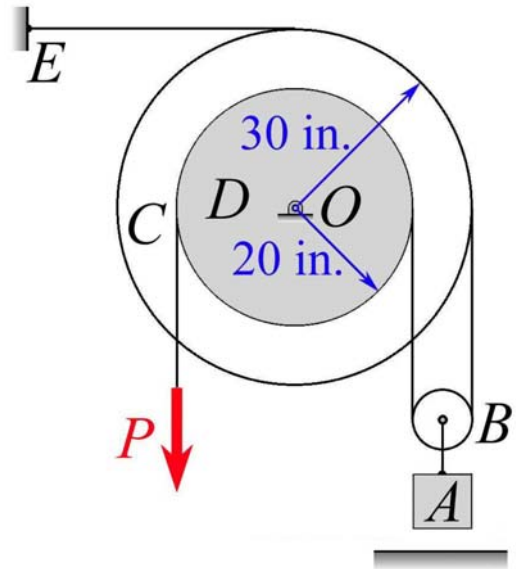Two drums C and D are rigidly fastened together and are free to rotate about the bearing at O as shown. The value of μ_s is 0.12 between the belt and all surfaces of the drums. Determine the minimum magnitude P_{min} of the applied force $\mathbf{P}$ required to prevent the 100-lb block A from falling down to the ground.

FBD for block A and pulley at B: ①

$$+\uparrow \Sigma F_y = 0: \quad T_B + T_B - 100 = 0$$

$$T_B = 50 \text{ lb} \quad ①$$

<u>Case *(a)*</u>: Slipping between belt and drum D impends.

$$50 = Pe^{0.12\pi} \qquad P = 34.2961 \text{ lb} \quad ②$$

<u>Case *(b)*</u>: Slipping between belt and drum C impends.

$$T_E = 50e^{0.12(\pi/2)} \qquad T_E = 60.3716 \text{ lb} \quad ②$$

FBD for both drums: ②

$$+\circlearrowleft \Sigma M_O = 0: \quad 30T_E + 20P - 20(50) - 30(50) = 0$$

$$P = 34.443 \text{ lb} \quad ①$$

<u>Conclusion</u>: Choose the larger of the two P's as answer.

$$P_{min} = 34.4 \text{ lb} \quad ①$$