

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)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Why is it necessary to compute deflections in structures?
 - Differentiate the statically determinate structures and statically indeterminate structures.
 - Where do you get rolling loads in practice?
 - What are the uses of influence line diagrams?
 - What are the assumptions made in slope-deflection method?
 - What are the advantages of Continuous beam over simply supported beam?
 - Mention the situations where in sway will occur in portal frames.
 - What is the difference between absolute and relative stiffness?
 - What are the uses of Castigliano's theorem?
 - 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

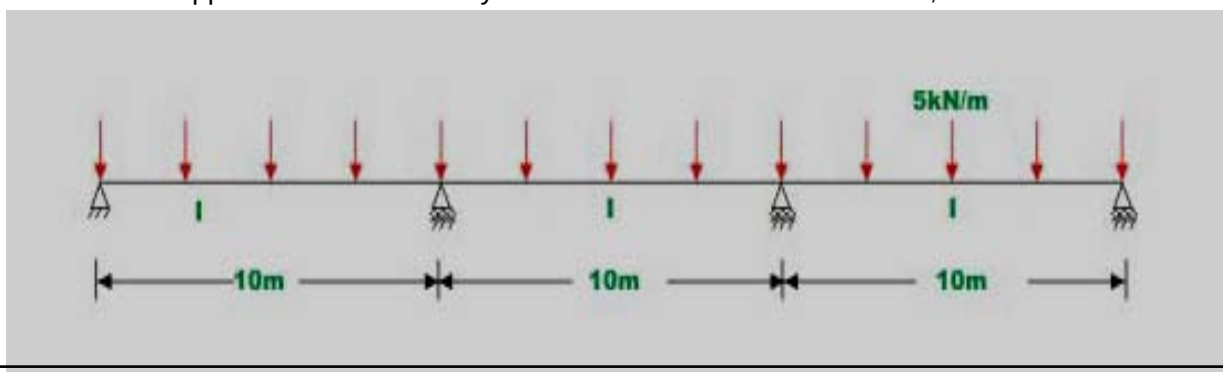
- 3 (a) A built-in beam AB carries a uniformly distributed load of 15 kN/m. The support B sinks down by 10 mm. The cross section of the beam is 350 mm x 500 mm. Determine the fixed end moments. Take $E = 200 \text{ GPa}$.
- (b) Derive an expression for the fixing moments, when one of the supports of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

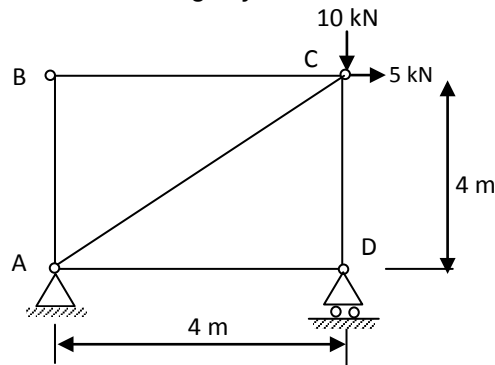
OR

- 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 $E = 200 \text{ GPa}$, $I = 1.35 \times 10^{-3} \text{ m}^4$.

