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

Structural Analysis – I

P. Pages : 3 **AHK/KW/19/2112**

Time : Three Hours * 1 1 6 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**

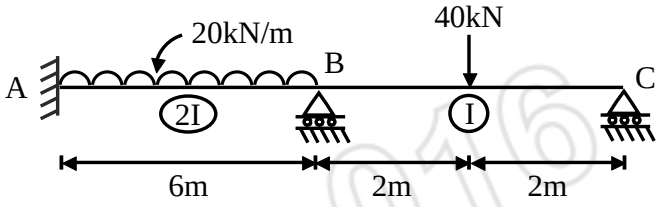

Fig. 1

OR

2. Analyse the continuous beam ABC shown in fig. 2 if support B sinks by 10 min. **14**
Given $E = 200\,kN/mm^2$ and $I = 1\times10^8\,mm^4$.

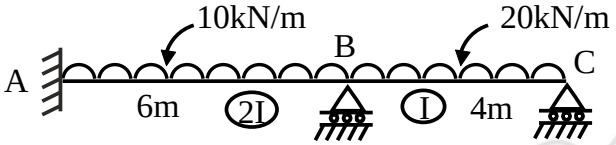

Fig. 2

3. Rolling load as shown in fig. 3, is moving left to right on 40 m girder. Find Max BM, Max SF @ 20 m from left support also calculate Absolute max BM and SF anywhere in the span. **13**

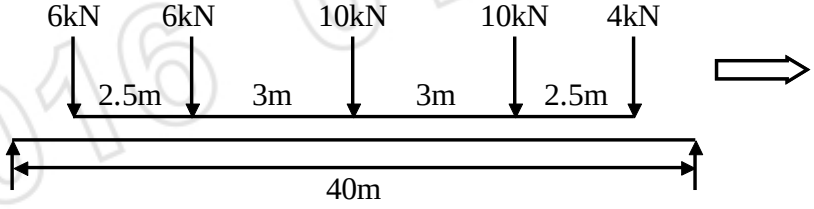

Fig. 3

OR

4. For the deck type of truss as shown in fig. 4. Draw ILD for **13**

i) Force in member BC
ii) Force in member BD
iii) Force in member BE

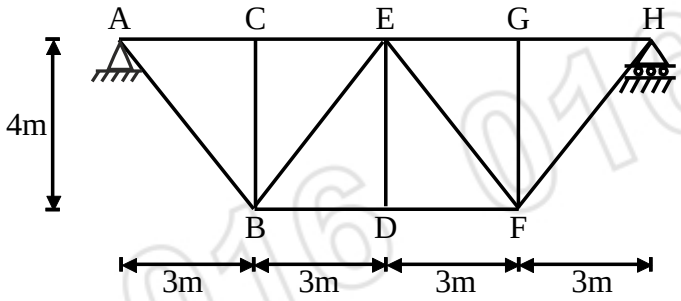

Fig. 4

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

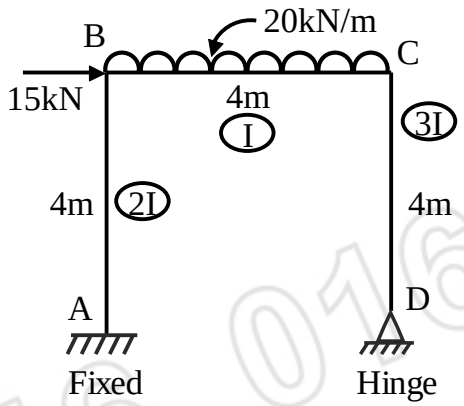

Fig. 5

OR

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

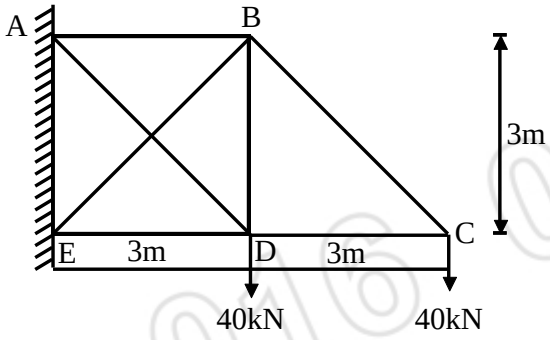

Fig. 6

7. a) Derive the Rankine's formula of buckling of column and clarify the statement "Rankine formula is applicable for any length of the column". **7**

b) Determine the ratio of the strength of a solid steel column to 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 35 m span and 8 m rise is subjected to udl of 15 kN/m over left half of arch. Find the reactions at supports, normal thrust and radial shear at a section 12 m from left support Take $I = I_C \sec\theta$ with usual notations. **13**

9. Analyse the continuous beam shown in fig. 7 by slope deflection method, when support C sinks by 10 mm. The beam is of constant stiffness throughout. **14**

Assume $EI = 8\times10^9\,kN-mm^2$.

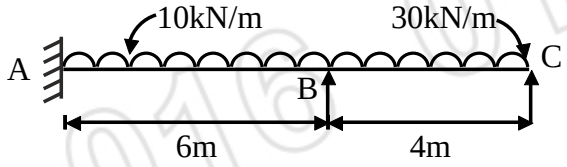

Fig. 7

OR

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

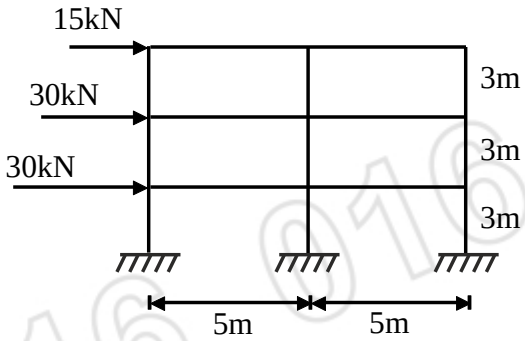

Fig. 8

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

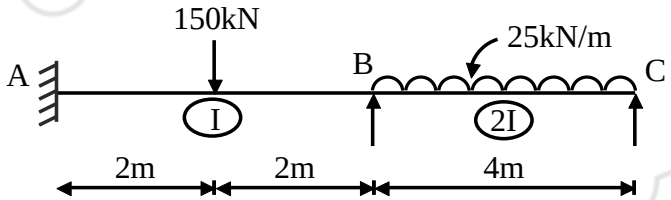

Fig. 9

OR

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

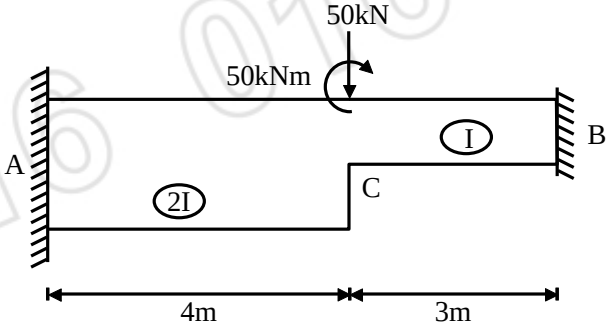

Fig. 10

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