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

Structural Analysis - I

P. Pages : 3 **NRJ/KW/17/4403**

Time : Three Hours * 0 1 9 1 * 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 by three moment theorem and draw BMD. Refer fig. 1. **14**

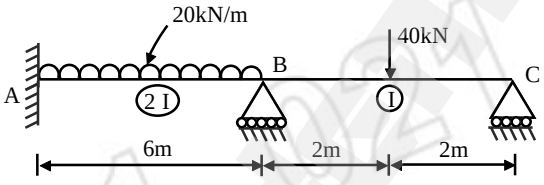

Fig. 1

OR

2. Determine the fixed end moment in the beam as shown in fig. (2). and plot the BMD. If support B sinks down by 20mm. Take $E = 2\times10^5\ N/mm^2$ and $I = 40\,x10^6 mm^4$. **14**

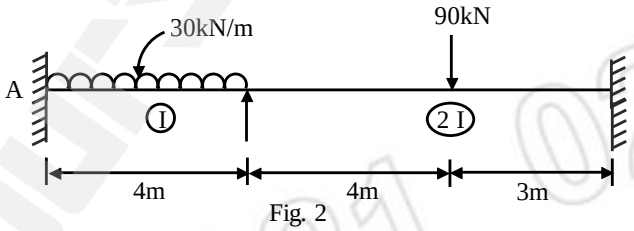

Fig. 2

3. Rolling load as shown in fig.3. is moving left to right on 40m girder. Find maximum bending moment, Max. SF at 20m from left support. Also calculate absolute max. BM and SF any where. **13**

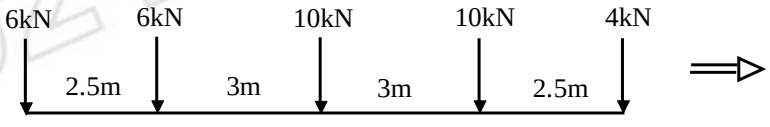

Fig. 3

OR

4. Draw the Influence lines for the forces in the members U_2 U_3, L_2 L_3 of the truss shown in fig.4. If a live load of 6.5 kN/m longer than the span, traverses the girder. Find maximum values of forces in the members mentioned above. **13**

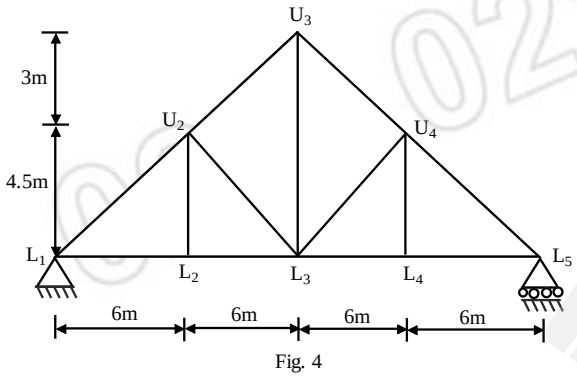

Fig. 4

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

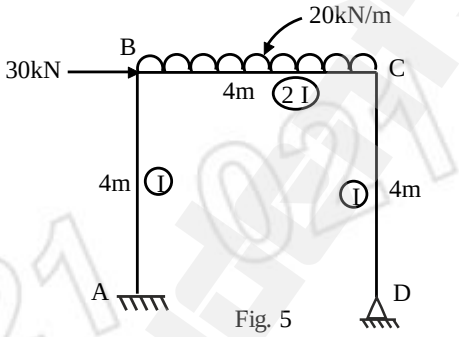

Fig. 5

OR

6. Find the forces in the member of the truss shown in fig.6. by using strain energy method. The cross sectional area and modulus of elasticity of all members are the same. **13**

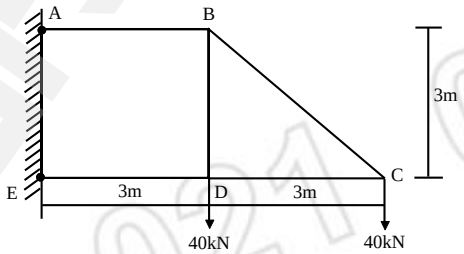

Fig. 6

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

b) Determine the ratio of the strength of a solid steel column of that of a hallow column of the same material and having the same cross-sectional area, the internal diameter of hallow column is ¾ of the external diameter. Both the columns have same length with one end fixed and other end pinned. **6**

OR

8. A two hinged parabolic arch with 35m span and 8m rise is subjected to udl of 15 kN/m over left half of arch. Find the reaction at supports, normal thrust and radial shear at a section 12m from left support. Take $I = I\sec\theta$ with usual notations. **13**

9. Analyse the portal frame shown in fig.7. Using slope deflection method and draw BMD. **14**

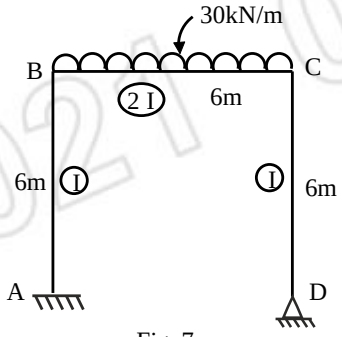

Fig. 7

OR

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

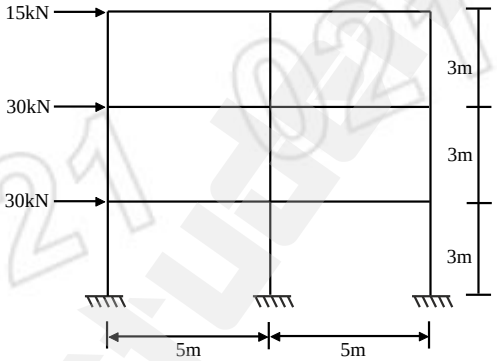

Fig. 8

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

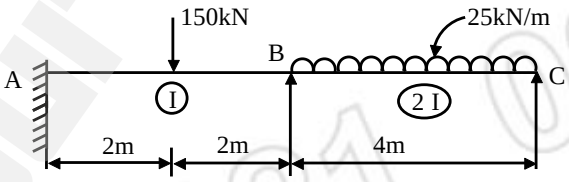

Fig. 9

OR

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

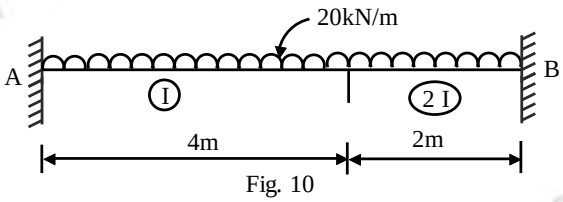

Fig. 10

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

~ Walt Disney