**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**
**(END SEMESTER EXAMINATION)**

**CLASS: BTech** **SEMESTER : 7**
**BRANCH: Civil** **SESSION : MO/2025**

**SUBJECT: CE411 ADVANCED STRUCTURAL ANALYSIS**

**TIME: 3 Hours** **FULL MARKS: 50**

**INSTRUCTIONS:**
**1. The question paper contains 5 questions each of 10 marks and total 50 marks.**
**2. Attempt all questions.**
**3. The missing data, if any, may be assumed suitably.**
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
**5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**

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| | | | CO | BL |
|---|---|---|---|---|
| Q.1(a) | Consider two suitable examples from beam, frame and truss structures and explain the difference between the determinate and indeterminate structures. | [5] | 1 | K1 |
| Q.1(b) | Find the inverse of the matrix | [5] | 1 | K2 |

$$[a] = \begin{bmatrix} 30 & -10 & 0 \\ -10 & 15 & -5 \\ 0 & -5 & 5 \end{bmatrix}$$

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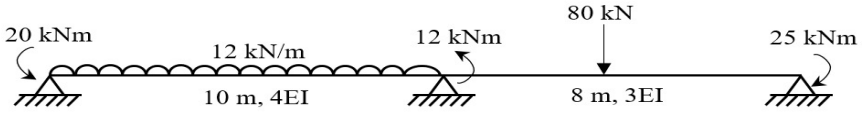
|---|---|---|---|---|
| Q.2 | Analyze the beam by using Displacement Transformation Matrices. | [10] | 2 | K3 |

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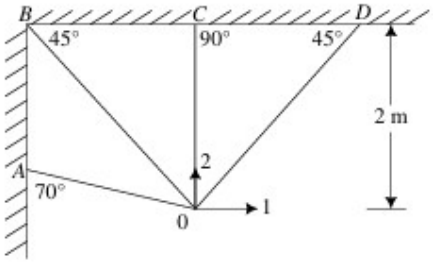
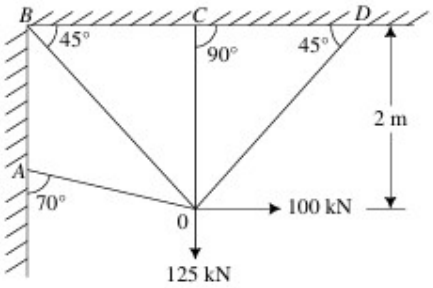
|---|---|---|---|---|
| Q.3(a) | Develop the stiffness matrix for Truss with reference to the given coordinates | [5] | 3 | K3 |

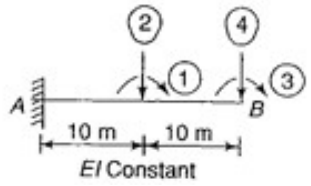



| | | | | |
|---|---|---|---|---|
| Q.3(b) | Analyse the pin-jointed plane frame shown in Q 3(a) by stiffness matrix method. Given: Cross-sectional area of each member = 1000 $mm^2$ and modulus of elasticity E = 200 $kN/mm^2$. | [5] | 3 | K2 |

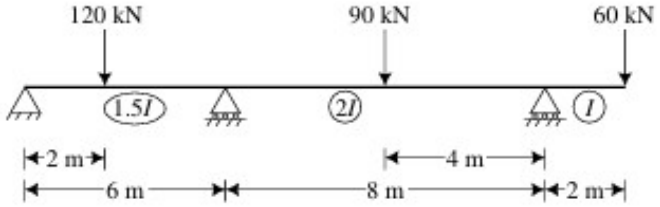



**PTO**

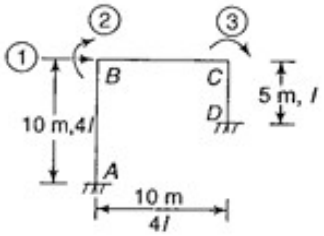
Q.4(a) Develop the flexibility and stiffness matrix for portal frame ABCD with reference to the given coordinates [5] 4 K3



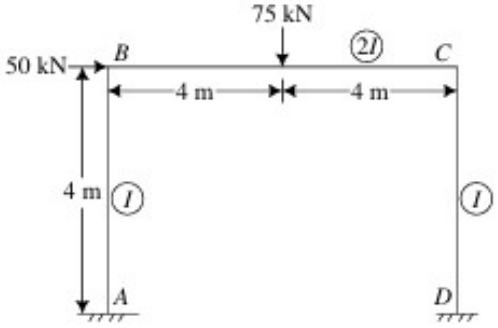

Q.4(b) Analyze the continuous beam shown in by stiffness matrix method. [5] 4 K3




Q.5(a) Develop the flexibility and stiffness matrix for portal frame ABCD with reference to the given coordinates. [5] 5 K3




Q.5(b) Analyze the frame shown in Figure using stiffness matrix method. [5] 5 K3

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