Marks)



OR

- 4 a. Derive an expression for strain energy due to shear force. (08 Marks)
 b. Using Cartigliano's theorem, determine the vertical and horizontal deflection at the free end of the frame as shown in Fig. Q4(b). (12 Marks)

Fig. Q4(b)



Module-3

- 5 a. A three hinged parabolic arch of span 20m and a central rise of 5m carry a point load of 200 kN at 6m from the left support. Find the support reactions at A and B. Calculate normal thrust and radial shear at 6m from the left support. Also draw the BMD. (12 Marks)
 b. A suspension cable having a support at same level of span 30m and maximum dip of the cable is 3m subjected to UDL of 10kN/m over the entire length. Find the support reactions at 'A' & 'B'. Also find maximum tensile force in the cable and length of the cable. (08 Marks)

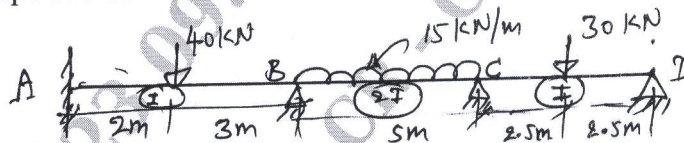
OR

- 6 a. A 3 hinged parabolic arch of span 60m and a central rise of 15m carry two point loads of 200kN at 15m from the left support and 300kN at 15m from the right support. Find the support reactions at A and B. Calculate normal thrust and radial shown at 20m from the left support. Also draw the BMD. (12 Marks)
 b. Derive an expression to find length of a cable subjected to UDL throughout with usual notations. (08 Marks)

Module-4

- 7 Analyse a continuous beam ABCD consists of 3 spans and it is loaded as shown in the Fig. Q7 by slope deflection method. Determine the moments at supports and draw the SFD & BMD. Also draw the deflected shape of the structure. (20 Marks)

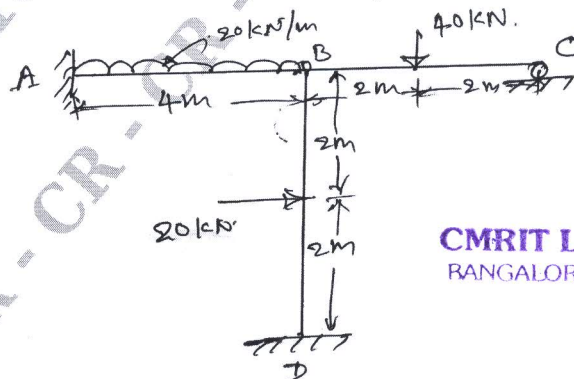
Fig. Q7



OR

- 8 Analyse the given frame as shown in Fig. Q8 by slope deflection method. EI is constant for all the members. Draw BMD and sketch the deflected shape of the frame. (20 Marks)

Fig. Q8

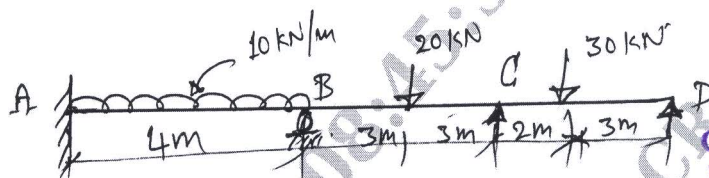


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Module-5

- 9 Analyse the given continuous beam shown in Fig. Q9 by Stiffness method and sketch BMD & SFD. (20 Marks)

Fig. Q9



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OR

- 10 Analyse the given continuous beam shown in Fig. Q10 by Stiffness method. The support 'B' sink by $300/EI$ and support 'C' sinks by $200/EI$. Sketch BMD and SFD. (20 Marks)

Fig. Q10

