B.E.(with Credits)-Regular-Semester 2012 - Civil Engineering Sem. IV

CE-401 - Structural Analysis-I

P. Pages : 3 **GUG/W/16/3875**

Time : Three Hours * 4 0 0 0 * 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.
6. Non-programmable calculator is allowed.

1. A continuous Beam shown in fig. 1. If the support 'B' sinks by 10mm, find the moment and reactions at support and draw SFD and BMD by three moment theorem. **16**
Take E= $2x10^8$ KN/m^2, I=$8.5x10^{-5}m^4$

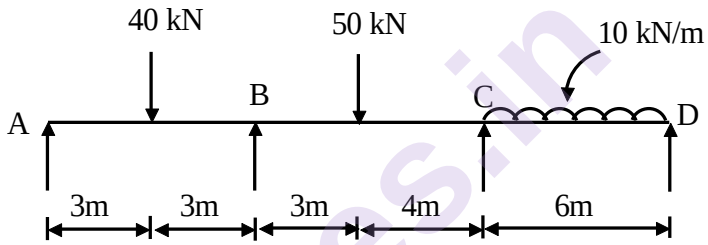

Fig.1

OR

2. Analyse the frame as shown in fig. 2 by slope deflection method. Draw B.M.D. **16**

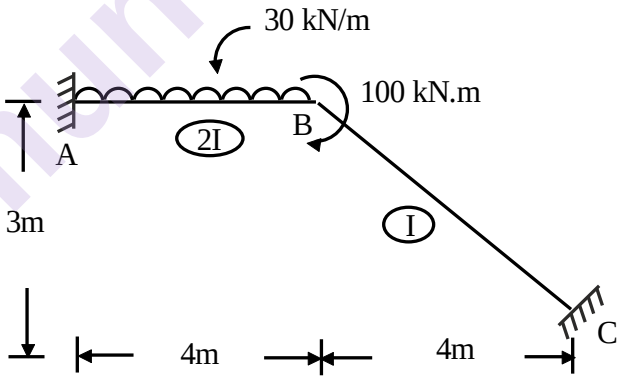

Fig.2

3. Analyse the continuous beam as shown in fig. 3 by Moment Distribution Method and draw B.M.D. EI same for all members **16**
I = 3.0 x 10^7 mm^4, E = 200kN/mm^2.

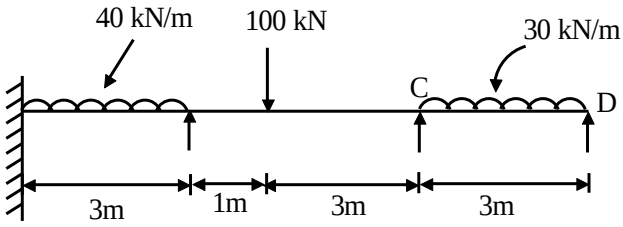

Fig. 3

OR

4. Analyse the rigid frame by Moment Distribution Method and Draw BMD shown in fig. 4. **16**

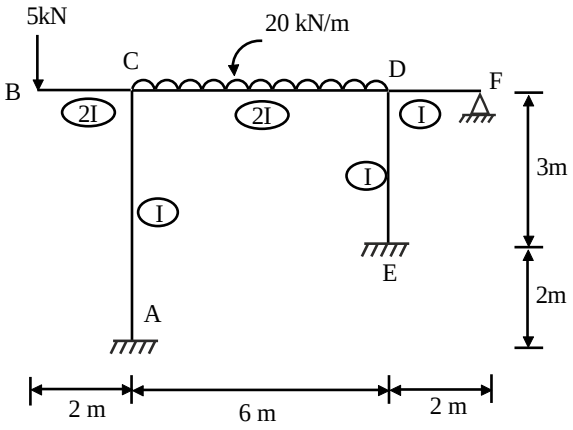

Fig. 4

5. A train of 5 wheel loads shown in fig. 5 crosses a simply supported beam of span 24m from left to right. Calculate the maximum '+ve' and '-ve' shear force values at the center of the span and the absolute maximum bending moment anywhere in the span. **16**

