B.E. Civil Engineering Fourth Semester

CE-401 - Structural Analysis-I

P. Pages : 4 **GUG/W/18/1533**

Time : Three Hours * 1 2 0 7 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Answer all questions.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.

1. Analyse the continuous beam by three moment equation & draw BMD. If support is sink by 2.5mm below the level of the supports. Find the support moment which is as shown in fig. 1. Take $E = 200kN/mm^2$ & $I = 1.5\times10^8 mm^4$. **16**

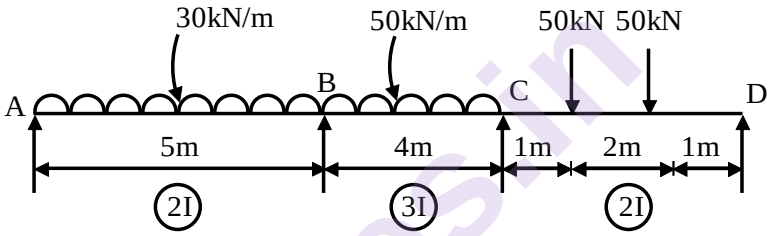

Fig. 1

OR

2. Analyse the portal frame as shown in fig. 2. Using slope deflection method. **16**

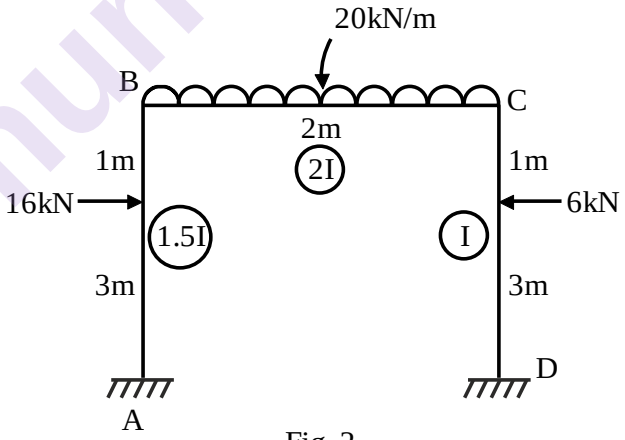

Fig. 2

3. Analyse continuous beam as shown in fig. 3 by moment distribution method & draw BMD and SFD. **16**

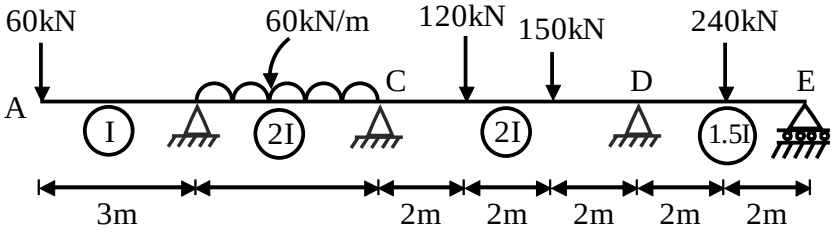

Fig. 3

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OR

4. Analyse the rigid frame as shown in fig. 4 by moment distribution method and Draw BMD. **16**

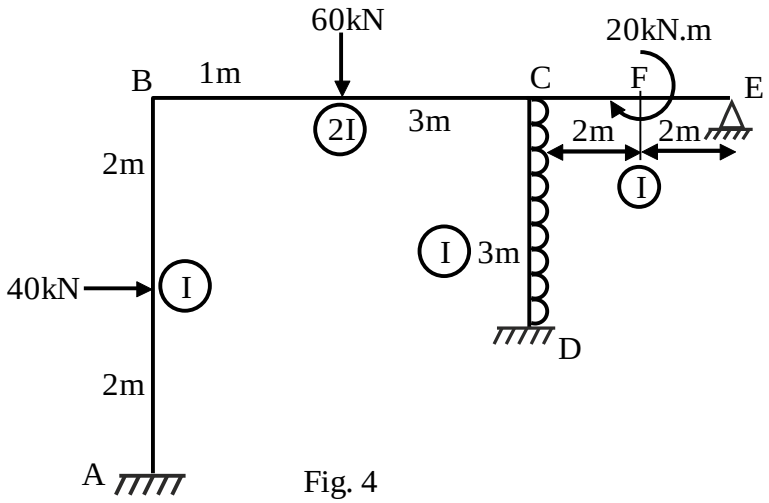

Fig. 4

5. A train of loads are moving from left to right as shown in fig. 5 over a simply supported beam of 20m span. **16**

Calculate.

a) Max. B.M. at section 5m from left support.
b) Max. S.F. at section 5m from left support.
c) Absolute maximum B.M. any where in the beam.

