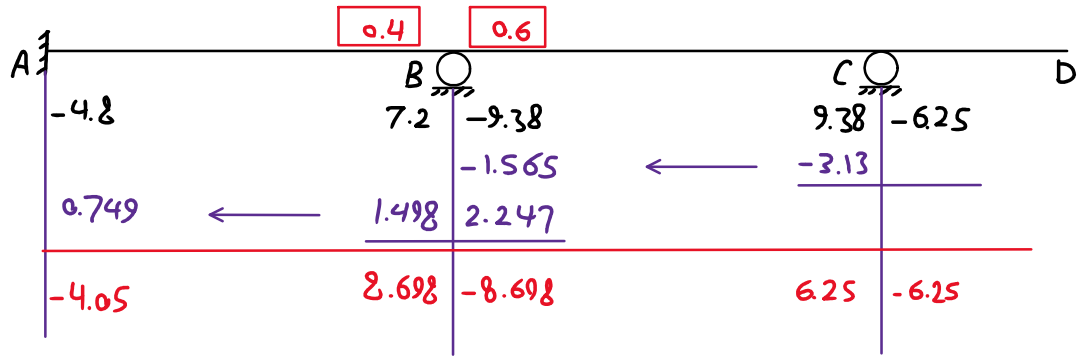
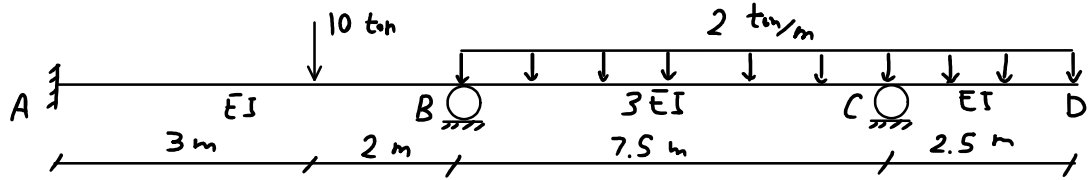


مثال: دوران  $\theta_B$  و  $\theta_C$  را پیدا کنید.

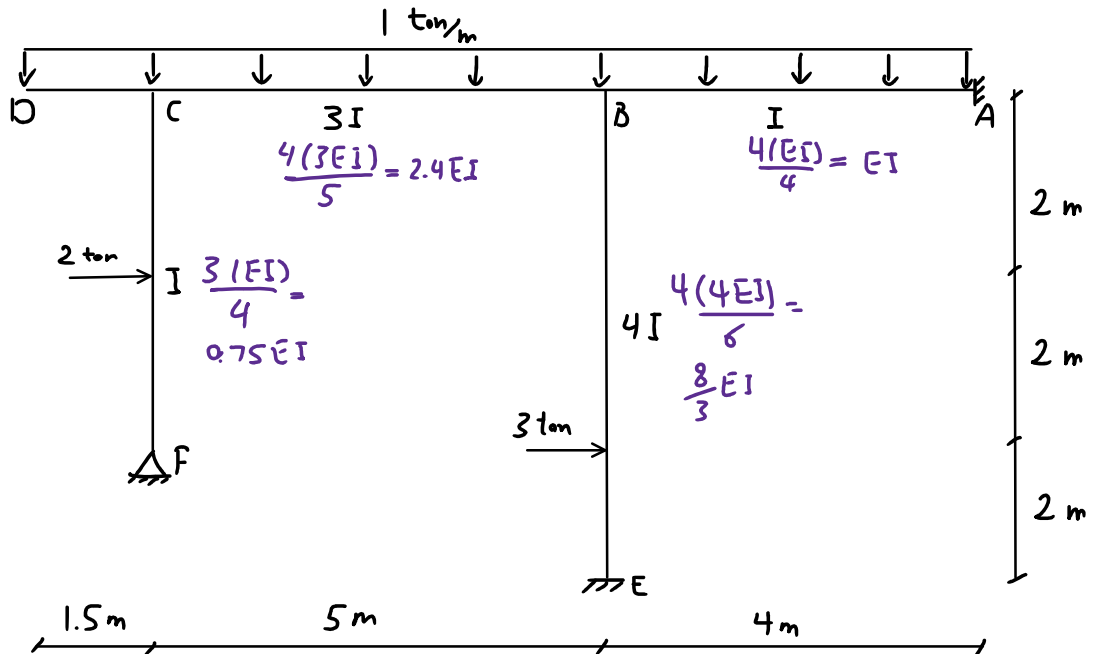


$$M_{BA} = \frac{2EI}{L} (2\theta_B) + FEM_{BA}$$

$$8.698 = \frac{4EI}{5} \theta_B + 7.2 \rightarrow \theta_B = \frac{1.87}{EI}$$

$$M_{CB} = \frac{4(3EI)}{7.5} \theta_C + \frac{2(3EI)}{7.5} \left( \frac{1.87}{EI} \right) + 9.38 \rightarrow \theta_C = -\frac{2.89}{EI}$$

مثال: دوران  $\theta_B$  و  $\theta_C$  را پیدا کنید.



