ESE GATE PSUs
State Engg. Exams

MADE EASY Workbook 2025

Detailed Explanations of Try Yourself *Questions*

Civil Engineering

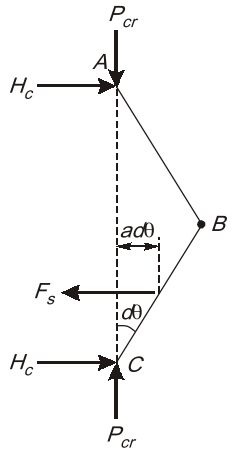
Strength of Materials

9 Theory of Columns

Detailed Explanation of Try Yourself Questions

T1 : Solution

A free body diagram of the entire system of two rigid bars is shown below



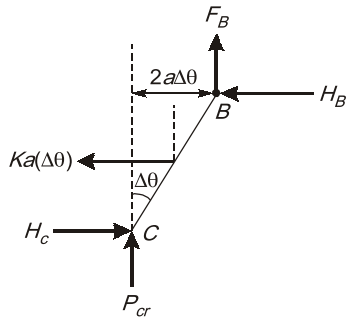
Take, $\Sigma M_A = 0$

$\Rightarrow \quad H_c \times 4a - F_s \times 3a = 0$

$\Rightarrow \quad H_c \times 4a - ka(d\theta) \times 3a = 0$

$\therefore \quad H_c = \dfrac{3\,ka(d\theta)}{4}$

Now, for the calculation of critical load, consider the free body diagram of lower bar *BC*, shown below



Take, $\sum M_B = 0$

$\Rightarrow$ $H_c \times 2a - P_{cr} \times 2a(d\theta) - ka\,(d\theta) \times a = 0$

$\Rightarrow$ $P_{cr} = \dfrac{ka}{4}$

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