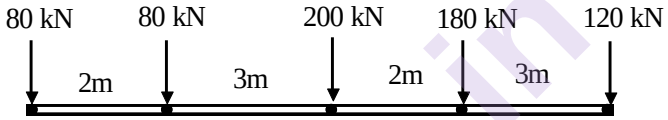

Fig. 5

OR

6. Draw Influence line Diagram for the forces in the members of the through truss shown in fig 6. Find the forces in L_2U_2, U_2L_3, L_2L_3 and U_2U_3. **16**

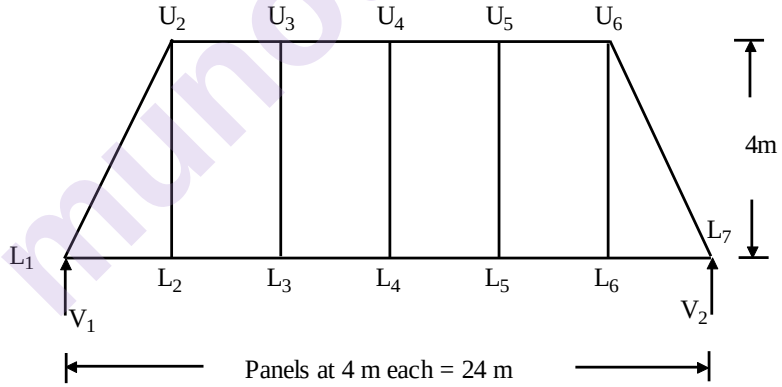

Fig. 6

7. For the portal frame as shown in fig.7. Find the horizontal thrust. Draw B.M.D. Use strain energy method. **16**

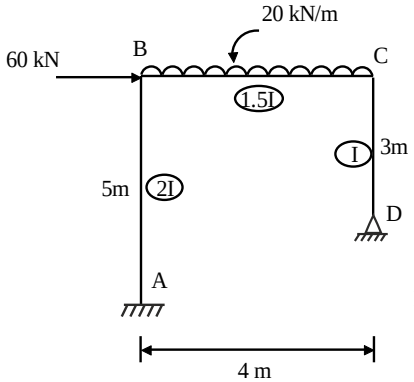

Fig. 7

OR

8. Find the forces in the members of the truss as shown in fig.8. Use strain Energy Method. AE is same for all the members. **16**

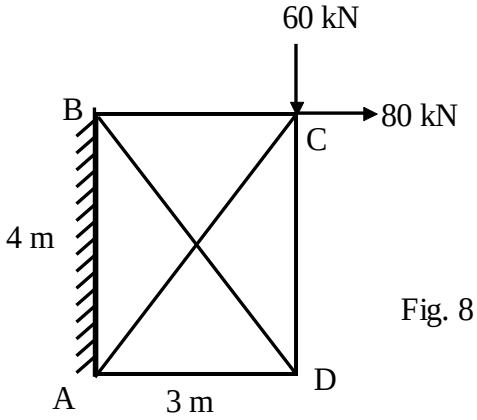

Fig. 8

9. a) Derive from the first principle, the expression for crippling load for a long column of one of the ends of the column is fixed and other free. **8**

b) A hollow circular column has an external diameter 140mm and an internal diameter of 120mm. Find the crippling load by Euler's formula of both the ends are fixed. The length of the column is 5m. Assume factor of safety equal to 3. Find the safe load. **8**
$E = 2.1 \times 10^5$ N/mm^2.

OR

10. A two hinged parabolic Arch of 20m span and 3m rise with $I = Ic \sec \theta$ (usual notation) is subjected to U.D.L of 10 kN/m over left half and in addition a point load of 20kN at the crown Arch, calculate horizontal thrust and draw B.M.D. **16**

Also calculate Radial Shear (R.S.) and Normal thrust (NT) at left quarter span.

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