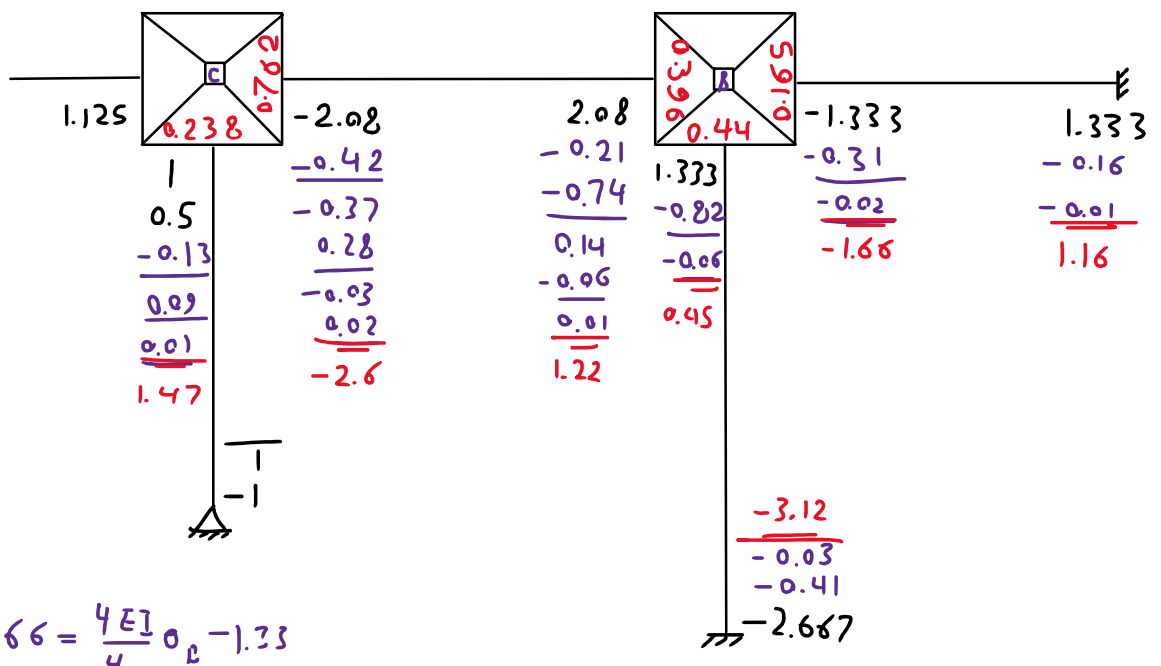
$$M_{BE} = \frac{4(4EI)}{6} \theta_B + FEM_{BE} \rightarrow \theta_B = -\frac{0.33}{EI}$$

$$M_{CI} = \frac{3EI}{4} \theta_C + (FEM_{CI} - \frac{1}{2} FEM_{CI}) \rightarrow \theta_C = -\frac{0.04}{EI}$$

$$M_{CF} = \frac{3EI}{4} \theta_C + \left( FEM_{CF} - \frac{1}{2} FEM_{FC} \right) \cdot 1.5 \rightarrow \theta_C = -\frac{0.04}{EI}$$

$$M_{FC} = \frac{4EI}{4} \theta_F + \frac{2EI}{4} \theta_C + FEM_{FC}$$

$$0 = EI \theta_F + \frac{1}{2} EI \left( \frac{-0.04}{EI} \right) - 1 \rightarrow \theta_F = \frac{1.02}{EI}$$



$$-1.66 = \frac{4EI}{4} \theta_D - 1.33$$

مثال: قاب شکل زیر را به روش توزیع گشت تحلیل کنید.

Structural diagram of a frame with a horizontal beam AC and a vertical column BD. A uniformly distributed load of 1.5 ton/m is applied to the beam from A to B. A horizontal load of 4 ton is applied to the column at B. The column is fixed at D. The beam is fixed at C. Handwritten calculations for stiffness and distribution factors are shown.

Stiffness calculations:

- At B:  $\frac{3EI}{4} = 0.75EI$
- At C:  $\frac{4EI}{4} = EI$
- At D:  $\frac{4EI}{5} = 0.8EI$
- At D:  $k_D = 0.5EI$

Distribution factors (DF):

- At B:  $\frac{0.75}{2.55} = 0.294$
- At B:  $\frac{0.8}{2.55} = 0.314$
- At B:  $\frac{1}{2.55} = 0.392$
- At C:  $\frac{0.8}{1.3} = 0.615$
- At C:  $\frac{0.5}{1.3} = 0.385$

Final calculation for rotation at D:

$$\theta_D = \frac{M_D}{I} = \frac{1.37}{EI} = \frac{2.74}{EI}$$

حساب دوران گره پس از محاسبه گشتها انتهای

حساب دوران گره پس از محاسبه تیرها استهیل

$$\theta_D = \frac{M_s}{k_\theta} = \frac{1.37}{0.5EI} = \frac{2.74}{EI}$$

$$M_{Bc} = \frac{4EI}{4} \theta_D \rightarrow \theta_D = \frac{-2.59}{EI}$$

$$M_{BA} = \frac{3EI}{4} \theta_D + 3 \rightarrow \theta_D = \frac{-2.59}{EI}$$

