SOLUTION (Comprehensive examination 2016-17)

Mechanics of Solids (PART -A)

Ans: 1

Rigid Beam ACB Rotates through angle 'θ' to close the gap

$\tan\theta = \frac{BE}{AB} = \frac{\delta_c}{AC}$ where δ_c = deflection of CD due to close the gap

$\Rightarrow \delta_c = \frac{0.08 \times 1.5\times10^{-3}}{0.40} = \boxed{3\times10^{-4}\ m}$ (1)

Again $\delta_c = \frac{F_{CD} L_{CD}}{E A_{CD}} \Rightarrow F_{CD} = \frac{200\times10^9 \times 3.14\times10^{-6} \times 3\times10^{-4}}{0.25}$

Where $A_{CD} = \frac{\pi}{4}\times(2\times10^{-3})^2 = 3.14\times10^{-6}\ m^2$

$= \boxed{753.6\ N}$ (2)

F.B.D of ACB

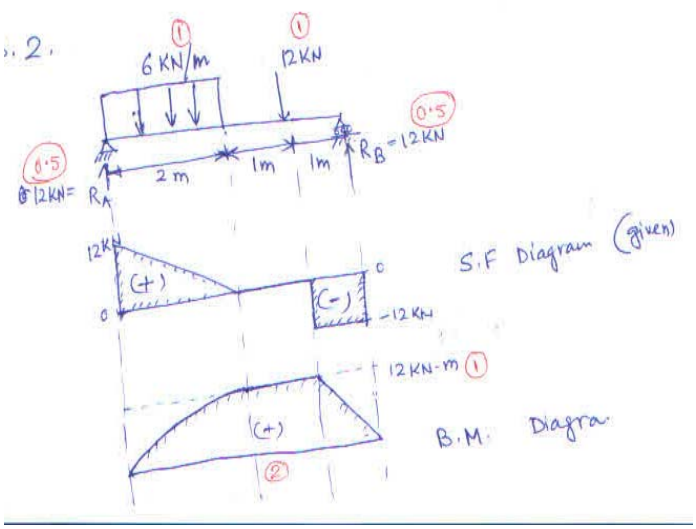
F_{CD}, $W = mg = 196.2\ N$, R_A (1)

$\Sigma M_A = 0$ (1)

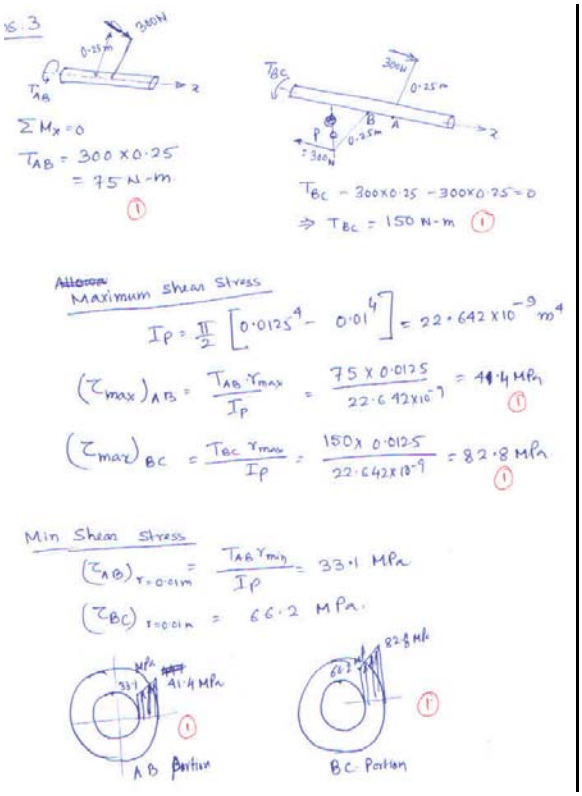
$\Rightarrow 0.08 \times F_{CD} = (0.40 - x) W$

$\Rightarrow \boxed{x = 92.72\ mm}$ (1)

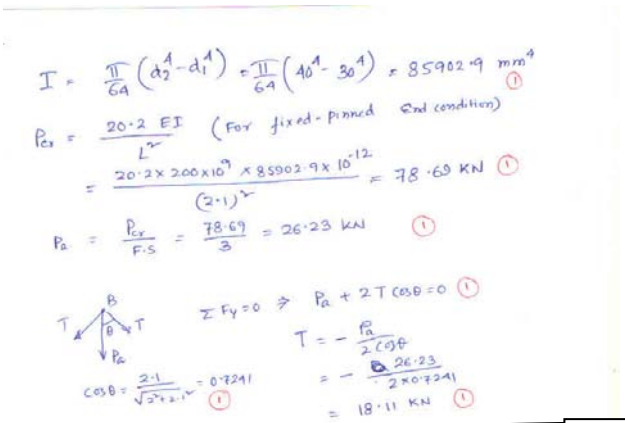
Ans:2



Ans 3



Ans 4



Ans 5