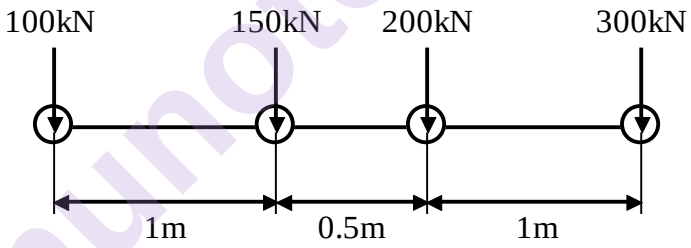

Fig. 5

OR

6. Draw the influence line diagram for the forces in member $(U_2\ L_2)$, $(U_2\ U_3)$, $(L_2\ L_3)$ and $(U_2\ L_3)$ for N-truss as shown in fig. 6. **16**

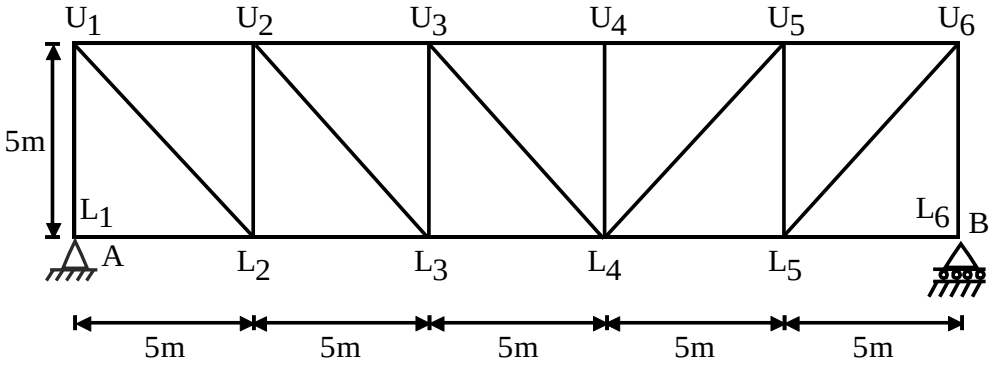

Fig. 6

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7. Analyse the frame shown below by strain Energy method and calculate horizontal thrust and draw BMD. **16**

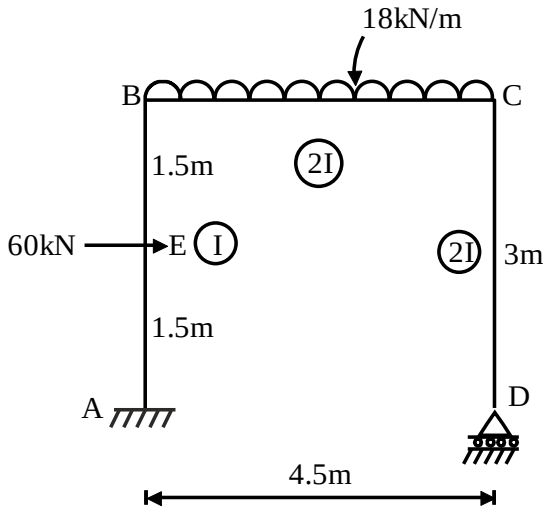

Fig. 7

OR

8. Find horizontal and vertical deflection at joint 'D' of frame loaded as shown in fig. 8 the cross-sectional area of each compression member is $800mm^2$ and that of each tension member is $500mm^2$. Take $E = 2\times10^5 N/mm^2$. **16**

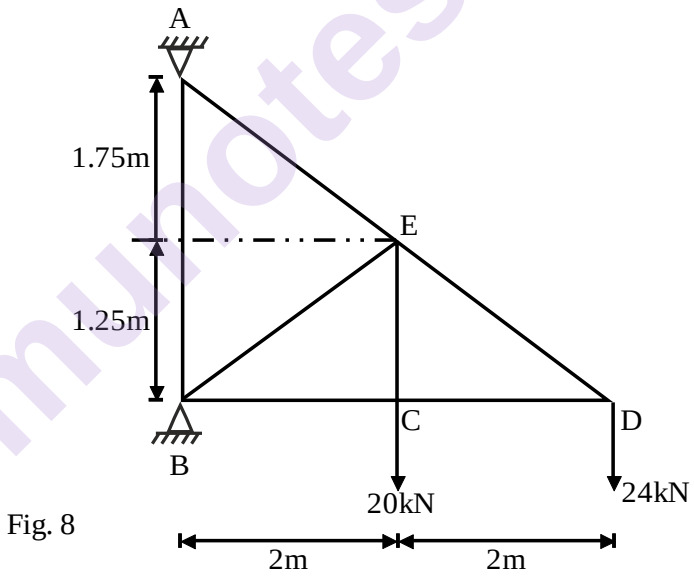

Fig. 8

9. a) Derive the expression for crippling load of long column when one end is fixed and other is hinged. **9**

b) A hollow circular column has an external diameter of 100mm and on internal diameter of 80mm. Find the crippling load by Euler's formula, if both ends are hinged. The length of column is 4m. Assume factor of safety = 2.25. Find safe load $E = 2.1\times10^5 N/mm^2$. **7**

OR

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10. A two hinged parabolic arch of span 30m, and Central rise 6m carries a UDL of intensity 12 kN/m over its left half span and concentrated load of 60kN exactly at the crown of the arch. If $I_C = I_{\sec\theta}$. Determine. **16**

i) Horizontal thrust.

ii) Maximum positive BM in the arch.

iii) Normal Thrust (N.T.) and Radial force at point 4m from left hand support.

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