

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

CLASS: M.TECH.
BRANCH: STRUCTURAL ENGINEERING

SEMESTER : I
SESSION : MO/19

SUBJECT: CE502 ADVANCED STRUCTURAL ANALYSIS

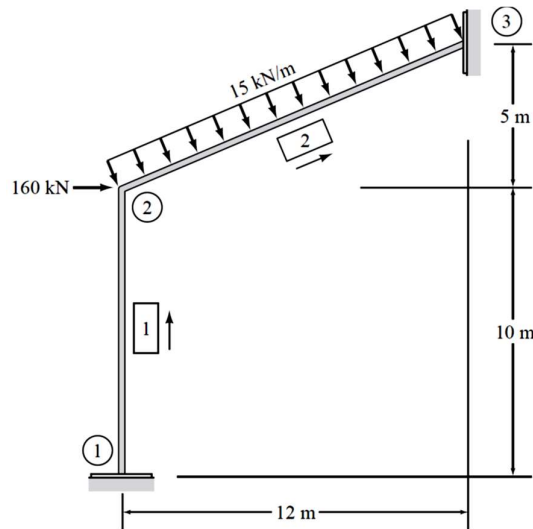
TIME:3:00 HOURS

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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- 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 Use Gauss Elimination Method to solve the following system: [10]
$$\begin{aligned}x + y - z &= 10 \\x + 2y + 3z &= 50 \\x - y + z &= 20\end{aligned}$$
- Q.3 Derive stiffness matrix and transformation matrix for a truss member. [10]
- Q.4 Write global stiffness matrix for beam 2. (Do not compute matrix multiplications) [10]
Take, $E = 210 \text{ GPa}$, $A = 5000 \text{ mm}^2$ and, $I = 20 \times 10^6 \text{ mm}^4$



- Q.5(a) Find the cross-sectional area of a square column whose one end is fixed and other is pinned such that its critical load against buckling is 2500 kN . Take $E = 210 \text{ GPa}$ and $L = 3 \text{ m}$. [5]
Q.5(b) Explain $P - \delta$ analysis by a suitable example. [5]

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