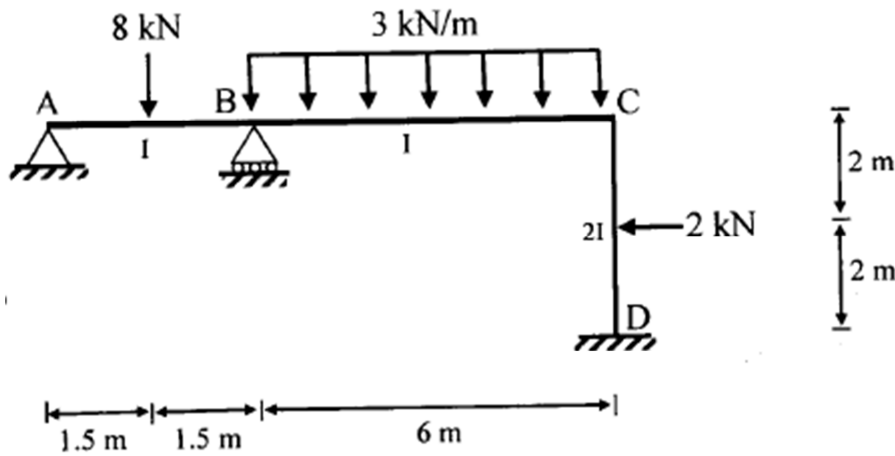


For the frame shown, determine the moments at member ends using the moment distribution method. E is constant for all members. Please conduct at least three iterations.



Fix-End Moments

$$\text{For } AB: \frac{8 \times 1.5}{2} = 6 \text{ kN} \quad \frac{8 \times 1.5^2}{2 \times 1.5} = 4.5 \text{ kN} \cdot \text{m}$$

$$\text{For } BC: \frac{3 \times 6^2}{12} = 9 \text{ kN} \cdot \text{m}$$

$$\text{For } CD: \frac{2 \times 4}{2} = 4 \text{ kN} \cdot \text{m}$$

Distribution Factors

$$k_{BA} = \frac{3EI}{3}, \quad k_{BC} = \frac{4EI}{6}$$

$$k_{CB} = \frac{4EI}{6}, \quad k_{CD} = \frac{4 \times 2EI}{4}$$

$$DF_{BA} = \frac{1}{1 + 2/3} = 0.6$$

$$DF_{BC} = 1 - 0.6 = 0.4$$

$$DF_{CB} = \frac{2/3}{2/3 + 2} = 0.25$$

$$DF_{CD} = 1 - 0.25 = 0.75$$

$$DF_{DB} = 1 \text{ (pin support)}$$

$$DF_{DC} = 0 \text{ (fixed support)}$$

	A	B	C	D
DF	0.6	0.4	0.25	0.75
Initial FEM	-4.5	9	-9	1
Iteration 1	-2.7	-1.8	2	6
Iteration 2	-0.6	-0.4	0.225	0.675
Iteration 3	-0.068	0.113	-0.2	0.338
Iteration 4	-0.015	-0.045	0.05	0.15
Iteration 5	-0.0015	0.0025	-0.003	0.0075
Iteration 6	-0.00015	-0.0001	0.0006	0.0017
Final	-7.88	7.88	-7.84	7.84
Reaction				2.41

