Code: 13A01404 **R13**

B.Tech II Year II Semester (R13) Supplementary Examinations December/January 2015/2016

STRUCTURAL ANALYSIS – I

(Civil Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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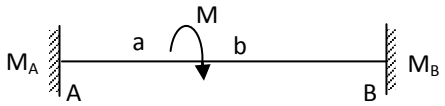
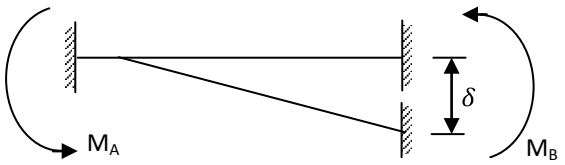
1 Answer the following: (10 X 02 = 20 Marks)

(a) Write the fixed end moments for the beam shown in below. Find M_A and M_B.



(b) What the fixed end moments when the beam sinks by 'δ'? Find M_A and M_B.



(c) Why slope deflection method is called a displacement method?

(d) What is the difference between absolute and relative stiffness?

(e) State Castigliano's first theorem.

(f) State the theorem useful for application of redundant structures.

(g) What is meant by influence line?

(h) What do you understand by the term reversal of stresses?

(i) Define kinematic indeterminacy of a structure.

(j) Define degree of redundancy of a structure.

PART – B

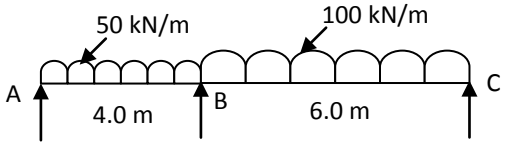
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 A fixed beam of span 10 m carries a concentrated load of 500 kN at 6 m from the left end. If the right end sinks by 15 mm, determine the fixing moments at the supports. Take $I = 3 \times 10^7$ mm^4, E = 200 kN/mm^2. Draw BMD.

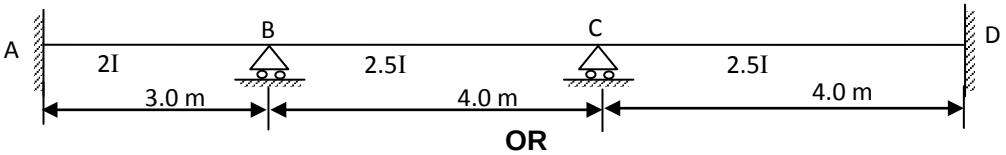
OR

3 Analyze the beam and draw BMD and SFD.



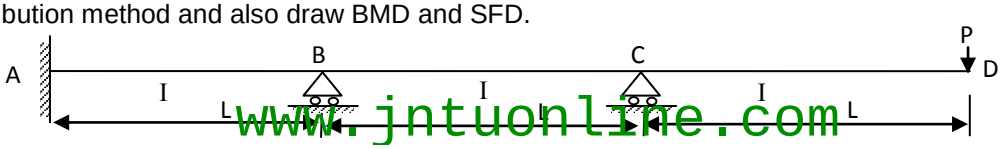
UNIT – II

4 Analyze the continuous beam shown in figure below by slope deflection method. Support 'B' settles by 5 mm down ward. Take $E = 2 \times 10^5$ N/mm^2 and $I = 36 \times 10^6$ mm^4.



OR

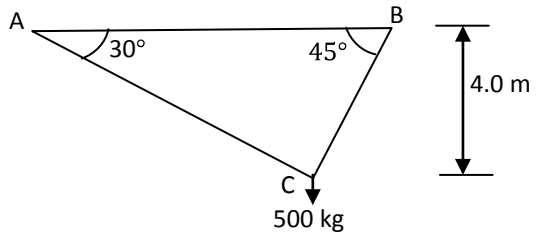
5 A continuous beam ABCD shown in the figure below is fixed at end A and simply supported at B and C and free at the end 'D'. The beam carries a concentrated load 'P' at free end. Analyze the beam by using moment distribution method and also draw BMD and SFD.



Contd. in page 2

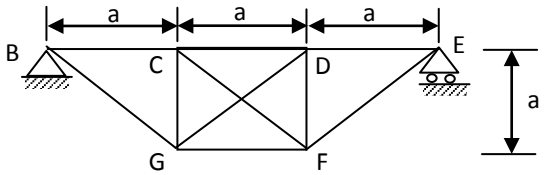
UNIT – III

6 Two straight wires AC and BC 8 mm diameter each meet at joint 'C' as shown in figure below. Support 'A' and 'B' (at the same level) are unyielding calculate the horizontal and vertical components of deflection of joint 'C' when the vertical load of 500 kg is applied at 'C'. Take E = 2 × 10^6 kg/cm^2. Joints may be assumed as hinged.



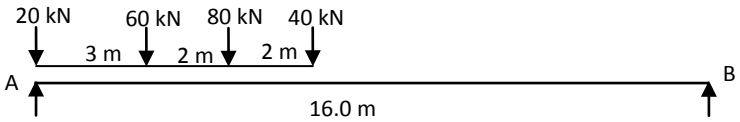
OR

7 Figure given below shows a plane pin-jointed truss BCDEFG of the given dimensions and carrying the loading shown. All the members having same axial stiffness. Evaluate the forces in the truss, if FG member is 0.1% too short and the structure carries no external load.



UNIT – IV

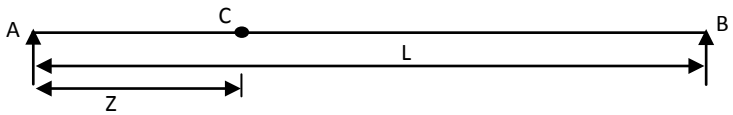
8 A train of concentrated loads shown in figure below. The loads moves from left to right on a simply supported girder of span 16.0 m. Determine absolute maximum bending moment.



OR

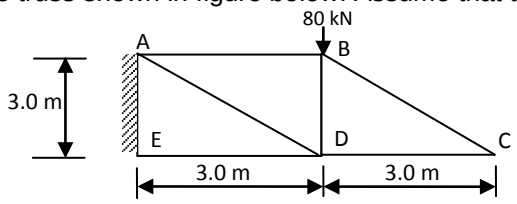
9 For a simply supported beam of span 'L' draw:

(a) Influence line for RA.
(b) Influence line diagram for RB.
(c) Influence line diagram for shear force at 'C'.
(d) Influence line diagram for B.M at 'C'.



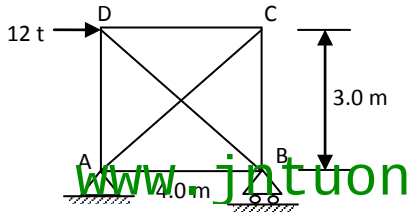
UNIT – V

10 Analyze the truss shown in figure below. Assume that the cross sectional area of all members are same.



OR

11 A pin jointed framed structure is loaded as shown in figure below. Calculate the forces in all members. Take area for horizontal members as 20 cm^2, vertical members as 30 cm^2, inclined members as 50 cm^2 and E = 2000 t/cm^2.



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