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Question Paper Code: 55011

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fifth Semester

Civil Engineering

15UCE501 - Structural Analysis - I

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. A statically indeterminate structure is one which
 - (a) Cannot be analysed using the equation of static alone
 - (b) cannot be analysed at all
 - (c) it is not stable for general loading
 - (d) Can be analysed with equations of statics alone
2. The influence line diagram for reaction at a support of simply supported beam is
 - (a) A triangle with ordinate 1 at that support
 - (b) A triangle with ordinate 1 at the other support
 - (c) A rectangle with ordinate 1 at that support
 - (d) A rectangle with ordinate 1/2 at that support
3. Which of the following is unknowns in slope deflection method?
 - (a) Displacement
 - (b) Force
 - (c) both (a) and (b)
 - (d) none of these
4. The moment distribution method is developed by
 - (a) Hardy cross
 - (b) G.N.Maney
 - (c) Euler
 - (d) Bernoulli
5. The moment in the arch will be zero, if
 - (a) ends are hinged
 - (b) ends are fixed

(c) the arch axis coincides with the line of thrust

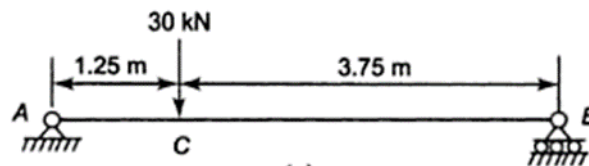
(d) the arch axis is parallel to line of thrust

PART - B (5 x 3 = 15 Marks)

6. What is meant by indeterminate structures?
7. Write down the general slope-deflection equations and state what each term represents?
8. Define Carry over factor.
9. What are the uses of influence line diagrams?
10. What are the types of arches according to the support conditions?

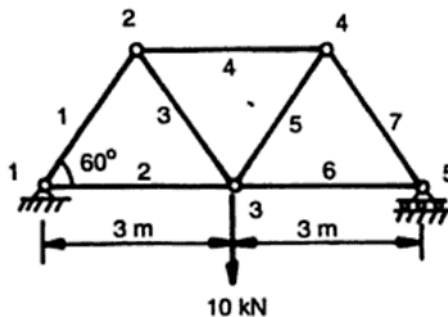
PART - C (5 x 16 = 80 Marks)

11. (a) A simply supported beam shown in fig. Calculate the deflection under the load point using principle of virtual work method. Take $E = 200 \times 10^6 \text{ kN/m}^2$ and $I = 13.0 \times 10^{-6} \text{ m}^4$. (16)

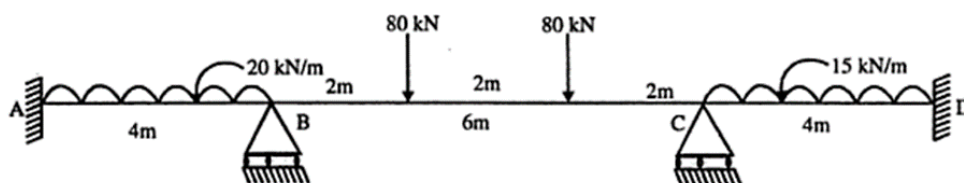


Or

- (b) Determine the vertical and horizontal deflection of joint 4 for the truss shown in fig. $L=3 \text{ m}$, $A= 500 \times 10^{-6} \text{ m}^4$ and $E = 200 \times 10^6 \text{ kN/m}^2$ are constant for all members. (16)

