

510302

Roll No. _____

Total No of Pages: **4**

510302

B. Tech. V - Sem. (Main) Exam., December - 2020

Civil Engineering

SCE4 – 02 Structural Analysis - I

Time: 2 Hours

Maximum Marks: 80

Min. Passing Marks:

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 5×2 marks = 10 marks.
All five questions are compulsory.

Part – B: Analytical/Problem solving questions 4×10 marks = 40 marks.
Candidates have to answer four questions out of six.

Part – C: Descriptive/Analytical/Problem Solving questions 2×15 marks = 30 marks.
Candidates have to answer two questions out of three.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL

2. NIL

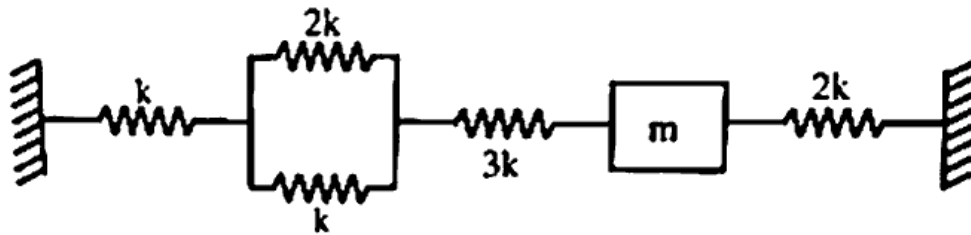
PART – A

- Q.1 Define Damping and mention its types. [2]
- Q.2 Define D'Alembert's principle. [2]
- Q.3 Mention the causes for sway in Portal Frames. [2]
- Q.4 Define Flexural Rigidity. [2]
- Q.5 Write the difference between static and kinematic indeterminacies. [2]

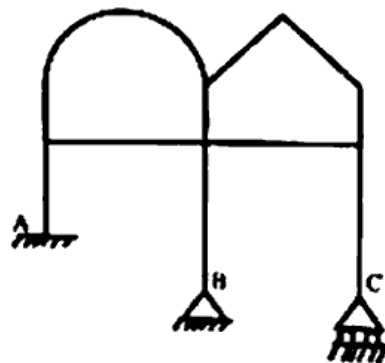
PART – B

✓ Q.1 Derive the expression and prove Maxwell's reciprocal theorem with neat diagram. [10]

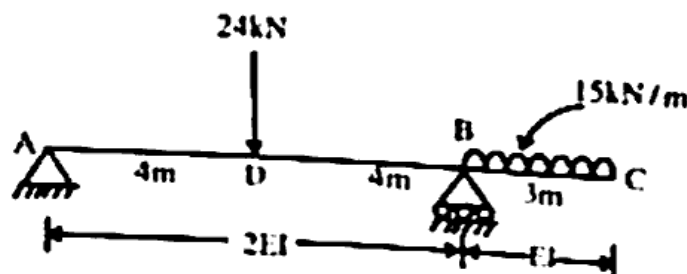
✓ Q.2 Find the equivalent spring stiffness of the system given below. [10]



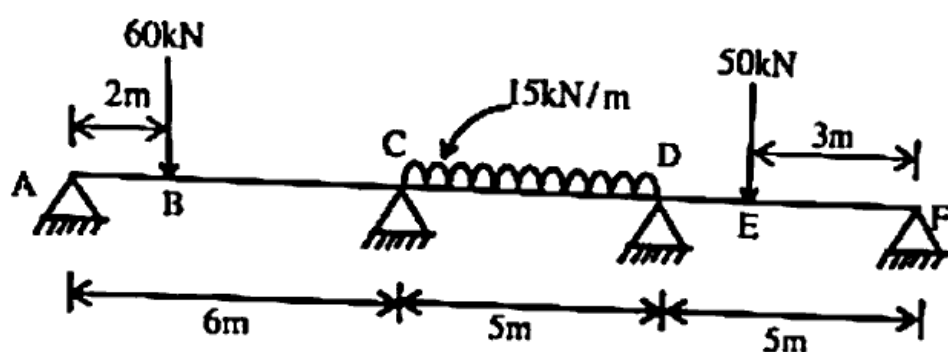
Q.3 Determine the degree of freedom and static indeterminacy of the given structure below. [10]



