

MUHAMMAD AZAN QAZI .

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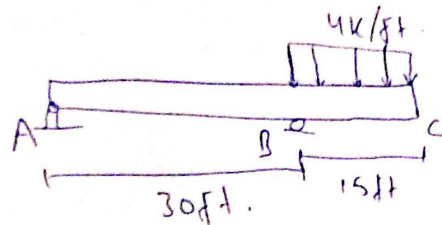
Sec A .

Civil Engineering Department.

Conjugate Beam method.

Sir Amjad Islam

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Using the  $\frac{M}{EI}$  diagram and Elastic Curve Shown.

$$\theta_c = \theta_{c/A} + \frac{1}{2}$$

$$\theta_c = \theta_{c/A} = \frac{1}{2} \left( \frac{4 \times 45}{EI} \right) (45) + \frac{2(4)(45)}{EI} (45) + \frac{1}{2} \left( \frac{4 \times 45}{EI} \right) (45) = \frac{1}{EI} (4050 + 16200 + 4050)$$

$$\theta_c = \frac{24300}{EI} \text{ rad}$$

$$\Delta_c = \theta_{c/A} = \left[ \frac{1}{2} \left( \frac{4 \times 45}{EI} \right) (45) \right] \left[ 45 + \frac{2}{3} (45) \right] + \left[ \frac{2(4)(45)}{EI} (45) \right] \left( 45 + \frac{45}{2} \right) + \left[ \frac{1}{2} \left( \frac{4 \times 45}{EI} \right) (45) \right] \left( \frac{2}{3} (45) \right)$$

$$= \frac{8100}{2EI} [75] + \left( \frac{16200}{EI} \right) (67.5) + \left( \frac{8100}{2EI} \right) (30)$$

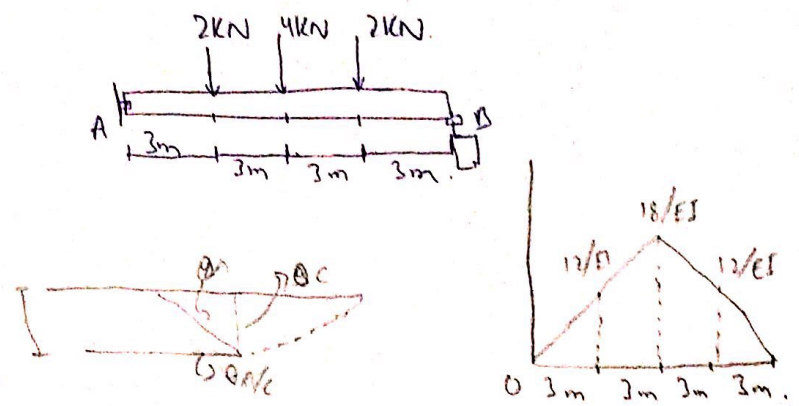
$$A_c = \frac{607500 + 1093500 + 243000}{6EI}$$

$$D_e = \frac{1944000}{6EI}$$

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Answer.





$$\theta_{A/C} = \frac{1}{2} \left( \frac{12}{EI} \right) (3) \left( \frac{3}{EI} \right) + \frac{1}{2} \left( \frac{6}{EI} \right) (3)$$

$$\theta_{A/C} = \frac{18}{EI} + \frac{36}{EI} + \frac{9}{EI}$$

$$\theta_{A/C} = \frac{63}{EI} \quad \text{Putting the values.}$$

$$\theta_{A/C} = \frac{63}{(200 \times 10^6)(6 \times 10^6)(1000)^4} = \frac{63}{1200}$$

$\Delta_c = \theta_{A/C} = 0.0201$   
 $\Delta_c = 20.1 \text{ mm. Answer}$

$$\theta_{A/C} = 0.0525 \text{ radians.}$$

$$\theta_{A/C} = 0.0525 \text{ rad. Ans.}$$

$$\theta_{A/C} = \left[ \frac{1}{2} \left( \frac{12}{EI} \right) (3) \left[ \frac{2}{3} (3) \right] + \left[ \frac{12}{EI} (3) \right] \left( 3 + \frac{1}{2} (3) \right) \right] + \left[ \frac{1}{2} \left( \frac{6}{EI} \right) (3) \right] \left( 3 + \frac{2}{3} (3) \right) = 0.202 \text{ m}$$