

**Fourth Semester B. E. Civil (CBS)
Examination**

STRUCTURAL ANALYSIS – I

Time : Three Hours]

[Max. Marks : 80

- N. B. : (1) All questions carry equal marks.
(2) Assume suitable data wherever necessary.
(3) Illustrate your answer wherever necessary with the help of neat sketches.
(4) Use of slide rule, Logarithmic tables, Drawing instruments is permitted.

1. Determine the fixed end moments developed in the beam shown in fig (1), if end B settles down by 1 mm, using three moment equation.

$EI = 60,000 \text{ kN-m}^2$.

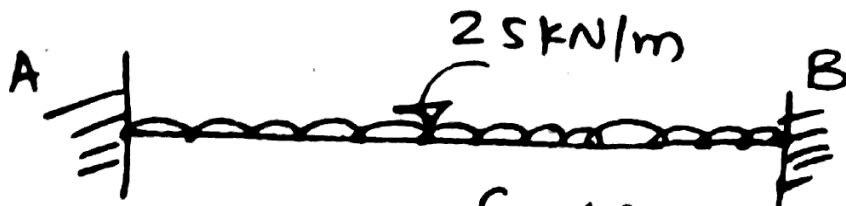


fig (1).

OR

2. Analyse the continuous beam shown in fig (2) by using three moment equation and draw bending moment diagram.

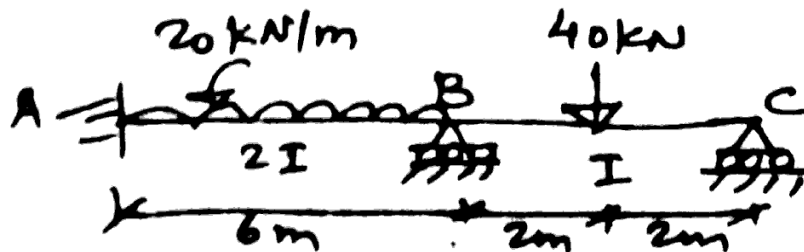


Fig (2)

3. Four loads as shown in fig (3) are travelling over a girder of 30 m span from left to right with 10 kN load leading. Calculate the maximum bending moment and shear force at 8 m from the left support. Also calculate the absolute maximum bending moment.

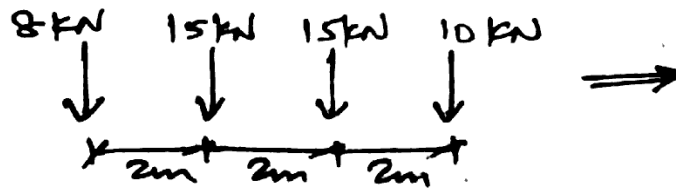


Fig (3).

OR

4. Draw influence line diagrams for forces in the members of truss shown in fig (4) and marked (x) when load is travelling through bottom chord.

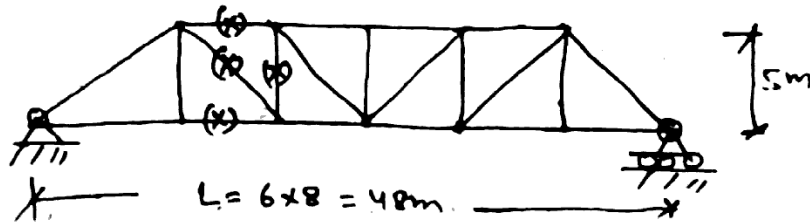


Fig (4)

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

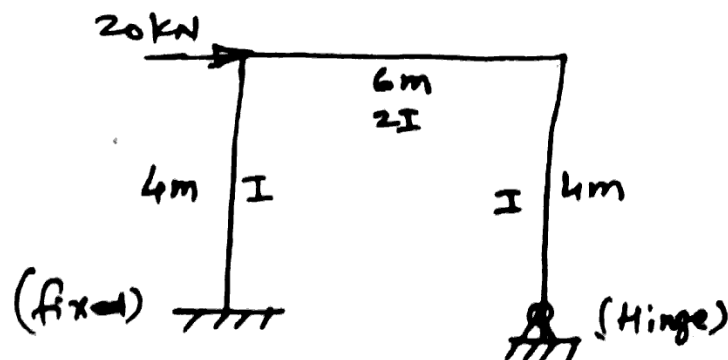


Fig (5)

OR

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

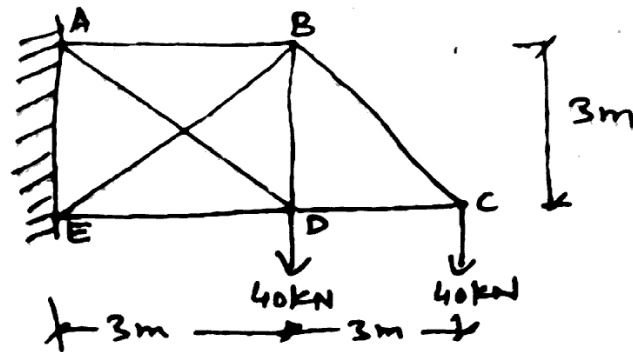


fig (6).

