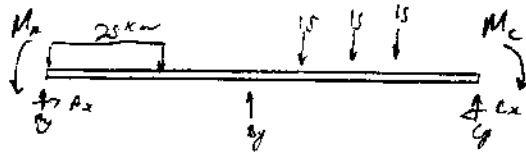


FBD



$EI = \text{constant}$

10/10

$$FEM_{AB} = -\frac{11}{192} WL^2 = +\frac{11(25)(6^2)}{192} = -51.563 \text{ kN}\cdot\text{m}$$

$$FEM_{BA} = \frac{5}{192} WL^2 = \frac{(5)(25)(6^2)}{192} = 23.438 \text{ kN}\cdot\text{m}$$

$$FEM_{BC} = -\frac{1}{48} PL = -\frac{(15)(15)(3)}{48} = -37.5$$

$$FEM_{CB} = \frac{1}{48} PL = \frac{(15)(15)(3)}{48} = +37.5$$

21/50

PROB. 12-19?

Distribution factors

$DF = K/EK$

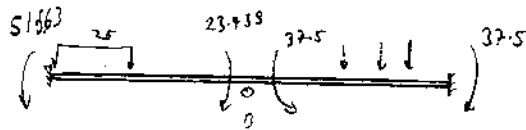
$K = I/L$

$$DF_{BA} = \frac{1/6}{(1/6 + 1/8)} = 0.571$$

COF = 1/2 For fixed ends  
0 for hinges & rollers

$$DF_{BC} = \frac{1/8}{(1/6 + 1/8)} = 0.429$$

Diagram



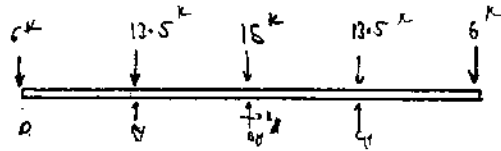
Member End	AB	BA	BC	CB
DF	0	0.571	0.429	0
FEM	-51.563	23.438	-37.5	37.5
Bal Int B	4.015 ←	8.029	6.033 →	3.017
$\Sigma$	-47.548			40.517

$$UM = 23.438 + (-37.5) = -14.062$$

$$\therefore M_{AB} = \underline{\underline{-47.5 \text{ kN}\cdot\text{m}}}$$

$$M_{CB} = \underline{\underline{40.5 \text{ kN}\cdot\text{m}}}$$

FBD



$EI = \text{constant}$

3° of freedom

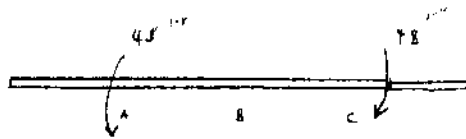
$\frac{I}{16}$

Due to overhangs

$$FEM_{AD} = 6^k \times 8 = 48^{1-k} \quad \left. \begin{array}{l} \text{ } \\ \text{ } \end{array} \right\} -$$

$$FEM_{CE} = 6^k \times 8 = 48^{1-k} \quad \left. \begin{array}{l} \text{ } \\ \text{ } \end{array} \right\} +$$

Redrawn



$$D.F. = \frac{k}{2k} \quad k = \frac{I}{L}$$

$$D.F_{BA} = \frac{10}{(10+10)} = 0.5$$

$$D.F_{BC} = 0.5 \quad \text{so } 48(0.5) = 24^{1-k}$$

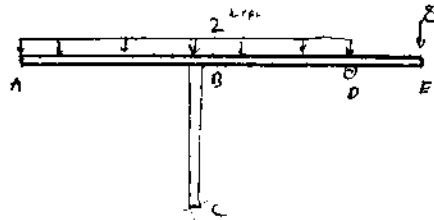
$$\therefore M_{AD} = -48^{1-k}$$

$$M_{BC} = 24^{1-k}$$

$$M_{CE} = 48^{1-k}$$

- 3 Moment Diagram

FBD



I constant all out

FEM

$$FEM_{AB} = -\frac{wL^2}{12} = -\frac{2(15^2)}{12} = -37.5 \text{ k}\cdot\text{m} \quad FEM_{DE} = 37.5 \text{ k}\cdot\text{m}$$

$$FEM_{BD} = -\frac{wL^2}{12} = -24 \text{ k}\cdot\text{m} \quad FEM_{DB} = 24 \text{ k}\cdot\text{m}$$

$$FEM_{DE} = 37.5 = 64 \text{ k}\cdot\text{m} \quad FEM_{CC} = 0 = FEM_{CB}$$

Distribution factor  $DF = \frac{k}{\sum k} \quad k = I/L$

$$DF_{BA} = \frac{15^{-1} (12)}{15^{-1} (12) + 12^{-1} (12)} = 0.26$$

$$DF_{BD} = \frac{12^{-1} (36)}{\frac{1}{4} 15^{-1} (12) + 12^{-1} (12) + \frac{1}{8} 12^{-1} (12)} = 0.32 \quad DF_{DC} = \frac{12^{-1}}{\frac{1}{4} 15^{-1} (12) + 12^{-1} (12) + \frac{1}{8} 12^{-1} (12)} = 0.42$$

$$DF_{DB} = \frac{12^{-1}}{12^{-1} + 8^{-1}} = 0 \quad DF_{DE} = 0$$

Joint	A	B		D		C	
Member Ends	AB	BA	BC	BD	DB	DE	CB
D.F	1	0.26	0.42	0.32	1	0	0
FEM	-37.5	37.5	0	-24	24	64	0
Balance Joint C/O		-3.86	-4.82	-1.82	-38.2	-52.5	

3 End Moments

-3 Moment Diagram.

22-141 50 SHEETS  
22-142 100 SHEETS  
22-143 200 SHEETS

22-144 300 SHEETS