Code No: R22016 **R10** SET - 1

II B. Tech II Semester Regular Examinations April/May – 2013
STRUCTURAL ANALYSIS - I
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

1. a) What is a propped cantilever?
   b) Determine the deflection at point ***'C'*** in a propped cantilever shown in Figure 1?

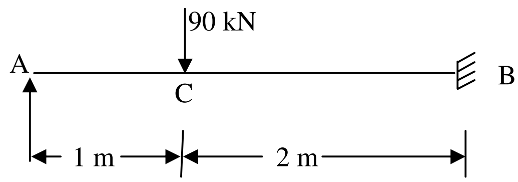

Figure-1

2. a) What is the degree of indeterminacy of a constrained beam?
   b) Draw the S.F.D. and B.M.D of the beam shown in Figure 2.

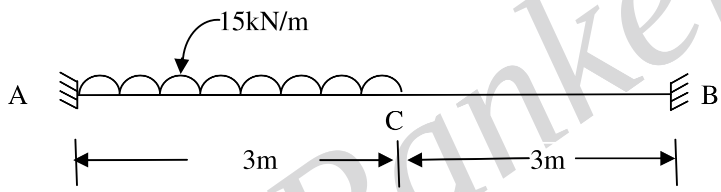

Figure-2

3. The moment of inertia of a continuous beam is different for different span as shown in Figure-3. Find the reactions.

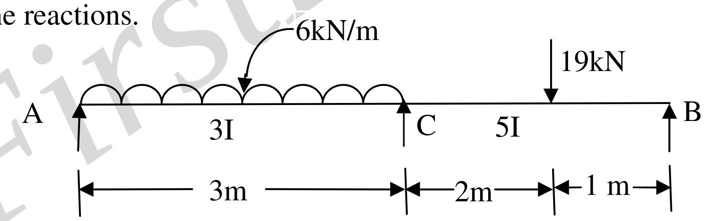

Figure-3

4. A continuous beam hinged at left end carries the load shown in Figure 4 .The supports are all at the same level. Determine the bending moments and reactions at all supports using slope deflection method.

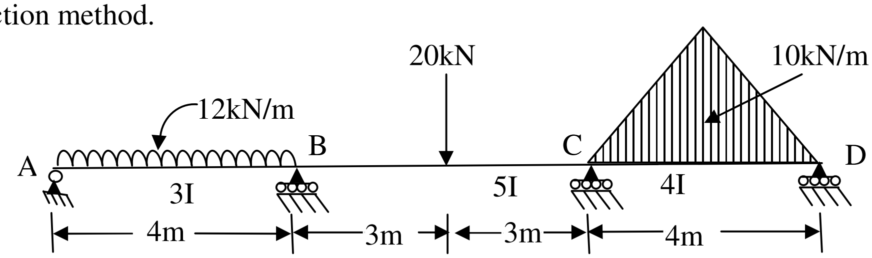

Figure 4
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22016 **R10** SET - 1

5. Solve the continuous beam shown in Figure 5, by Castigliano's theorem. Draw the SFD and the BMD.

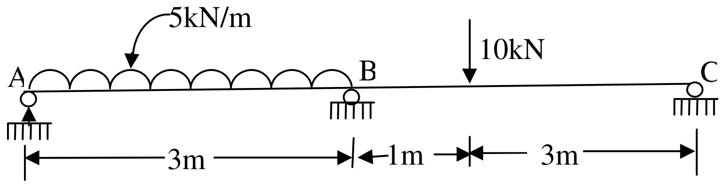

Figure 5

6. a) Define absolute maximum shear force.
   b) Two point loads of 150kN and 300kN with 4m space between them rolls across the girder of span 20m. Calculate the equivalent UDL.

7. a) Define influence lines.
   b) Determine absolute maximum left and right reactions for a simple beam 15m span with a series of loads shown in Figure 6.

