

Code No: RT41018

R13
Set No. 1

IV B.Tech I Semester Supplementary Examinations, February/March - 2018

MATRIX METHODS OF STRUCTURAL ANALYSIS

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

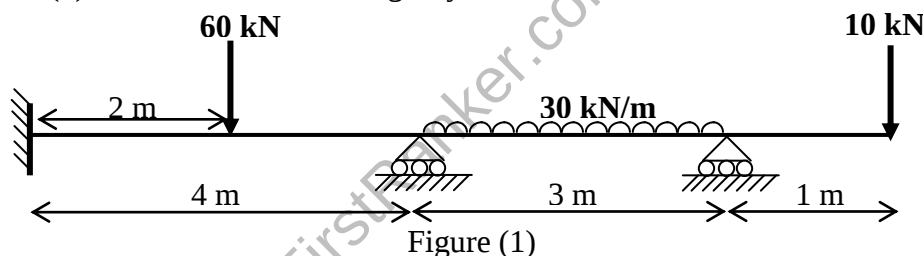
Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Explain the rank deficiency of a matrix. [3]
- b) What are the characteristics of a beam element? [3]
- c) Distinguish between the element and global stiffness matrices. [4]
- d) What is a grid element and generate the stiffness matrix of a grid element? [4]
- e) Explain the significance of sub-structuring. [4]
- f) Differentiate a frame element and a truss element. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain degrees of freedom of different types of structural elements. [8]
- b) Explain the static and kinematic indeterminacy of various structural components. [8]
3. a) Derive the stiffness matrix of a two noded truss element of length 'L, and axial rigidity 'AE'. [8]
- b) Obtain the force-displacement equation of a beam element. [8]
4. Using the stiffness method, analyse the beam supported and loaded as shown in Figure (1) Assume the flexural rigidity is constant.



[16]

5. Analyse the pin jointed steel plane truss supported and loaded as shown in Figure (2). The cross-sectional area of each member is 1000 mm².

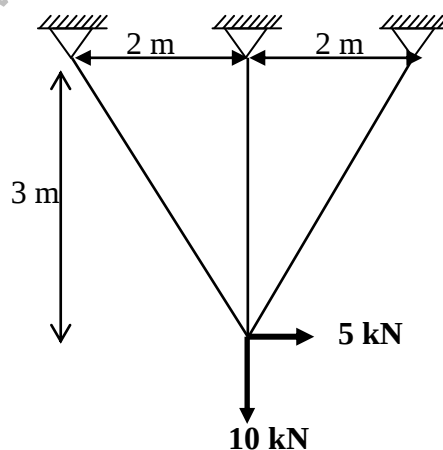


Figure (2)

[16]

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6. a) What is static condensation and explain its significance? [8]
b) Explain the methods of handling the loads acting between the joints of various types of members in stiffness method. [8]
7. Define a stiffness coefficient and derive the stiffness matrix of a space truss element. [16]

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