**Shantilal Shah Engineering College, Bhavnagar**

**Applied Mechanics Department**

**3150614 STRUCTURAL ANALYSIS-II**

**Tutorial :4:A: Approximate Methods**

Q.1 Analyse the frame using approximate method as shown in Fig.-1 and draw free body diagram and bending moment diagram.

Q.2 Analyse the frame as shown in Fig.-2 using portal method. Draw free body diagram, Axial force diagram Shear forced diagram and Bending Moment Diagram.

Q.3 Analyse the frame as shown in Fig.2 using cantilever method. Assuem area of internal column is twice than external column. Draw free body diagram, Axial force diagram Shear forced diagram and Bending Moment Diagram.

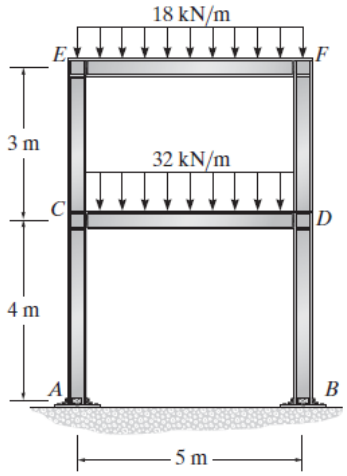


Fig.-1

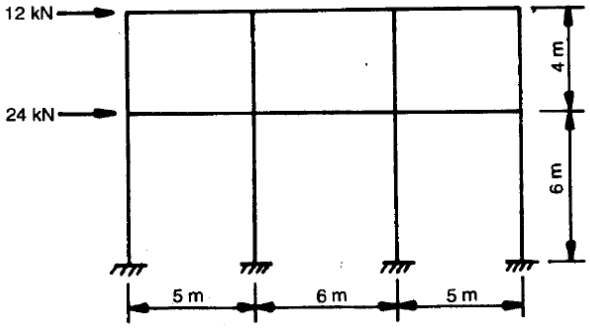


Fig.-2

Q.3 Compare the result of Q.2 and Q.3 and your comment on the result.

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**Tutorial :4:b: Structure subjected to Moving loads**

Q.1 A simply supported beam AB of span 20 m, with section C located 8 m from A. Draw influence lines for (a) the support reaction $R_A$ at A, (b) the shear force $V_C$ at C and (c) the bending moment $M_C$ at C. Determine their maximum values due to the passage of a vehicular load, comprising a 5 m long UDL of total load 25 kN/m and a point load of 200 kN with a gap of 2.5 m (from the edge of the UDL), which can travel over the beam in either direction. Also determine the absolute maximum bending moment in the beam.

Q.2 A train of five wheel loads (sequentially 10 kN, 12.5 kN, 10 kN, 20 kN, and 20 kN), with gaps of 2 m between two successive wheel loads can traverse over a simply supported beam AB of span 18 m in either direction. Using influence lines, find the maximum shear force and bending moment at a section located 7 m from the left end A. Also find the absolute maximum bending moment in the beam.

Q.3 It is required to construct influence lines for reaction $R_A$ and $R_B$ and for shear and moment at sections 1 and 2 for the balanced cantilever beam shown in Fig. 1. Use Müller-Breslau principle.

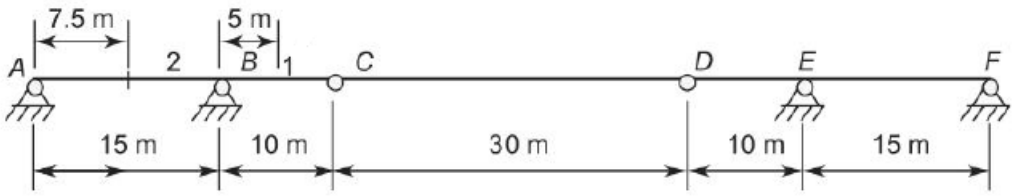
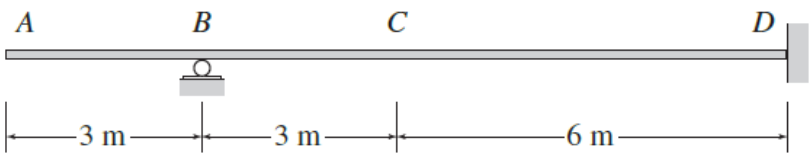



Fig.-1

Q.4 Draw the influence lines for the reaction at support B and the shear and bending moment at point C of the beam shown in Fig. 2. Determine the influence line ordinates at 3 m intervals.




$EI$ = constant

Fig.-2

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