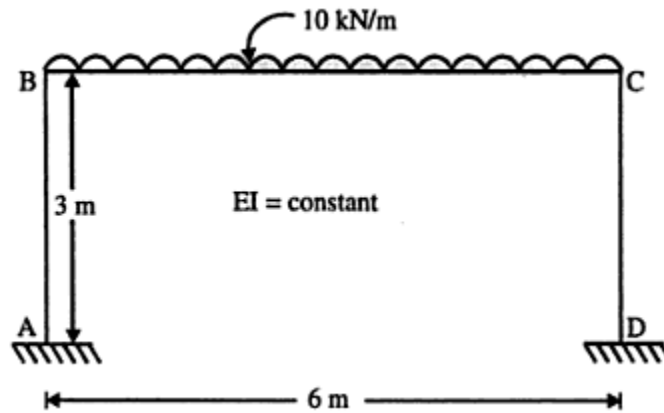


12. (a) Analyse the beam by slope deflection method and draw the bending moment diagram. Take $I_{AB} = I_{CD} = I$, $I_{BC} = 2I$. (16)



Or

- (b) Analyse the Portal frame shown in fig by slope deflection method and draw the Bending Moment Diagram. (16)

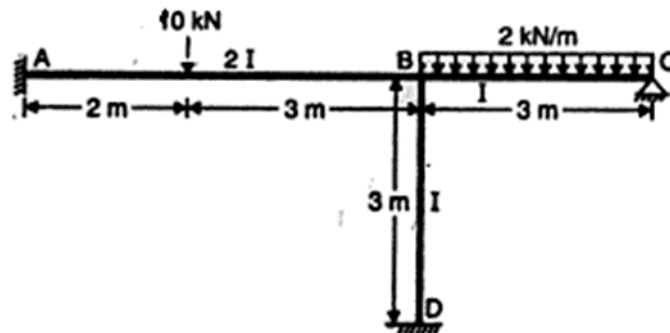


13. (a) Solve the beam shown in fig. by moment distribution method and draw the Bending Moment Diagram. (16)



Or

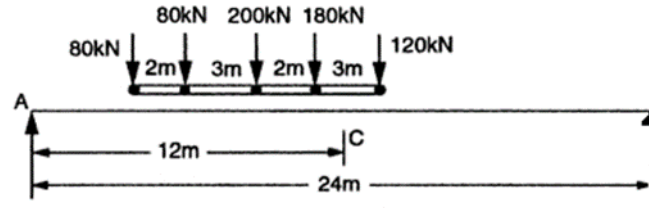
- (b) Analyse the frame shown in fig by moment distribution method and draw Bending Moment Diagram. (16)



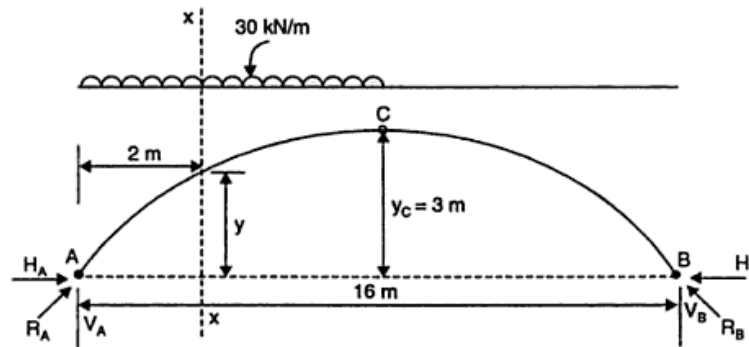
14. (a) A UDL of 15 kN/m covering a length of 3 m crosses a girder of span 10 m. Find the maximum shear force and bending moment at a section 4 m from left support. (16)

Or

- (b) A train of 5 wheel loads shown in fig crosses a simply supported beam of span 24 m from left to right. Calculate the maximum positive and negative shear force at the centre of span and the absolute maximum bending moment anywhere in the span. (16)



15. (a) A parabolic 3 hinged arch carries a UDL of 30 kN/m on the left half of the span. It has a span of 16 m and a central rise of 3 m. Determine the resultant reactions at supports. Find the bending moment, normal thrust and radial shear at a section 2 m from left support. (16)



Or

- (b) A two hinged parabolic arch is loaded as shown in fig. Determine (i) horizontal thrust (ii) Maximum positive and negative B.M. assume $I=I_0 \sec \theta$. (16)

