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B.E. (Civil Engineering) Fourth Semester (C.B.S.)

Structural Analysis - I

P. Pages : 3 **NIR/KW/18/3348**

Time : Three Hours * 1 2 9 6 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

1. Analyse the continuous beam ABC shown in fig. (1) and plot BMD using three moment equation. **13**

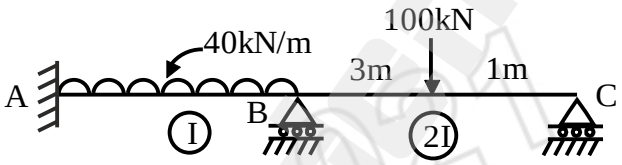


Fig. (1)

OR

2. Analyse the beam ABCD as shown in fig. (2) if support B sink by 10 mm. **13**
Given $\in = 200\,kN/mm^2$ and $I = 1\times10^8\,mm^4$.

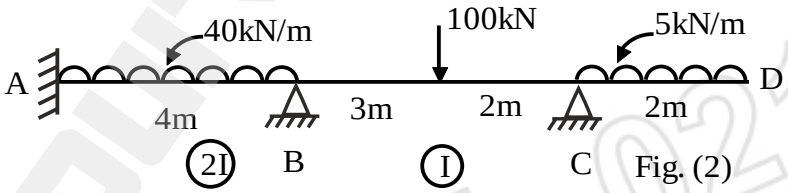
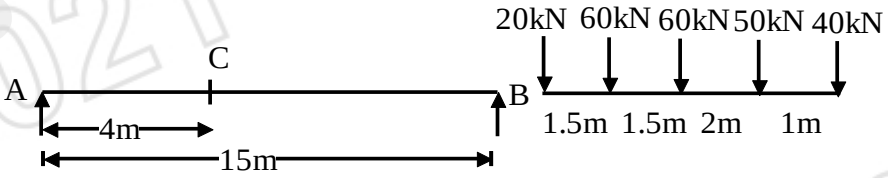


Fig. (2)

3. The system of concentrated load as shown in fig. (3) rolls from left to right on the girder of span 15 m, 40 kN load leading. For a section 4 m from left support determine. **13**
i) Maximum bending moment.
ii) Maximum shear force



OR

4. Draw the influence line diagram for forces in member U_3U_4, U_3L_4 and L_3L_4 of frame shown in fig. (4) and find maximum forces developed, when uniformly distributed load of intensity longer 40 kN/m the span moves from left to right on top chord. **13**

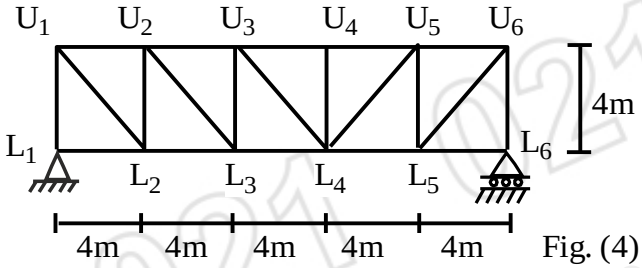


Fig. (4)

5. Analyse the frame by strain energy method and draw BMD. Frame is shown in fig. (5) **13**

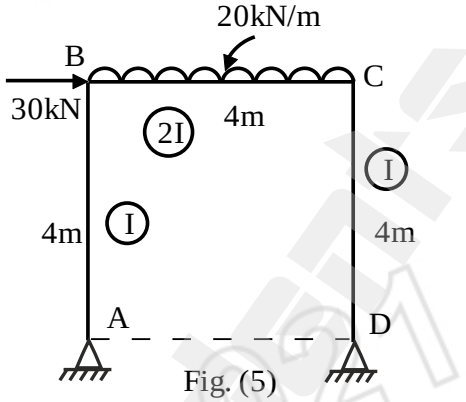


Fig. (5)

OR

6. Determine the vertical deflection of point D. in the truss shown in fig. (6). The cross sectional areas of members AD and DE are $1600\,mm^2$. While those of the other members are $900\,mm^2$. Take $E = 180\,kN/mm^2$. **13**

