ME 247: Engineering Mechanics-I Time: 20 Mins.
CT# 2 Name: Student #:

1. A rectangular plate is acted upon by the force and couple as shown in Fig. 1. Find the distance from B along the line AB at which the given force-couple system can be replaced by a single equivalent force. Given that $\alpha = 40°$.
2. The bracket BCD is hinged at C and attached to a control cable at B as shown in Fig. 2. For the loading shown, determine the tension in the cable and reaction at C.

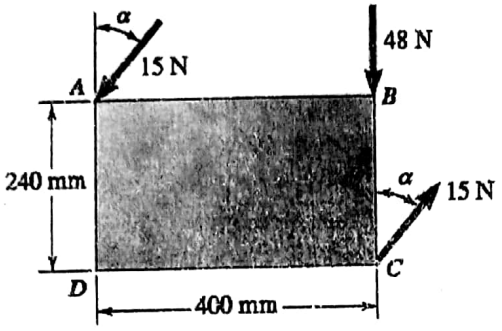


Fig. 1

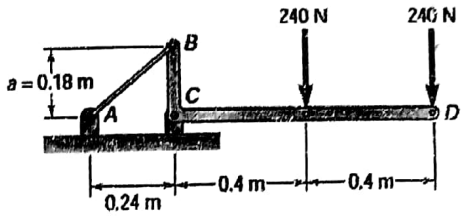
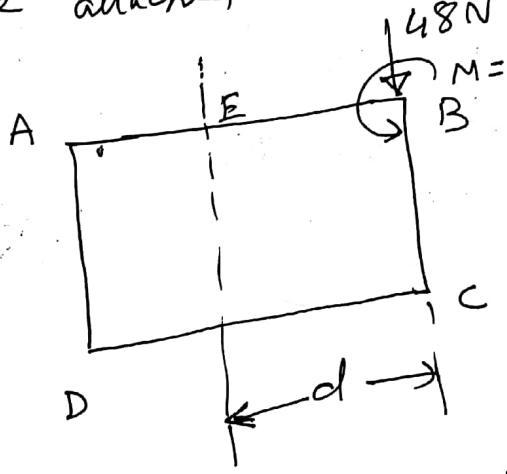


Fig. 2

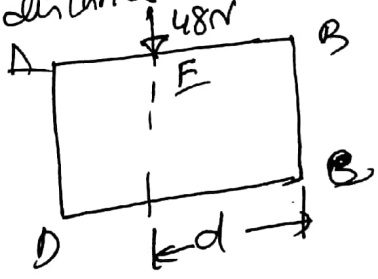
1. The moment of the couple is $M = (15\cos 40° \times 400 + 15\sin 40° \times 240)$ N.mm

$M = 6910.30$ N.m

The couple can be attached at point B as shown



Say the force-couple system can be replaced by a single force at point E at a distance d from B.

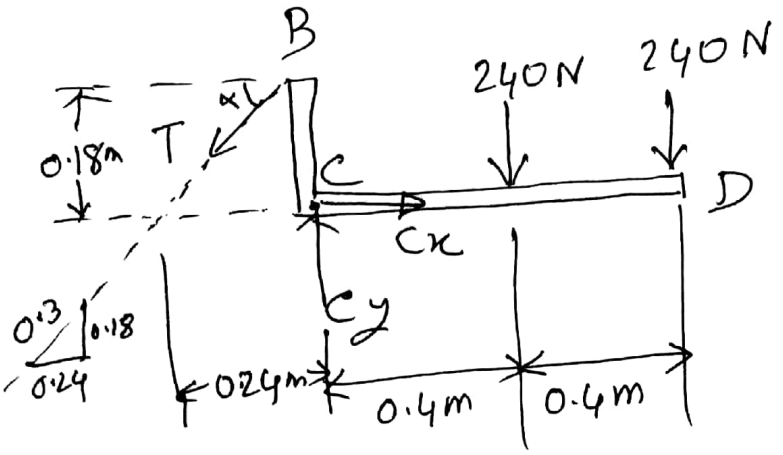


Thus, $M_B = 48 \times d = 6910.30$

$d = 143.96$ mm

$\simeq \boxed{144 \text{ mm}}$ Ans:—

2.



$\circlearrowleft + \Sigma M_C = 0; \quad \frac{0.24}{0.3} T \times 0.18 - 240 \times 0.4 - 240 \times 0.8 = 0$

$T =$ **2000 N** Ans.—

$\swarrow 36.87°$

$\pm \Sigma F_x = 0; \quad -\frac{0.24}{0.3} \times T + C_x = 0 \Rightarrow C_x = \frac{0.24}{0.3} \times 2000$

$C_x =$ **1600 N →** Ans:—

$+\uparrow \Sigma F_y = 0; \quad -T \times \frac{0.18}{0.3} + C_y - 240 - 240 = 0$

$C_y = 240 + 240 + 2000 \times \frac{0.18}{0.3}$

$C_y =$ **1680 N ↑** Ans:—