Roll No..

MVSE-103

M.E./M.Tech. I Semester

Examination, December 2020

Advance Structural Analysis

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

    ii) All questions carry equal marks.

    iii) Support the answers with neat sketches.

    iv) Assume suitable data, wherever necessary.

1. a) What do you understand by a substitute frame? How do you select it?   4

    b) Analyze the continuous beam show in figure 1 below. Assume EI is constant. Use matrix flexibility method. Draw the shear force and bending moment diagram.   10
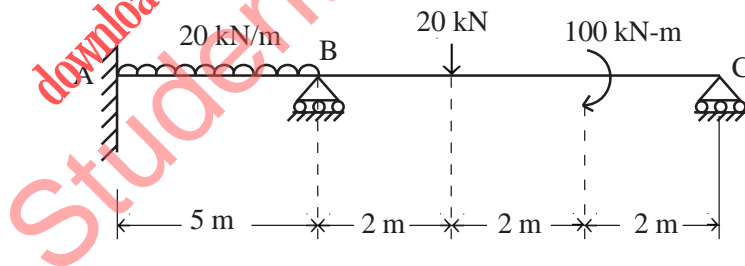

Figure 1

2. a) What are the requirements to be satisfied in analyzing any structure?   4

b) A two span continuous beam shown in figure 2 below. The moment of inertia is constant throughout. Analyze the beam by stiffness method. 10
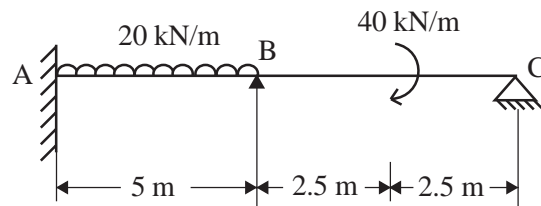

Figure 2

3. a) Developed the stiffness matrix for grid structure. 7

b) Developed the stiffness matrix for space truss structure.

7

4. a) Explain the member coordinate and global coordinate system. 4

b) Analyze the pin jointed frame shown in figure 3. The axial stiffness of each member is 5 kN/mm. 10
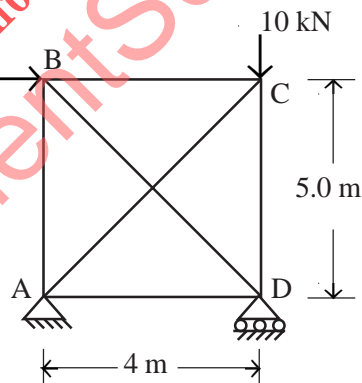

Figure 3

5. a) What is meant by degree of freedom? Give some examples. 4

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b) Analyse the pin-jointed frame of figure 4 by the force method. The axial flexibility. 1/AE is the same for the members. The numbers in parentheses are the cross sectional areas of the members in cm^2. 10
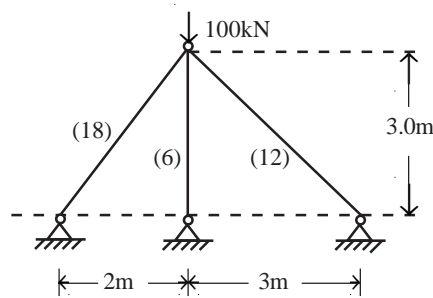

Figure 4

6. a) Write similarities and dissimilarities of force and displacement methods. 4

b) Analyse the portal frame shown in figure 5 by flexibility matrix method. Draw the deflection shape and bending moment diagram. 10
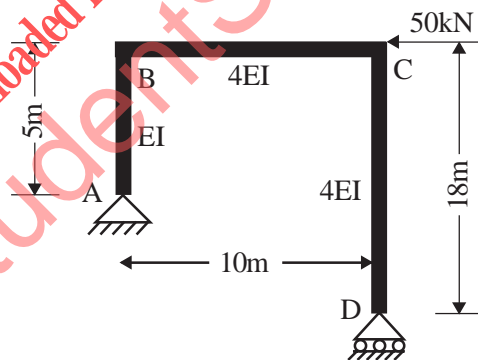

Figure 5

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7. Analysis the pin jointed truss by stiffness matrix method. Take area of cross-section for all members $= 100 \text{ mm}^2$ and modulus of elasticity $E = 200 \text{ kN/mm}^2$. 14
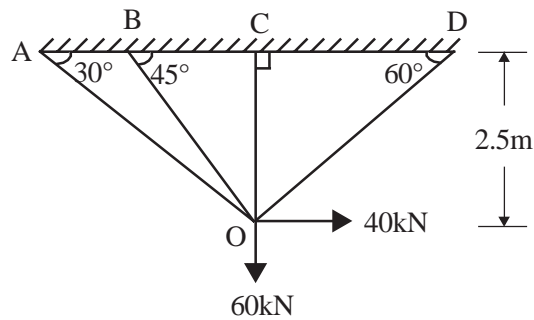

Figure 6

8. Write short notes on (any four) :
   a) Energy approach in flexibility method
   b) Boundary conditions
   c) Equivalent joint load
   d) Effect of support displacement and temperature changes
   e) Code No. approach for global stiffness matrix

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