Code: 15A01403 **R15**

B.Tech II Year II Semester (R15) Regular 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) What is minimum strain energy?

(b) Write the expression for strain energy due to axial load.

(c) What do you mean by static indeterminacy?

(d) Explain external indeterminacy.

(e) Write the Clapeynon's equation of three moments.

(f) Write the conditions to be used to calculate the fixed end moments in fixed beams.

(g) Write the assumptions in the slope deflection method.

(h) Write the slope deflection equations when one of the supports at a lower level.

(i) What is distribution factor?

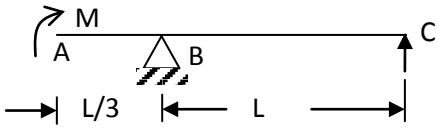
(j) What is stiffness factor?

PART - B

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

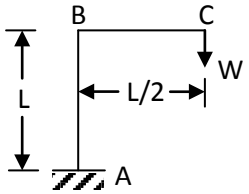
UNIT - I

2 Using Castigliano's theorem, determine the deflection and rotation of the overhanging end A of the beam loaded as shown in figure below.



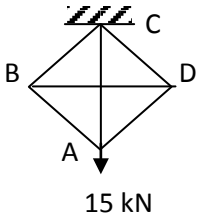
OR

3 A vertical load W is applied to the rigid cantilever frame shown in figure below. Assuming EI to be constant throughout the frame determine the horizontal and vertical displacements of the point C. Neglect axial deformation.



UNIT - II

4 A frame work consists of six bars of uniform non-sectional area and hinged together to form a square with two diagonals, is suspended from ended as shown in figure. At the opposite corner, a load of 15 kN is suspended. Calculate the forces in all the members. The diagonals act independently.



OR

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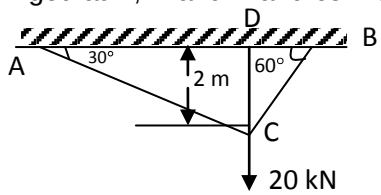
5 Three rods AC, DC and BC are hinged at A, D and B and connected at C, carry a load of 20 kN as shown in figure below.



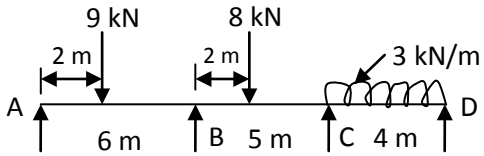
Find the forces in the various members of the frame if the cross-sectional areas of AC and BC is 8×10^{-4} m^2 and that of CD is 4×10^{-4} m^2.

UNIT - III

6 A fixed beam of length 6 m carries two point loads of 30 kN each at a distance of 2 m from both ends. Determine the fixed end moments and draw BMD.

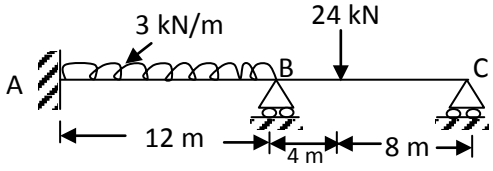
OR

7 Analyze the continuous beam ABCD shown in the figure below using theorem of three moments. Draw SFD and BMD.



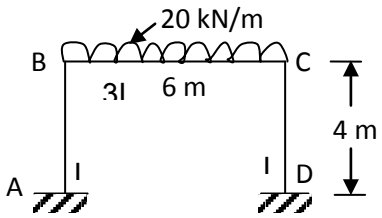
UNIT - IV

8 Analyze the continuous beam shown in figure below using slope deflection method. The support B sinks by 0.03 m. Values of E and I are 200 GPa and 0.2×10^{-3} m^2 respectively uniform throughout. Draw SF and BM diagrams.



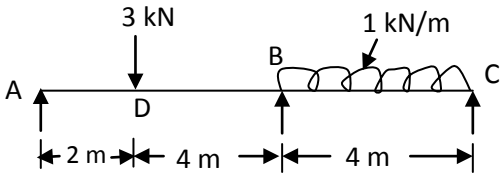
OR

9 Analyze the portal frame shown in the figure below using slope deflection method. Draw also the bending moment diagram.



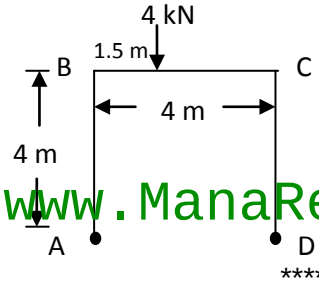
UNIT - V

10 Analyze the continuous beam shown in figure below using moment distribution method. Draw the SF and BM diagrams.



OR

11 Analyze the portal frame shown in figure using moment distribution method.



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