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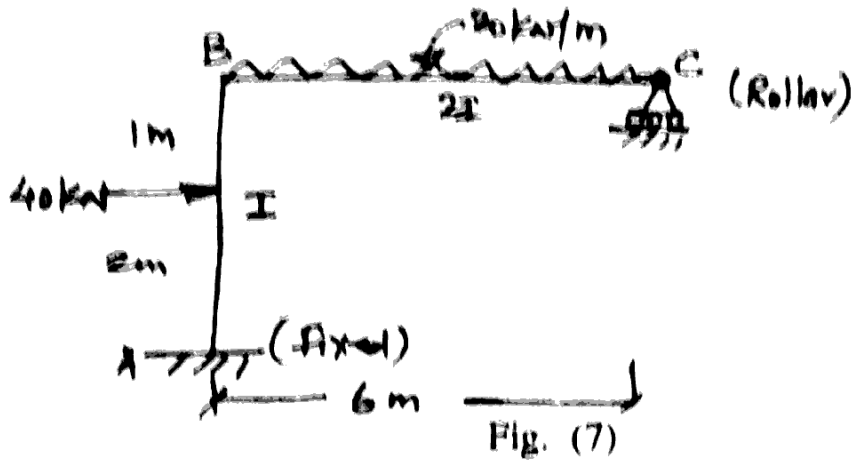
7. A two hinged parabolic arch with 40 m span and 8 m rise is subjected to uDL of 20 kN/m over left half of arch. Find the reactions at the supports, normal thrust and radial shear at a section 10 m from left support. Take $I = I_c \sec\theta$ with usual notations.

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OR

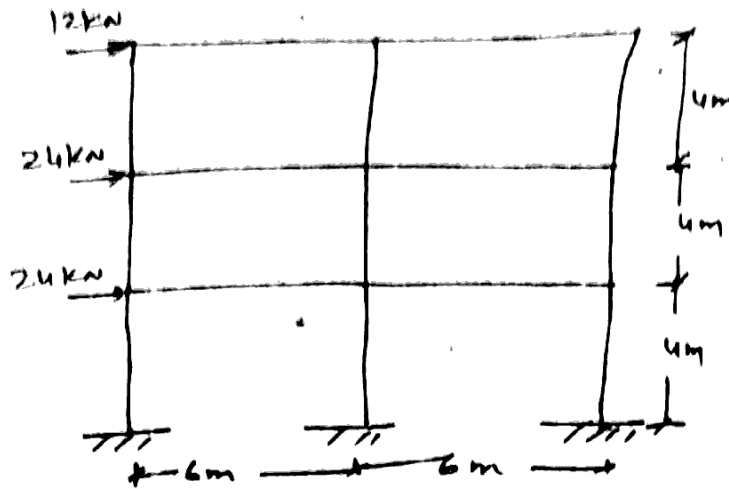
8. (A) What are the limitations of Euler's buckling load of steel column? Explain. 5
(B) Derive expression of Euler's buckling load for column with one end is fixed and other end in hinged. 9
9. Analyse the frame shown in fig (7) using slope deflection method and draw BMD.

(Fig on Next Page)



OR

10. Analyse the frame shown in fig (8) by portal method and draw BMD of beams and columns.



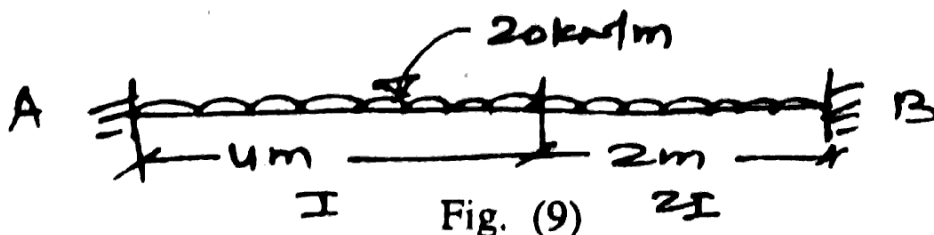
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fig (8)

11. Analyse the beam of Q. 2. Shown in fig (2) using flexibility matrix method and draw BMD.

OR

12. Analyse the fixed beam by column analogy method for beam shown in fig (9).



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