



Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020
Matrix Methods of Structural Analysis

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Define :
 - i) Degree of static indeterminacy
 - ii) Degree of kinematic indeterminacy
 - iii) Flexibility
 - vi) Stiffness

(08 Marks)
- b. Derive the relationship between Global Flexibility Matrix [F] and Element Flexibility Matrix [Fe] with usual notations. (08 Marks)
- c. Assemble the element flexibility matrix for the beam element, shown in Fig.Q1(c) with respect to the given coordinates.

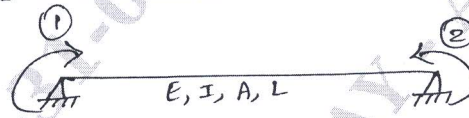


Fig.Q1(c) (04 Marks)

- 2 Analyze the continuous beam shown in Fig.Q2 by Force Transformation Method. Take the vertical reactions at C and B as redundant. Draw BMD. EI is constant.

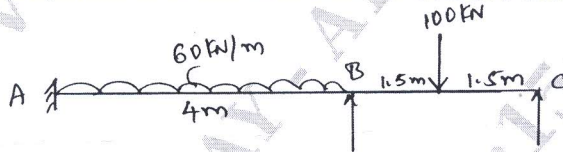


Fig.Q2 (20 Marks)

- 3 Analyze the rigid frame shown in the Fig.Q3 by Flexibility Method. Draw BMD. EI is constant.

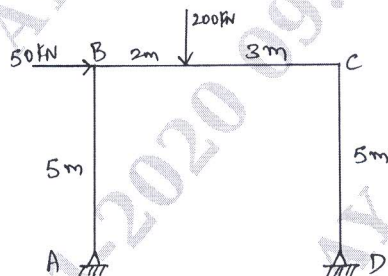


Fig.Q3 (20 Marks)

- 4 Find the forces in all the members of the truss shown in the Fig.Q4 by force transformation method. Take member AC as redundant. AE is same for all the members.

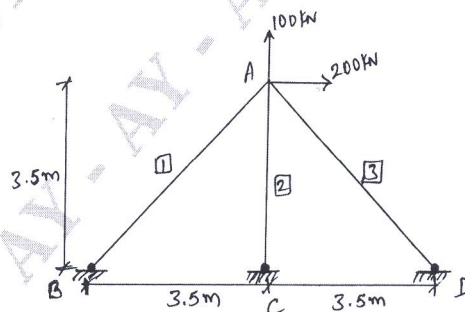


Fig.Q4 (20 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

PART - B

- 5 a. Assemble the element stiffness matrix for the beam element shown in the Fig.Q5(a) with respect to the given coordinates.

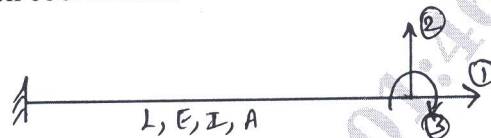


Fig.Q5(a) (08 Marks)

- b. Determine the vertical displacement and the rotation at the loaded point in beam shown in the Fig.Q5(b) by displacement transformation method.

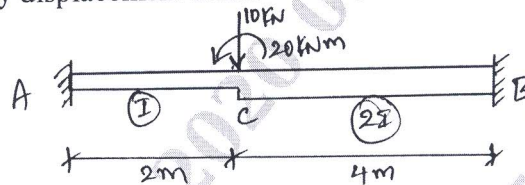


Fig.Q5(b) (12 Marks)

- 6 Analyze the rigid frame shown in the Fig.Q6 by displacement transformation method. Draw BMD. EI is constant.

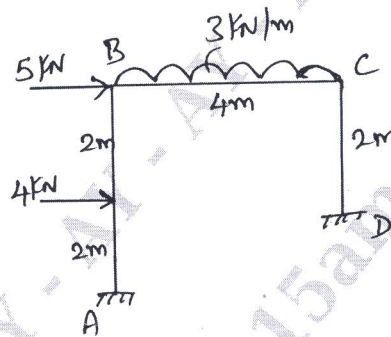


Fig.Q6 (20 Marks)

- 7 Analyze the continuous beam by direct stiffness method. Draw BMD and SFD. The element coordinates are indicated in the Fig.Q7.

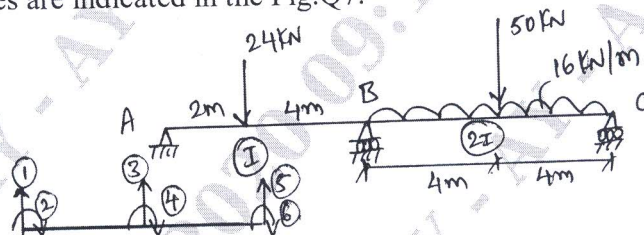


Fig.Q7 (20 Marks)

- 8 Determine the forces in all the members of the plane truss shown in the Fig.Q8 by direct stiffness method. Take AE as constant.

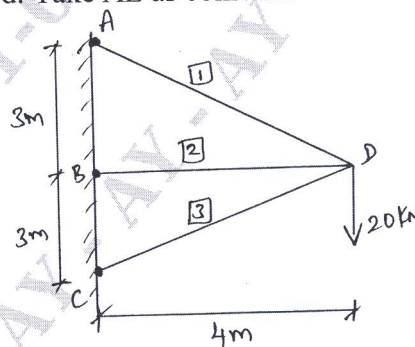


Fig.Q8 (20 Marks)
