**Code: 13A01404** **R13**

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)

(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 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.

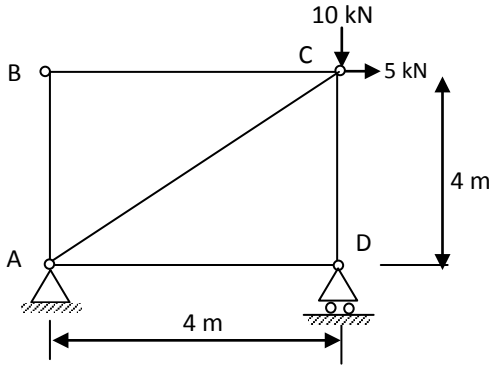
Support C 0.01 m vertically downwards. Assume E = 200 GPa, I = 1.35 x $10^{-3}$ $m^4$.




Contd. in page 2

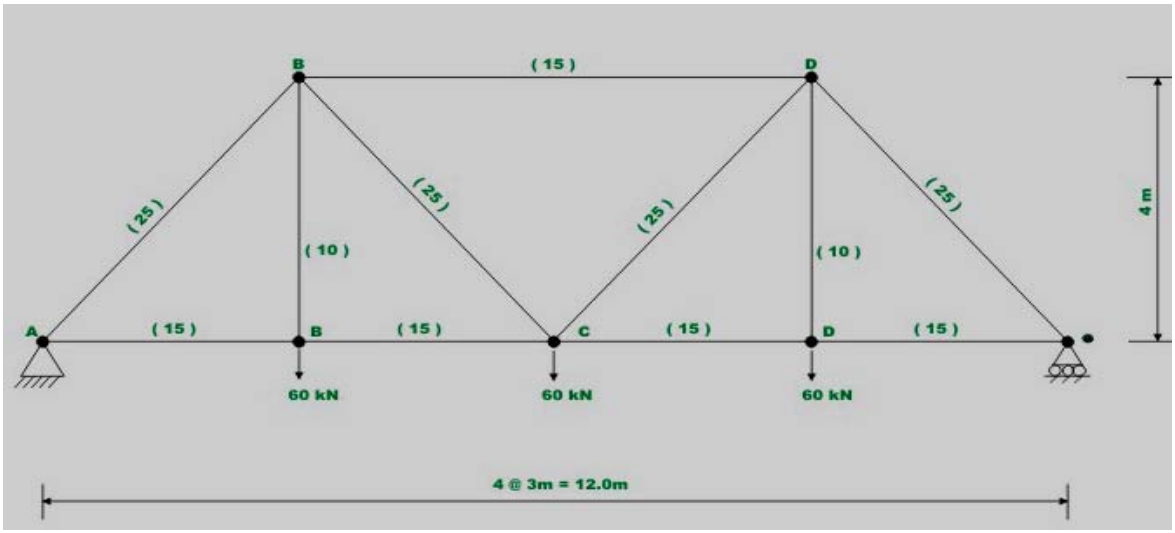
**UNIT – III**

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.



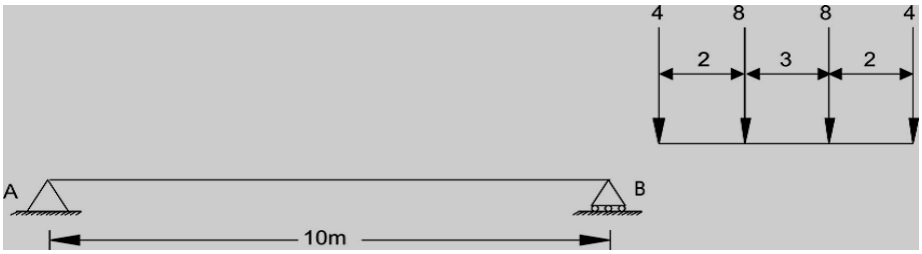

**OR**

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**

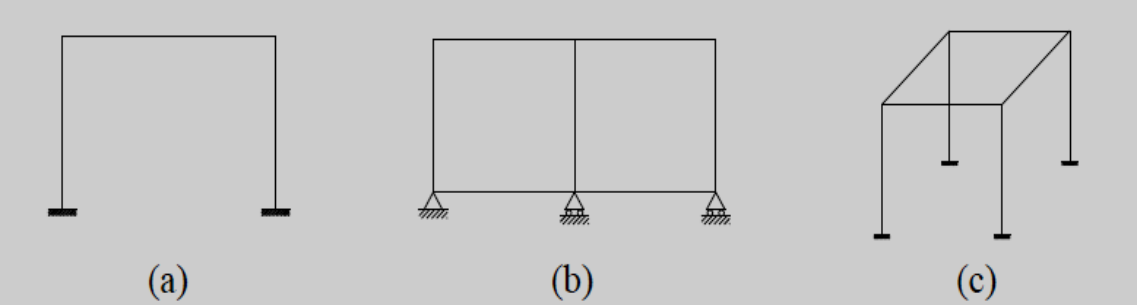
9 The beam is loaded with concentrated loads, which are moving from right to left as shown in figure below. Compute the maximum moment at the section C and also calculate absolute maximum bending moment.




Contd. in page 3

UNIT – V

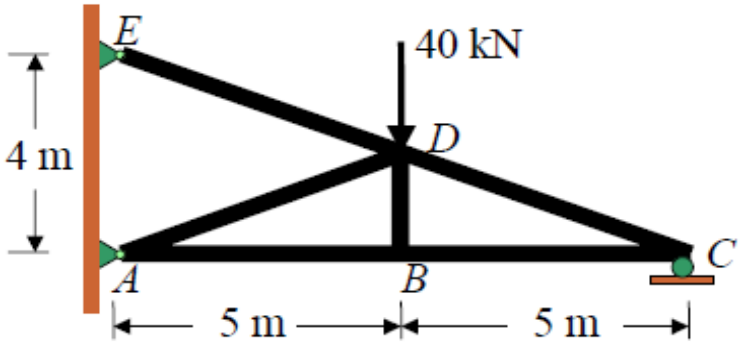
10 (a) Determine the number of indeterminacy for the three frames shown in figure below.




(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 GPa and A = 500 $mm^2$.




*****