B.Arch. 2ND YEAR 2ND SEMESTER 2024
SUBJECT: *Theory of Structures - II*
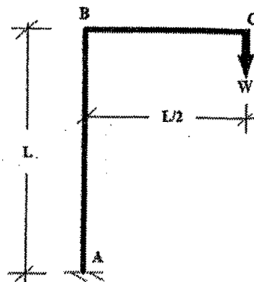
Full Marks 100

Time: Three hours

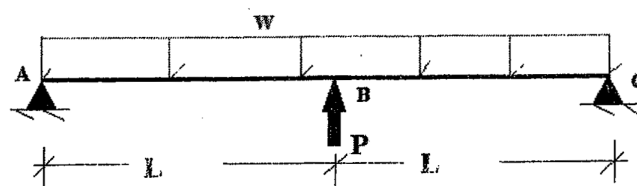|	
	Attempt any five questions (All carry equal marks)
1	A vertical load W is applied to the rigid cantilever frame as shown in figure below as shown. Assuming EI to be constant throughout the frame, determine the horizontal and vertical displacements of the point C. Neglect axial deformation. Use Castigliano's first theorem.

2	A multi-span continuous beam ABCD, 20 m long is simply supported at its ends and is propped at the same level at B and C. It is loaded as shown below. If support B sinks by 10 mm, analyze the beam by using moment distribution method and sketch the shear force and bending moment diagrams (SFD and BMD). Take $E = 2.1 \times 10^5 \, N/mm^2$, and $I = 85 \times 10^5 \, mm^4$.
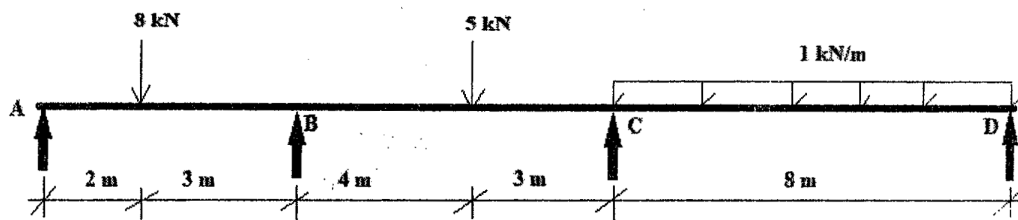
3	Analyze the frame as shown below for moments at the end members. EI is constant throughout the horizontal and vertical members. Use slope-deflection method.
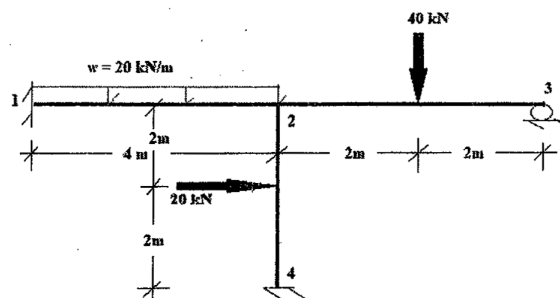
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4	A beam of uniform section and of length 2L is freely supported by rigid supports at its ends and by an elastic prop (P) at its center as shown below. If the prop (P) deflects by an amount λ times the load (w) it carries, and if the beam carries a total distributed load of w, show that the load carried by the prop is: $5w/\{8(1 + 6EI\lambda/L^3)\}$. Use strain-energy method or Castigliano's theorem.

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	Attempt any five questions (All carry equal marks)
5	Analyze the frame as shown below by using 'Portal Method'. Draw SFD and BMD.
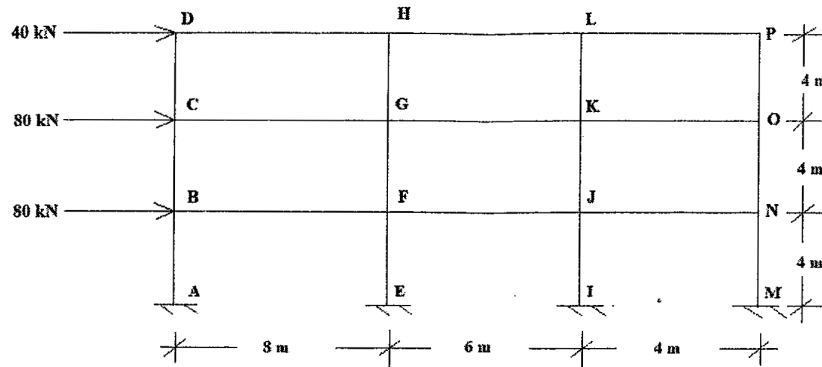
6	Analyze the portal frame loaded as shown below by using the moment distribution method. Sketch SFD and BMDof the frame as loaded.
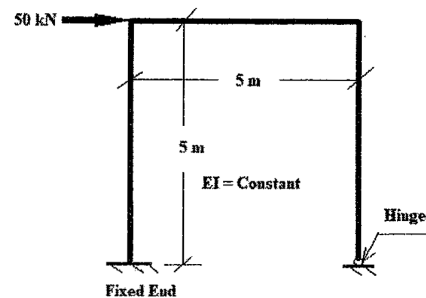
7	Using the 'Cantilever Method', analyze the building frame subjected to horizontal forces as shown below. Sketch relevant SFD and BMD.