

B.Tech II Year II Semester (R13) Regular & Supplementary Examinations May/June 2016

**STRUCTURAL ANALYSIS – I**

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

**PART – A**  
(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
  - (a) Why is it necessary to compute deflections in structures?
  - (b) Differentiate the statically determinate structures and statically indeterminate structures.
  - (c) Where do you get rolling loads in practice?
  - (d) What are the uses of influence line diagrams?
  - (e) What are the assumptions made in slope-deflection method?
  - (f) What are the advantages of Continuous beam over simply supported beam?
  - (g) Mention the situations where in sway will occur in portal frames.
  - (h) What is the difference between absolute and relative stiffness?
  - (i) What are the uses of Castigliano's theorem?
  - (j) A rigid frame is having totally 10 joints including support joints. Out of slope-deflection and moment distribution methods, which method would you prefer for analysis? Why?

**PART – B**  
(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

- 2 A beam AB of uniform cross section and 6 m span is built-in at the ends. A uniformly distributed load of 3 kN/m runs over the left half span and in addition, there is a concentrated load of 4 kN at right quarter span. Analyze the beam.

OR

- 3 (a) A built-in beam AB carries a uniformly distributed load of 15 kN/m. The support B sinks down by 10 mm. The cross section of the beam is 350 mm x 500 mm. Determine the fixed end moments. Take  $E = 200 \text{ GPa}$ .
- (b) Derive an expression for the fixing moments, when one of the supports of a fixed beam sinks down by  $\delta$  from its position.

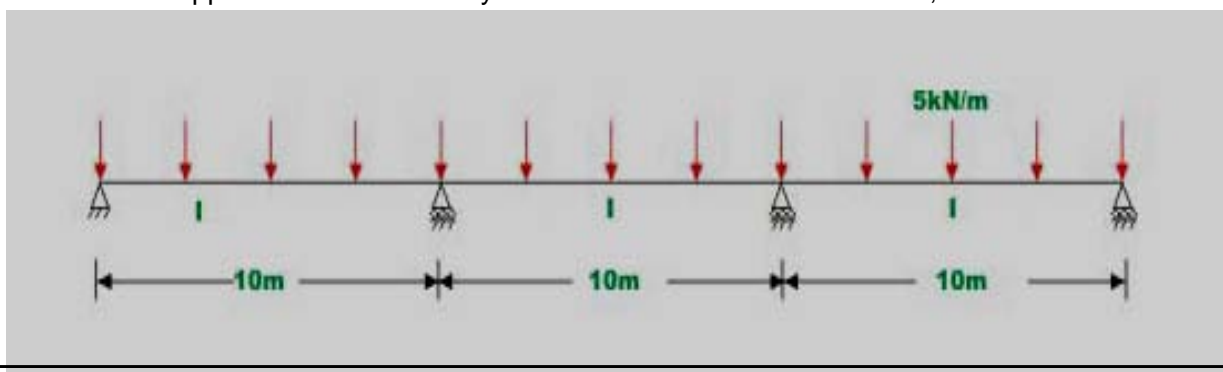
**UNIT – II**

- 4 A continuous prismatic beam ABC of constant moment of inertia is carrying a uniformly distributed load of 2 kN/m for a span of 3 m from left fixed support. In addition, it carries a concentrated load of 10 kN at a distance of 2 m from right roller support. Intermediate support is roller which is at a distance of 3 m from left end. Analyze the beam using moment distribution method.

OR

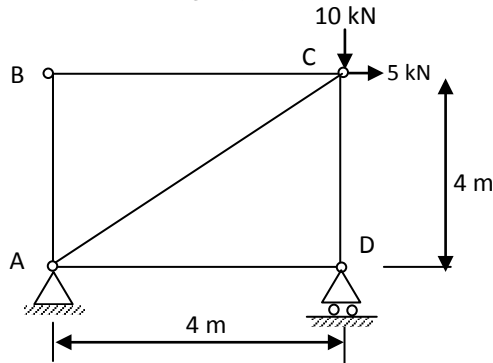
- 5 A continuous beam ABCD is carrying a uniformly distributed load of 5 kN/m as shown below figure. Compute reactions and draw shear force and bending moment diagram due to following support settlements: Support B 0.005 m vertically downwards.

Support C 0.01 m vertically downwards. Assume  $E = 200 \text{ GPa}$ ,  $I = 1.35 \times 10^{-3} \text{ m}^4$ .



