*(Please write your Exam Roll No.)* *Exam Roll No.*

# END TERM EXAMINATION

**FIFTH SEMESTER [B.TECH.] NOV.-DEC. 2018**

| *Paper Code: ETCE-303* | *Subject: Advanced Structural Analysis* |
|---|---|
| *Time : 3 Hours* | *Maximum Marks :75* |

***Note: Attempt all questions as directed. Assume suitable missing data if any.***

Q1. Attempt all. (5×5=25)

a) Define the types of framed structures and deformations available in these structures. Also explain static and kinematic indeterminacy for the plane truss and plane frame with examples.

b) Define Eddy's theorem. Explain the effect of yielding of supports in arches?

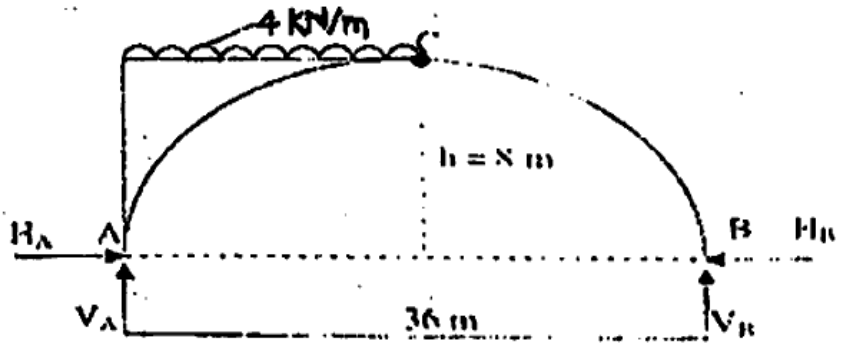
c) Define flexibility matrix and stiffness matrix. Also define flexibility & stiffness influence coefficients and derive the relationship between stiffness matrix and flexibility matrix.

d) Differentiate between structure approach and element approach used in stiffness matrix method. What is the relationship between structure stiffness matrix and element stiffness matrix?

e) A three hinged parabolic arch has a span l and rise h. Draw influence line diagram for the following;

i. Horizontal thrust
ii. Bending moment at a section 'a' distance from left support
iii. Normal thrust at the above section
iv. Radial shear at the above section

Q2. A UDL of 4 KN/m covers left half of a 3-hinged parabolic arch of span 36m and central rise of 8m. Determine the horizontal thrust. Also find bending moment, normal thrust and radial shear at quarter section from left support. Sketch BMD. (12.5)

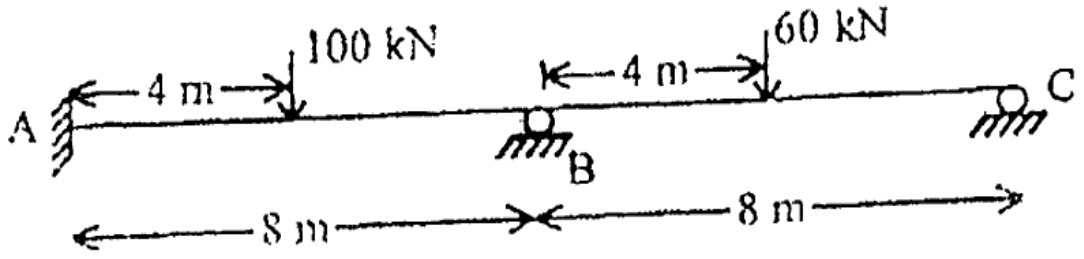



OR

A quarter circle beam of radius R curved in plan is fixed at end A and free at end B. It carries a vertical load P at its free end. Determine the deflection at the free end and sketch shear force, bending moment and torsional moment diagrams. Assume flexural rigidity (EI) = torsional rigidity (GJ). (12.5)