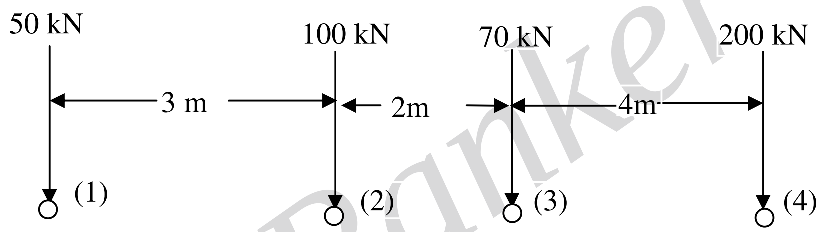

Figure 6

8. Determine (approximately) the forces in the members of the truss shown in Figure 7. The diagonals are to be designed to support both tensile and compressive forces, and therefore each is assumed to carry half the panel shear. The support reactions have to be computed. Assume all the Joints are pin joints.

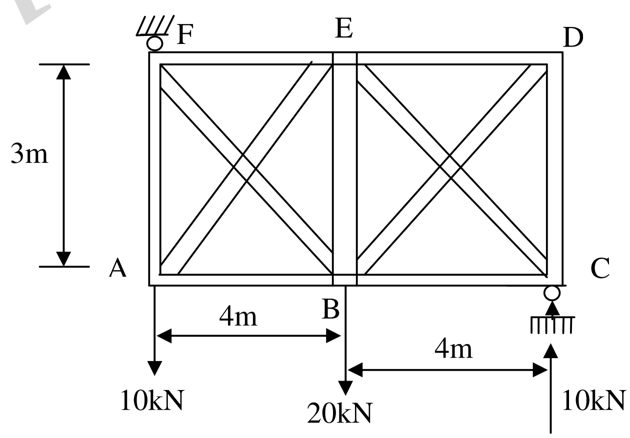

Figure 7

Code No: R22016 **R10** SET - 2

II B. Tech II Semester Regular Examinations April/May – 2013
STRUCTURAL ANALYSIS - I
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~~~

1. a) How is the prop reaction determined? Explain
   b) In the beam shown in the Figure 1, the prop has sunk by 15 mm. calculate the prop reaction. Take E= 200 x10^6 kN/m^2 and I=5x10^{-6} m^4.

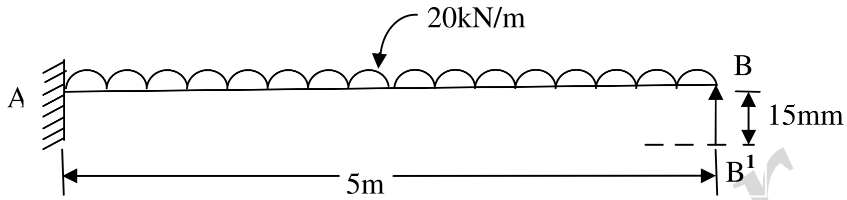

Figure 1

2. a) Why the ends in a fixed beam are called 'direction – fixed ends'?
   b) Evaluate the fixed –end moments in the beam shown in Figure 2.

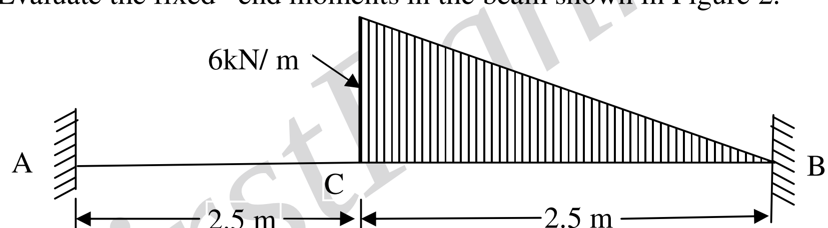

Figure 2

3. A continuous beam has overhangs on both sides as in the Figure 3. Apply three moment equation to determine the support moments. EI is constant throughout.

