HW5-14 Soln)

Let up be +y and towards the center of the platter be +c. Convert the angular speed from rpm to rad/sec:

$$\omega = \frac{33.3\ \text{rev}}{\text{min}} \times \frac{2\pi\ \text{radians}}{\text{rev}} \times \frac{1\ \text{min}}{60\ \text{sec}} = 3.5\ \text{rad/sec}\ .$$

We also realize that the radius of the circle for the coin in 15 cm.

Then, write NII:

$$\text{c:}\ \ + F_{fS} = ma_C = m\omega^2 r$$

$$\text{y:}\ F_N - gm = ma_y = 0$$

$$F_{fS} = \mu_S F_N\ \ (\text{crit sit})$$

We're looking for the coefficient of friction, so

$$\mu_S = \frac{F_{fS}}{F_N} = \frac{m\omega^2 r}{gm} = \frac{\omega^2 r}{g} = \frac{3.5^2(0.15)}{10} = 0.18$$