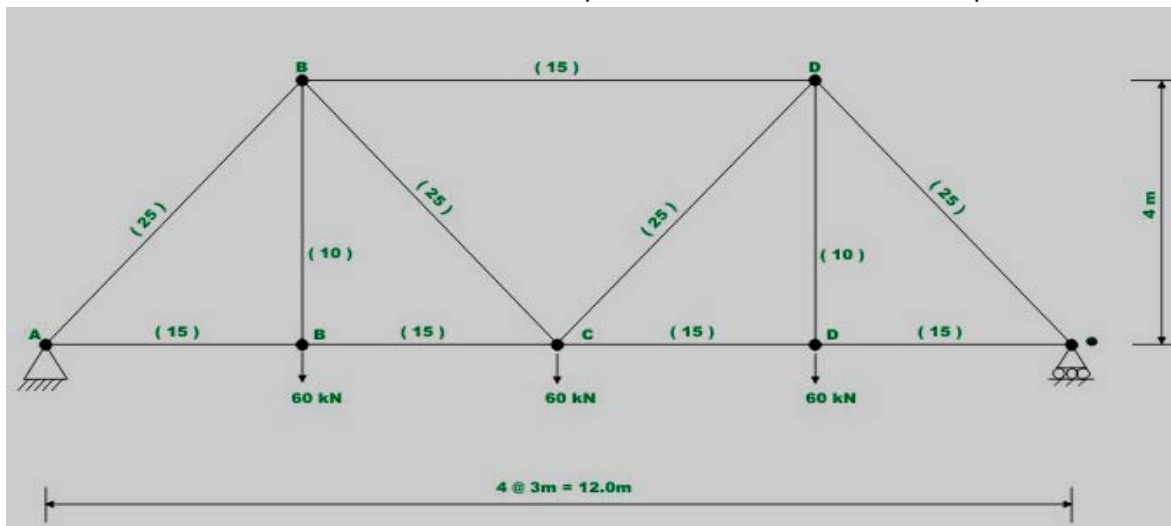
UNIT - III

- 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.



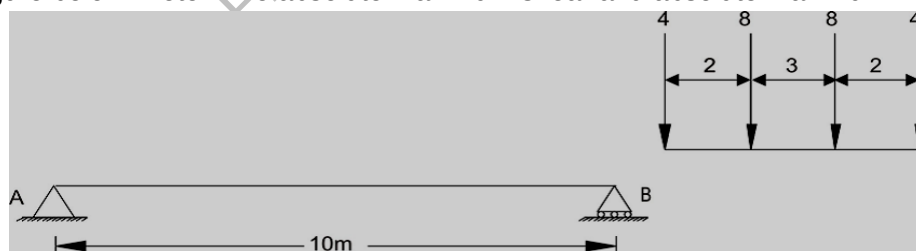
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- 7 Compute the vertical deflection and horizontal displacement of joint D of the truss shown in figure below. The cross sectional areas of the members in square centimeters are shown in parentheses.



UNIT - IV

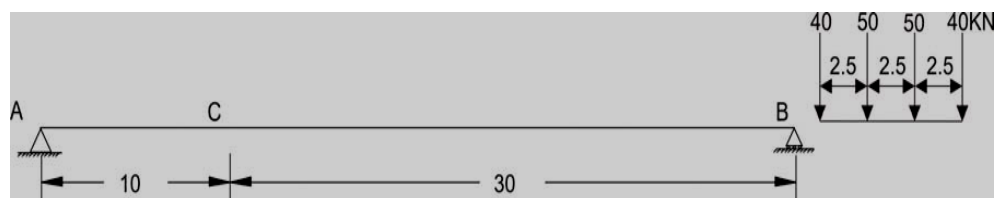
- 8 (a) A simply supported beam is subjected to a set of four concentrated loads which move from left to right as shown in figure below. Determine absolute maximum shear and absolute maximum moment.



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

OR

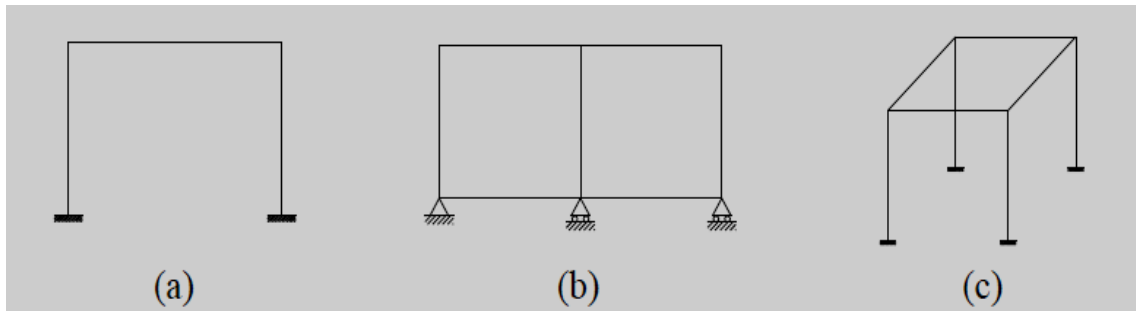
- 9 The beam is loaded with concentrated loads, which are moving from right to left as shown in figure below. Compute the maximum moment at the section C and also calculate absolute maximum bending moment.



Contd. in page 3

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 $A = 500 \text{ mm}^2$.

