



**NTK/KW/15/7351**

**Faculty of Engineering & Technology**

**Fourth Semester B.E. (Civil Engg.) (C.B.S.)**

**Examination**

**STRUCTURAL ANALYSIS—I**

**Time—Three Hours]**

**[Maximum Marks—80**

1. A continuous beam ABC with an overhang CD is loaded as shown in Fig. Q. 1. Analyse the beam and draw BMD using three moment theorem. Assume EI constant.

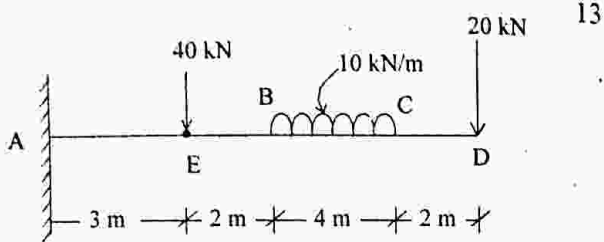


Fig. Q. 1  
OR

2. Analyse the continuous beam as shown in Fig. Q. 2 by three moment theorem if support C sinks by 2 mm below.  $E = 2 \times 10^5 \text{ N/mm}^2$  and  $I = 80 \times 10^6 \text{ mm}^4$ .

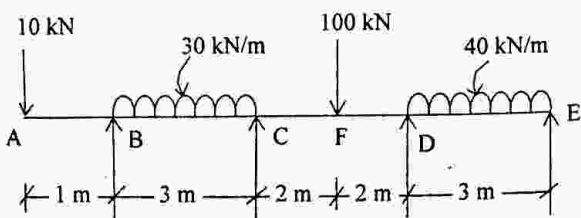


Fig. Q. 2

3. A train of loads are moving from left to right as shown in Fig. Q. 3 over a simply supported beam of 20 m span. Calculate the max B.M. at section 5 m from left

support also calculate S.F. at section 5 m from left support and absolute maximum B.M. anywhere in the beam.

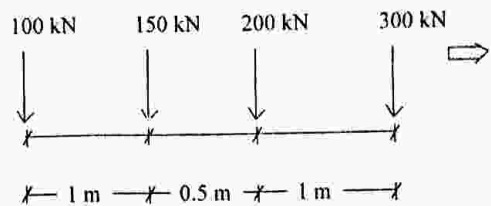


Fig. Q. 3  
OR

4. Draw ILD for the force in the members of the truss. Refer Fig. Q. 4. Find the forces in  $L_2U_2$ ,  $U_2L_3$ ,  $L_2L_3$  for 10 kN/m load longer than span of girder.

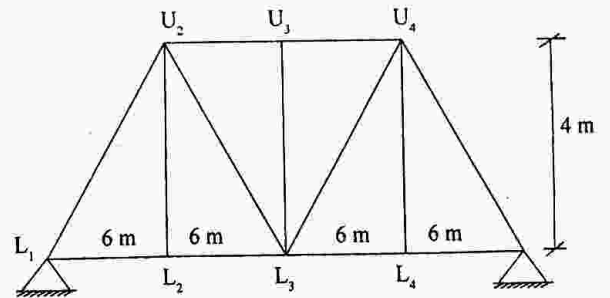


Fig. Q. 4

5. Analyse the portal frame as shown in Fig. Q. 5. The end A is fixed and D is hinged. Draw BMD. Use strain energy method. 13

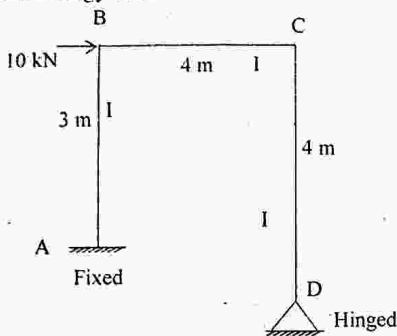


Fig. Q. 5

OR

6. Find out the forces in the members of truss shown in Fig Q. 5 using strain energy method. The area of cross-section and modulus of elasticity of all members are same. 13

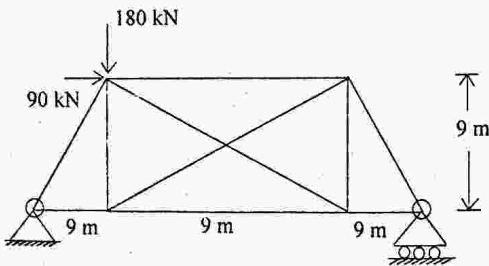


Fig. Q. 5

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 support, normal thrust and radial shear at a section 10 M from left support. Take  $I = I_c \sec \theta$ . 14

OR

8. (a) Derive the expression of buckling load of column if both ends are fixed. 9  
 (b) What are the limitations of Euler's formula? 5

9. Analyse the frame shown in Fig. Q. 9 by portal method and draw BMD of the beam and column. 13

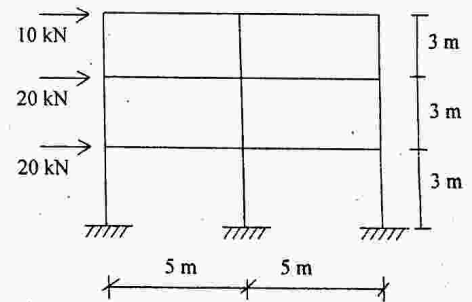


Fig. Q. 9

OR

10. Determine the moment at support for the beam shown in Fig. Q. 10 if support B sinks by 8 mm for the beam

$$I = 13169 \times 10^4 \text{ mm}^4$$

$$E = 2.1 \times 10^5 \text{ N/mm}^2$$

Use slope deflection method.

13

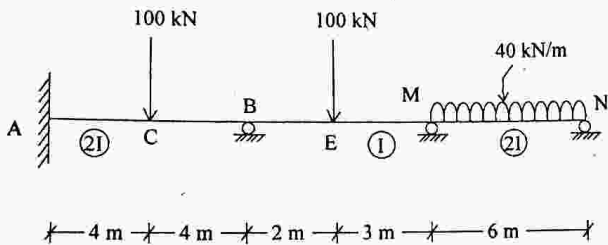


Fig. Q. 10

11. Analyse the fixed beam by column analogy method for the beam shown in Fig. Q. 11.

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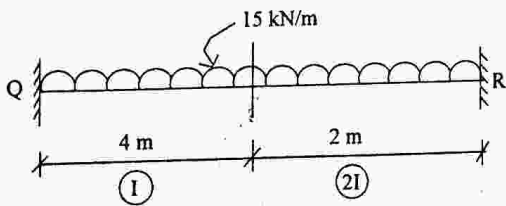


Fig. Q. 11

OR

12. (a) Write a note on flexibility method. 3  
 (b) Analyse the given beam by flexibility method and draw B.M.D. 10

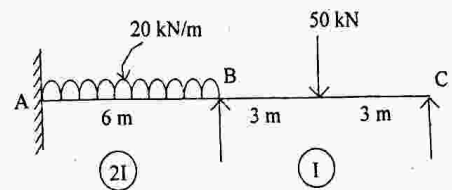


Fig. Q. 12(b)