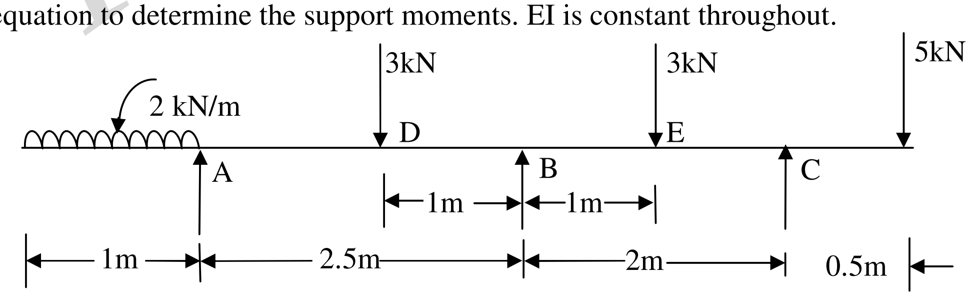

Figure 3
~~~~~~~~~~~~~~~~~~~~~~~~~~~

4. Analyze the continuous beam shown in Figure 4. By Slope –deflection equation.

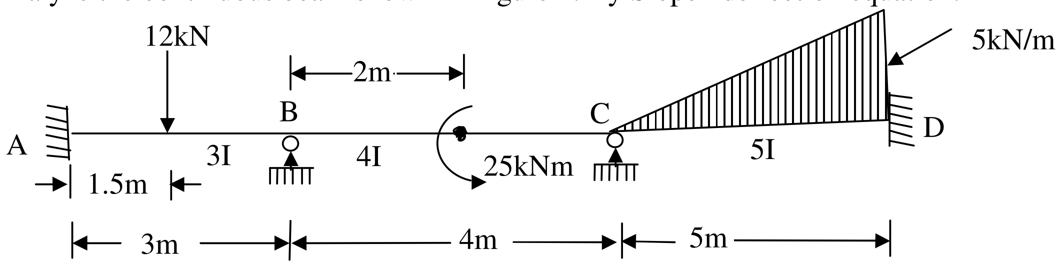

Figure 4

5. a) Explain the principle of virtual work.
   b) State Castigliano's first theorem.

6. a) Define the focal length.
   b) Two concentrated loads of 50kN and 75kN separated by 4m rolls across a beam of 12m span from left to right with 50kN load leading the train. Draw the maximum SFD and BMD. Also locate the position and calculate the magnitude of the absolute maximum bending moment.

7. a) State the Muller –Breslau's principle.
   b) A UDL of length of 2.5 m and intensity 25 kN/m rolls across a girder of span 9.5 m shown in the Figure 5. Calculate the maximum negative and positive shear force and maximum bending moment at a section 4.5m from the left support.

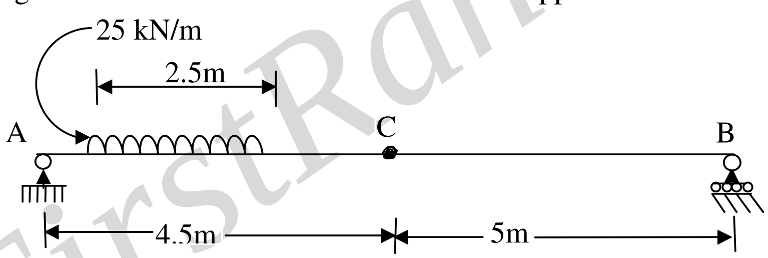

Figure 5

8. Find the forces in all the members of the frame shown in Figure 6. The figures in parenthesis show the cross sectional area of the members in cm^2?

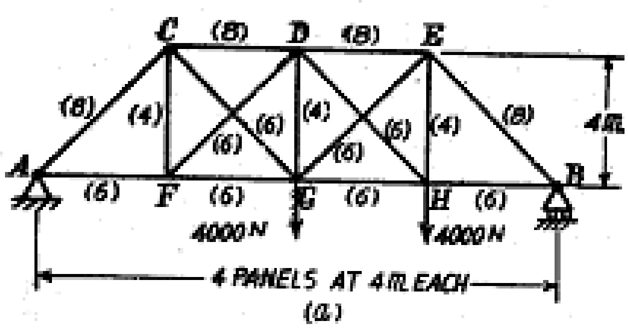

Figure 6

Code No: R22016 **R10** SET - 3

II B. Tech II Semester Regular Examinations April/May – 2013
STRUCTURAL ANALYSIS - I