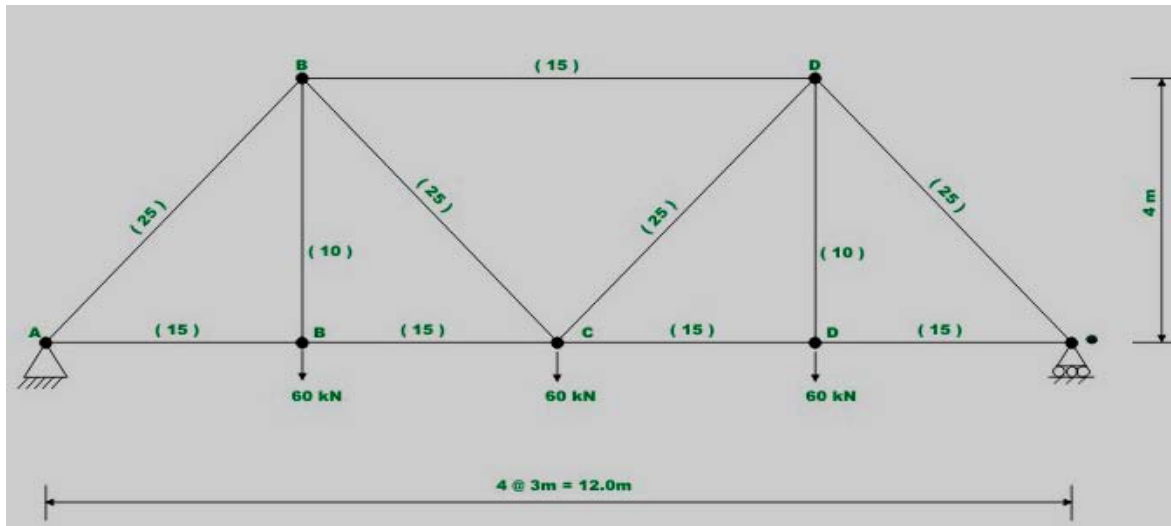
UNIT - III

- 6 Find horizontal and vertical deflection of joint C of truss ABCD loaded as shown in figure below. Assume that, all members have the same axial rigidity.



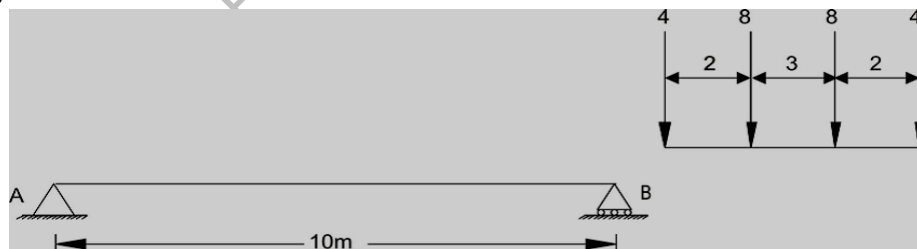
OR

- 7 Compute the vertical deflection and horizontal displacement of joint D of the truss shown in figure below. The cross sectional areas of the members in square centimeters are shown in parentheses.



UNIT - IV

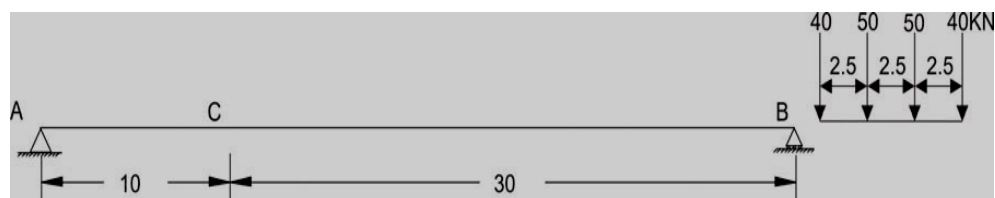
- 8 (a) A simply supported beam is subjected to a set of four concentrated loads which move from left to right as shown in figure below. Determine absolute maximum shear and absolute maximum moment.



- (b) Where do you have the absolute maximum bending moment in a simply supported beam when a series of wheel loads cross it?

OR

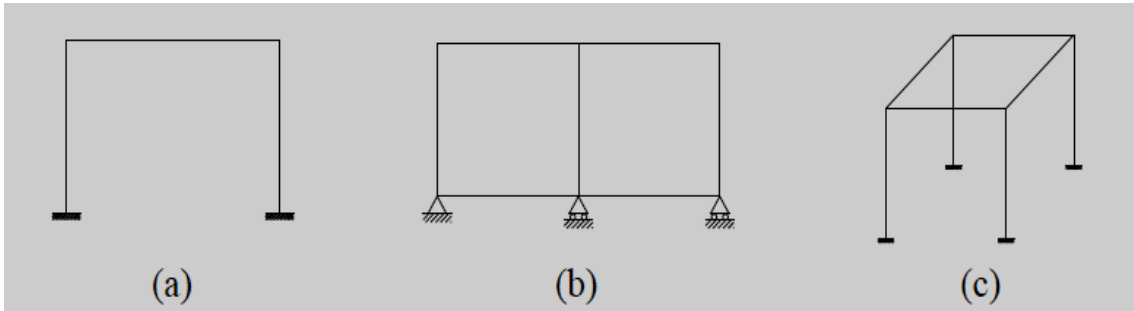
- 9 The beam is loaded with concentrated loads, which are moving from right to left as shown in figure below. Compute the maximum moment at the section C and also calculate absolute maximum bending moment.



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UNIT – V

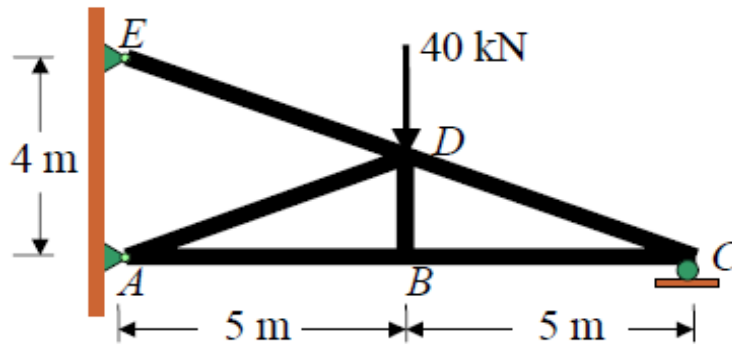
- 10 (a) Determine the number of indeterminacy for the three frames shown in figure below.



- (b) Differentiate Static and kinematic indeterminacies.

OR

- 11 Determine the reaction at support A, C, E and all the member forces for the truss shown in figure below. Take  $E = 200 \text{ GPa}$  and  $A = 500 \text{ mm}^2$ .



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