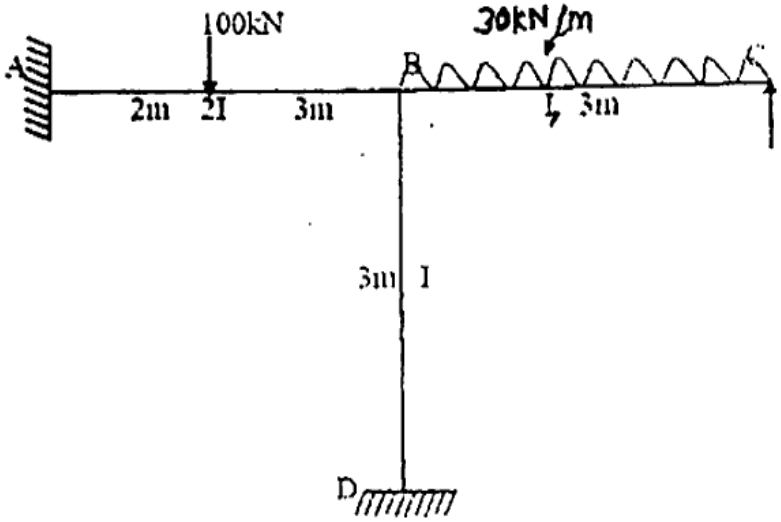
P.T.O.

Q3. Analyse the continuous beam shown in figure by flexibility matrix method and sketch BMD. Take EI constant throughout. (12.5)

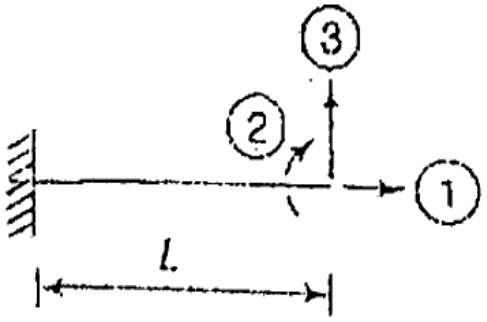



OR

Analyse the portal frame ABCD shown in figure by stiffness matrix method. (12.5)

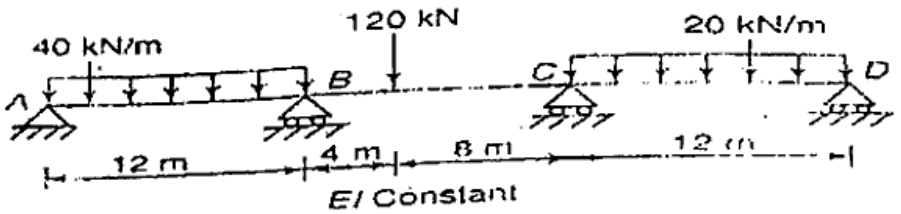



Q4. For a cantilever beam of uniform cross section shown in figure, develop the flexibility and stiffness matrices with reference to the coordinates. Verify that the two matrices are the reciprocal of each other. (12.5)

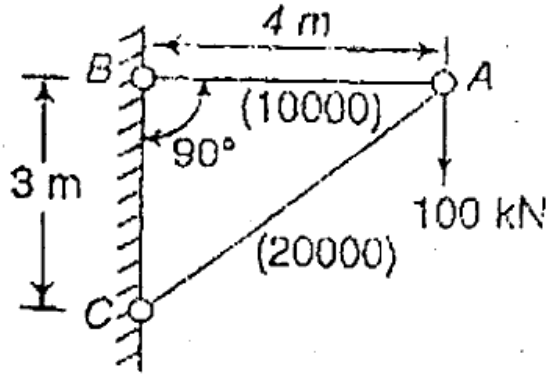



OR

Write down the design steps of stiffness matrix method for analysis of structure. Generate the stiffness matrix for the structure shown in figure. (12.5)




Q5. Develop the stiffness matrix for the plane truss shown in figure. Also determine the displacement of joint A. and calculate the forces in member AB and AC. The numbers in parentheses are the cross section areas of the members in $mm^2$. Take E= 200KN/$mm^2$. (12.5)




OR

Write down the steps for analysis of plane frame by direct stiffness method. Develop element stiffness matrix for a plane frame member having span l. EA is axial stiffness and EI is flexural stiffness. (12.5)