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Explain the consistent deformation method of an analyzing a propped cantilever.
   b) Find the deflection at C in the beam as shown in figure 1. Take EI= 9000 kNm^2. Use strain energy method.

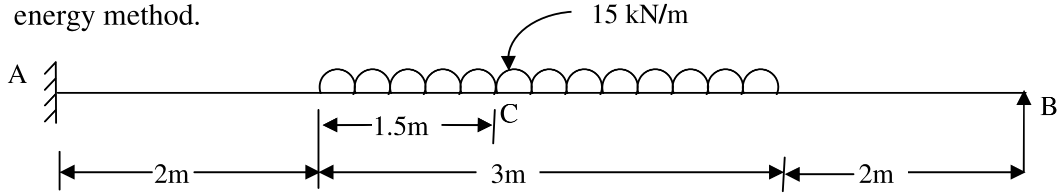

Figure 1

2. a) Derive expressions for fixe-end moments in a fixed beam of span of L carrying UDL of ***w*** kN/m by consistent deformation method.
   b) Determine the fixed-end moments in the beam shown in figure 2.

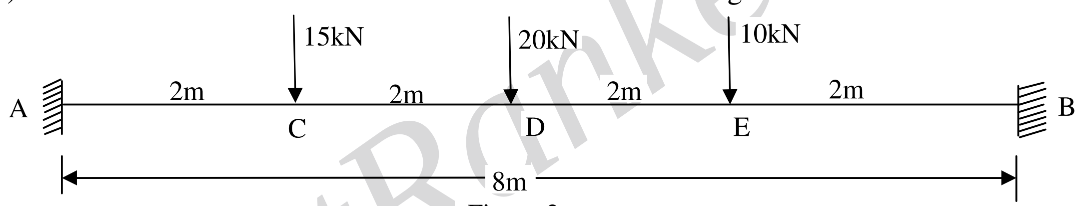

Figure 2

3. Using Clapeyron's theorem, solve the problem of the continuous beam shown in figure 3. EI is constant throughout.

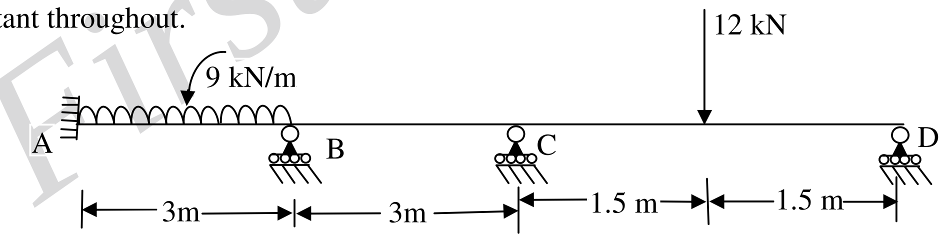

Figure 3

4. Analyse the continuous beam shown in figure 4, by slope –deflection method.

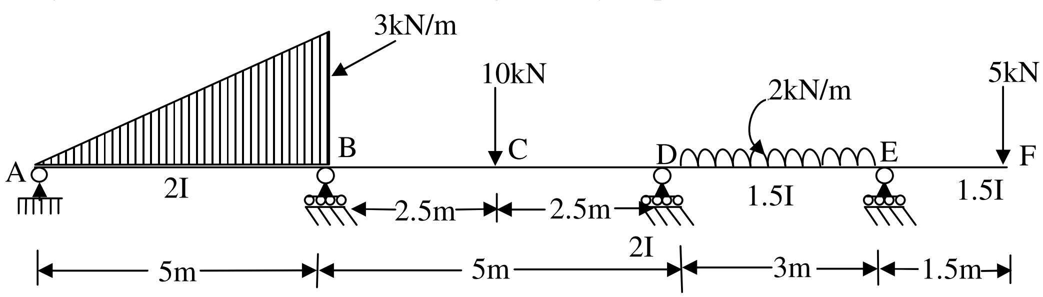

Figure 4
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

5. a) State Castigliano's second theorem.
   b) State the Maxwell's theorem of reciprocal deflections.

6. a) Define absolute maximum bending moment.
   b) Two concentrated loads of 75kN and 150kN separated by a distance of 3.5m between them rolls across a beam of 12m from left to right with 75kN load leading the train. Calculate the maximum negative shear force and maximum bending moment at a mid – span of the beam.