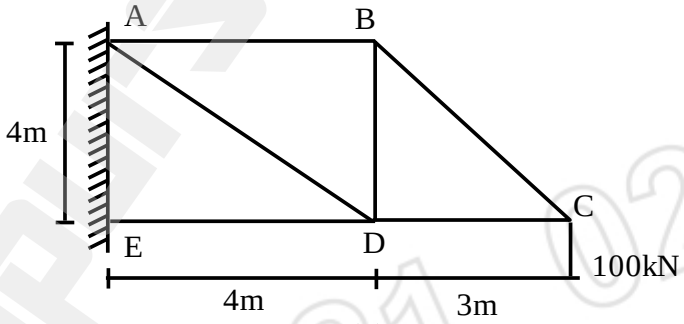


Fig. (6)

7. a) Derive from the first principle. Euler's crippling load for the column for length 'ℓ' with one end fixed and other end free. **7**

b) Explain the Rankine's theory for determining load carrying capacity of column. **7**

OR

8. A two hinged parabolic arch with 35 m span and 8 m rise is subjected to udl of $15\,kN/m$ over left half of arch. Find the reaction at support, normal thrust and radial shear at a section 12 m from left support. Take $I = I\,cosec\,\theta$ with usual notations? **14**

9. Analyse the portal frame shown in fig. (7) using slope and deflection method also draw the BMD. **14**

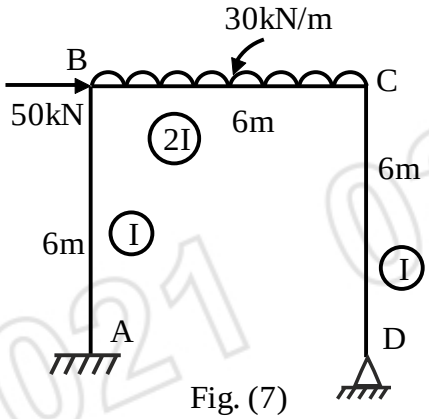


Fig. (7)

OR

10. Analyse the frame shown in fig. 8 by cantilever method and draw BMD of column and beam. **14**

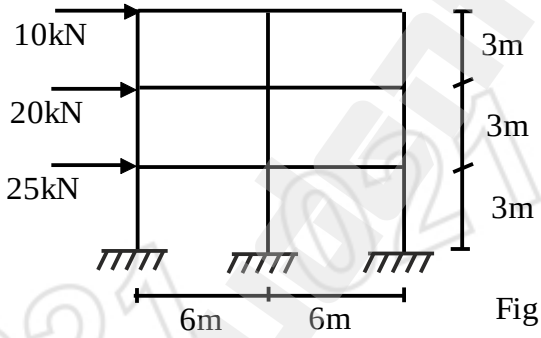


Fig (8)

11. Analyse the beam by flexibility method and draw BMD. Refer fig. 9. **13**

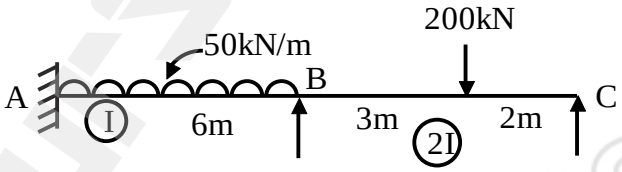
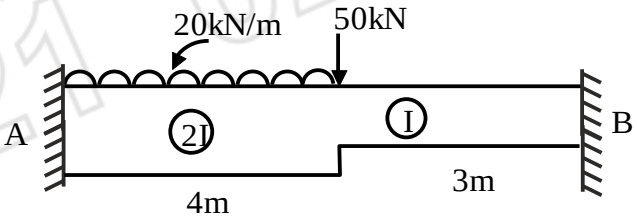


Fig. (9)

OR

12. Analyse the fixed beam shown in fig. 10 by column Analogy Method. **13**



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All our dreams can come true if we have the courage to pursue them.

~ Walt Disney