Code: 13A01404 **R13**

B.Tech II Year II Semester (R13) Supplementary Examinations May/June 2017

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) How will be the effect of sinking of support in fixed beam?

(b) Write the theorem of three moments equation for general case with explanation of terms.

(c) What are the steps of slope deflection method for solution of a problem of continuous beam?

(d) Discuss importance of distribution factor in the method of moment distribution.

(e) State Castigliano's first theorem.

(f) Derive the expression of strain energy in linear elastic systems due to axial loading.

(g) Define influence lines.

(h) A single concentrated load of 60 kN crosses a girder of 10 m span. Using influence diagram, find the maximum shear force at a section 3 m from left end of girder.

(i) State Castigliano's second theorem

(j) What is meant by static and kinematic indeterminacy of a structure?

PART – B

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

UNIT – I

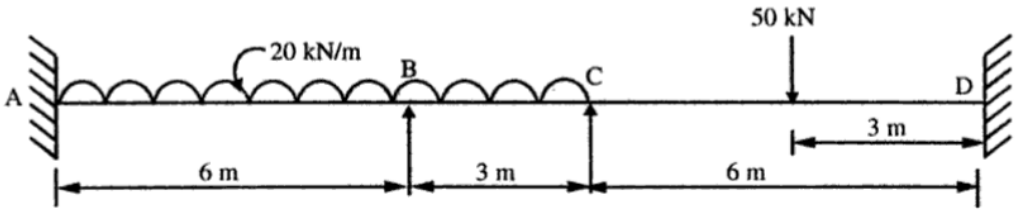
2 A continuous beam ABC of constant moment of Inertia carries a load of 10 kN in mid span AB and a central clockwise moment of 30 kN-min span BC. Span AB = 10 m and span BC = 15 m. Find the support moments and plot the shear froce and bending moment diagram.

OR

3 Determine the fixed end moments for the fixed beam with applied clockwise moment 'M' of distance 'a' from left end. The total length of beam is 'L'. Sketch the bending moment and shear force diagram.

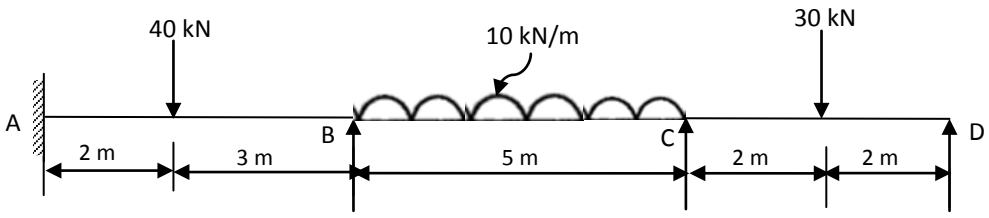
UNIT – II

4 Analyze the continuous beam as shown in figure below by slope deflection method. Support B sinks by 10 mm. Take E = 200 GPa and I = 16 x 10^7 mm^4. Draw the bending moment diagram.



OR

5 Analyze the continuous beam as shown in figure below by moment distribution method. Draw the bending moment diagram



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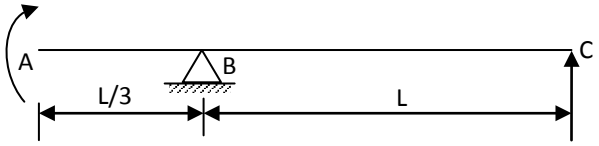
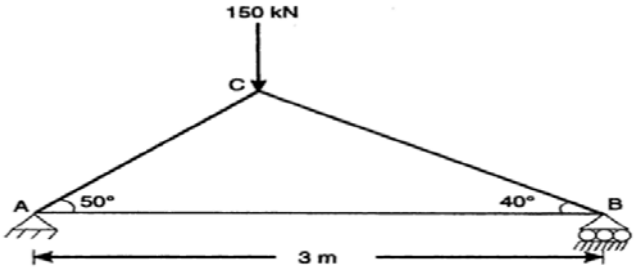
UNIT – III

6 Using Castigliano's first theorem, determine the deflection and slope at the overhanging end A of the beam as shown in figure below.



OR

7 Determine the horizontal and vertical deflection components of joint C of the truss shown in figure below by energy method. Take E = 200 GPa and cross sectional area of each member is 150 x 10^{-6} m^2.



UNIT – IV

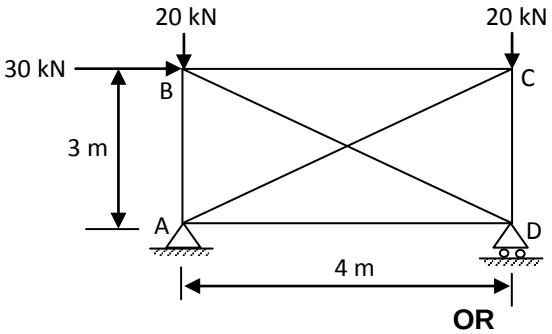
8 Four point loads of 120 kN, 160 kN, 160 kN and 80 kN spaced 2 m between consecutive loads move on a girder of 25 m span from left to right with the 120 kN load leading. Calculate the maximum bending moment at a point 10 m from left support. Also calculate the position and value of the absolute maximum bending moment.

OR

9 Four equal loads of 150 kN each equally spaced at 2 m apart followed by a uniformly distributed load of 60 kN/m at a distance of 1.5m from the last 150 kN load cross a girder of 20 m span from right to left. Using influence lines, calculate the shear force and bending moment at a section 8 m from left hand support when the leading 150 kN load is at 5 m from the left hand support.

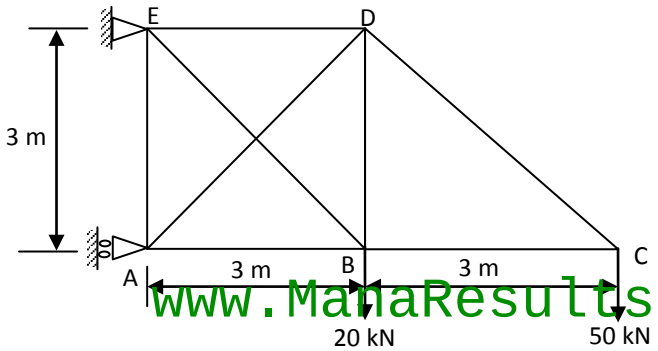
UNIT – V

10 Determine the stresses in all the members of the frame shown in figure below, in which the cross sectional area of vertical members are 30 cm^2 each and those of all the members are 22 cm^2. Take E = 200 GPa.



OR

11 A braced cantilever truss is loaded as shown in figure below. All the members are of the same material and have the same cross sectional area. Find the axial force in the member AD by strain energy method.



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