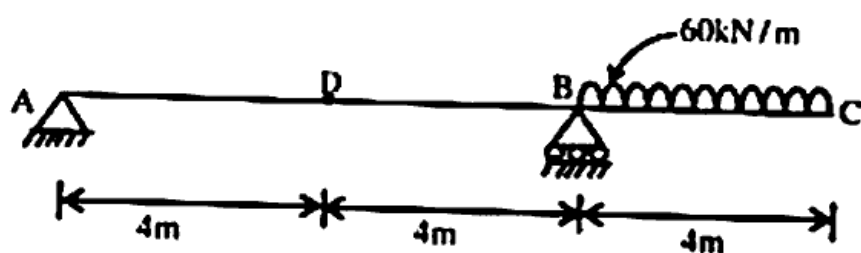
Q.4 Using Area Moment Method, find slopes at point A, B and deflection at point D. [10]



- Q.5 Analyze the continuous beam using Three Moment Theorem and draw the bending moment diagram and shear force diagram. [10]

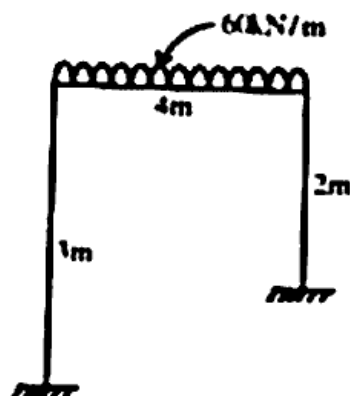


- Q.6 Determine the slope and deflection at point B (θ_B , Δ_B) and at point D (θ_D , Δ_D) using Conjugate Beam method for the beam given below. Take $E = 70\text{GPa}$ and $I = 700 \times 10^6 \text{mm}^4$ [10]

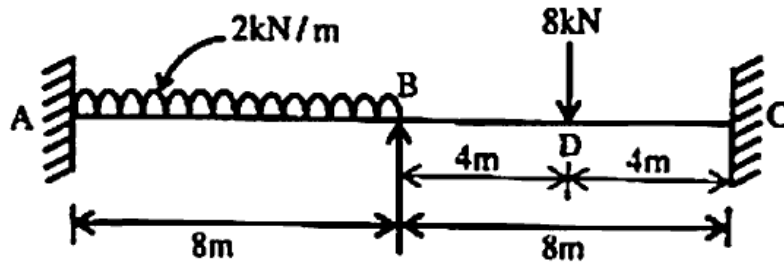


PART - C

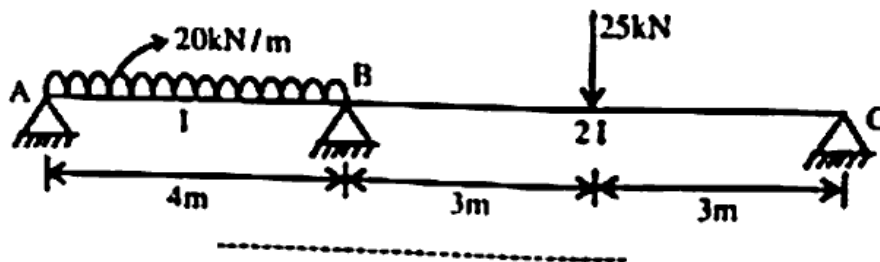
- Q.1 Analyze the portal frame as shown in figure by using Slope Deflection method. EI is constant for the entire frame. [15]



Q.2 Analyze the beam using Moment Distribution method. Take EI constant throughout the span. [15]



Q.3 Analyze the two span continuous beam by using the Clapeyron's theorem. Draw the shear force and bending moment diagrams. [15]



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