7. a) Explain the indirect model analysis for influence lines of indeterminate structures.
   b) Determine the maximum shear at a point 8 m from the left support for a 20m span of a simple supported beam with the moving load (1-2-3-4), moving from right to left as shown in figure 5.

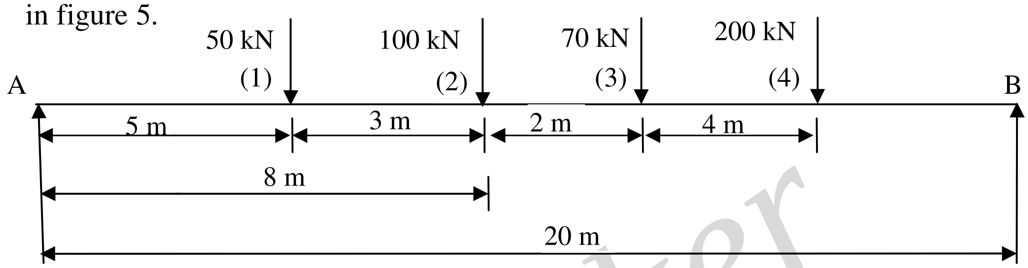

Figure 5

8. Determine the forces in members of the truss with one double braced panel shown in figure 6. Members BE is short by 35mm. all members have the same cross-section and the same E value

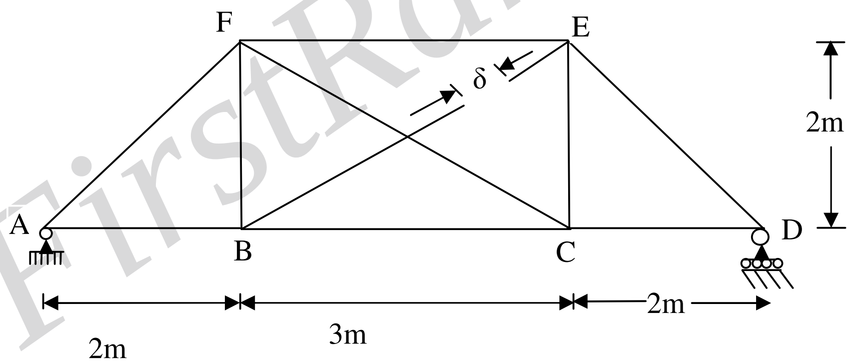

Figure 6

Code No: R22016 **R10** SET - 4

II B. Tech II Semester Regular Examinations April/May – 2013
STRUCTURAL ANALYSIS - I
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Propped cantilever is statistically determinate or indeterminate?
   b) Using consistent deformation method, evaluate the prop reaction in the beam shown in Figure 1. EI is constant.

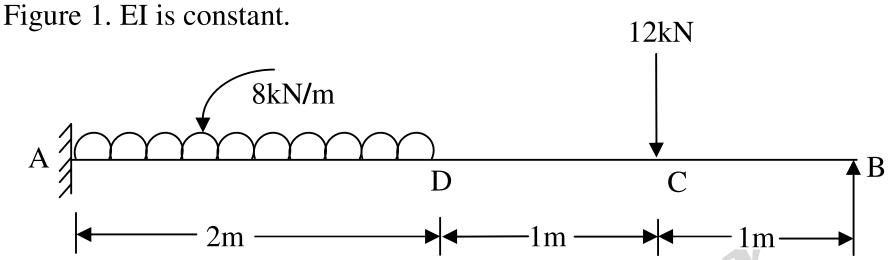

Figure 1

2. a) What is an encastre beam?
   b) Determine the fixed end moments in the beam shown in Figure 2. Support **B** is sinking by 30 mm with respect to support A.

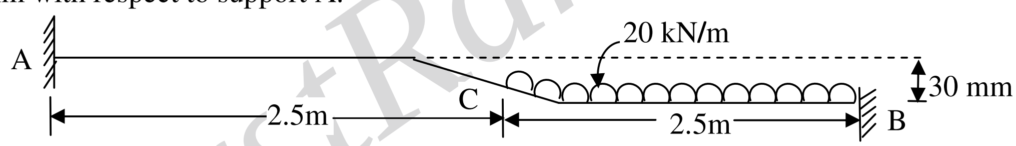

Figure 2

