

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

CLASS: M.TECH
BRANCH: CIVIL

SEMESTER : I
SESSION : MO/18

SUBJECT: CE502 ADVANCED STRUCTURAL ANALYSIS

TIME: 3 HRS.

FULL MARKS: 50

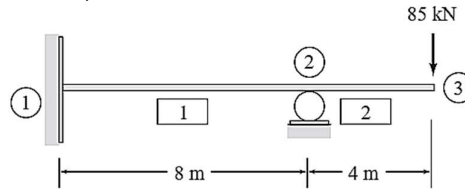
INSTRUCTIONS:

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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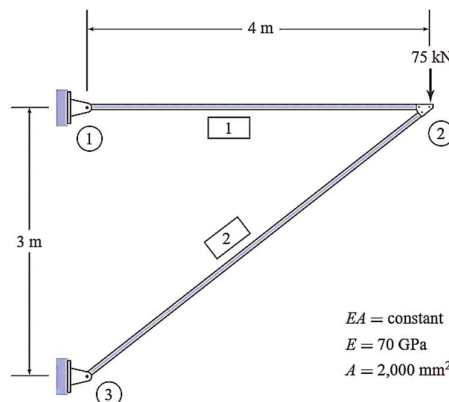
- Q.1(a) Describe one force method of analysis by a suitable example. [5]
 Q.1(b) Which method will you use to analyze a structure having high degree of kinematic indeterminacy? Explain why. [5]

- Q.2(a) Which method of solving simultaneous equations will you use when the coefficient matrix is banded and sparse? Explain why. [5]
 Q.2(b) Derive displacement transformation matrix for a beam member. [5]

- Q.3(a) State the stiffness matrix for a truss element in 2D. [5]
 Q.3(b) Analyze the given structure using matrix method. Also find reactions. [5]
 Consider EI as constant, $E = 210GPa$, $I = 700 \times 10^6 \text{ mm}^4$.



- Q.4(a) State the stiffness matrix for a beam element in 3D. [5]
 Q.4(b) Analyze the given truss structure using stiffness matrix method. Also find reactions and member stresses. [5]



- Q.5(a) Find the diameter of a circular column whose one end is fixed and other is pinned such that its critical load against buckling is $1000kN$. Take $E = 210GPa$ and $L = 3m$. [5]
 Q.5(b) Explain when and why second order analysis is required. [5]