3. The support *C* of a continuous beam shown in Figure 3, has settled by 12mm. Find the moments at supports.

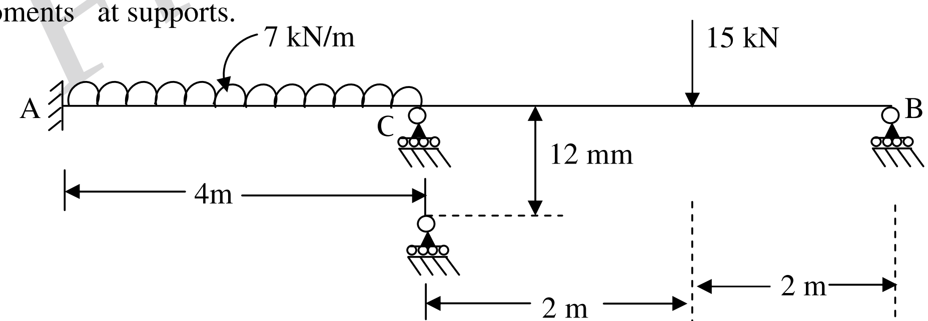

Figure 3
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22016 **R10** SET - 4

4. Analyze the continuous beam shown in Figure 4, by slope-deflection method.

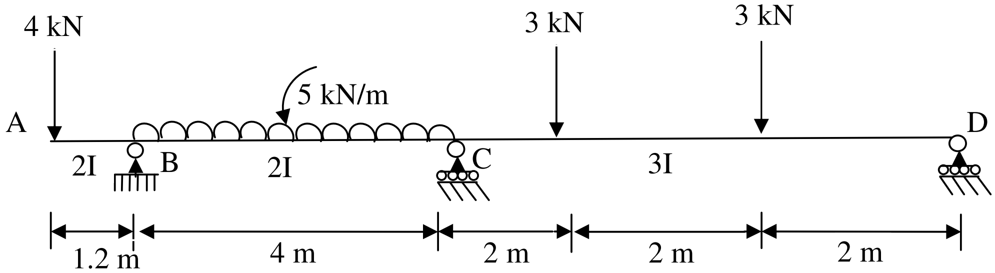

Figure 4

5. Calculate the strain energy of a simple beam shown in Figure 5.

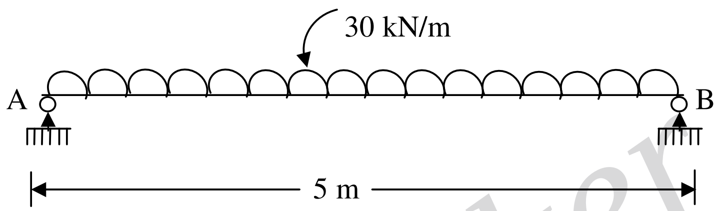

Figure 5

6. a) Define equivalent UDL.
   b) A UDL of intensity 100 kN/m and 30m long crosses a girder of 25m span. Determine the maximum shear force and bending moment at a section situated at distance of 7m from the left support.

7. a) Prove the Muller –Breslau's principle.
   b) Construct the influence line for bending moment at section of 2.5m from left support of a simple beam of span of 6m. Determine the maximum bending moment when a UDL of 10 kN/m longer than the span moves across the beam.

8. Find the forces in the members of the frame shown in Figure 6. The areas of cross-section of members in mm^2 are shown in figure. Take E=200 kN/mm^2. Member AC is heated up by 20^0C per unit length. Coefficient of expansion α=0.000015 per ^{0}Cper unit length.

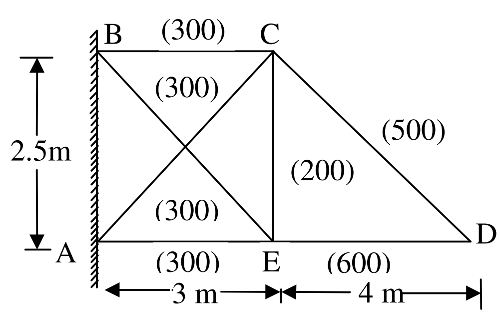

Figure 6