Times:

Part A:	Part B:
$t_1 = 5.52$	$t_1 = 5.65$
$t_2 = 5.58$	$t_2 = 5.75$
$t_3 = 5.39$	$t_3 = 5.68$
$t_{avg} = 5.50$	$t_{avg} = 5.69$

Part A calculations: $t = 5.50\,s$; $m_1 = 0.448\,kg$; $r = 0.155m$

$$F_c = \frac{4\pi^2 mr}{T^2} = \frac{4\pi^2 (0.448)(0.155)}{(0.55)^2} \qquad T_1 = \frac{5.50}{10} = 0.55$$

$$= 9.06\,N$$

$$F_{spring} = mg = (0.960)(9.8) = \boxed{9.4\,N}$$

Part B calculations: $t = 5.69\,s$ $m_2 = 0.5487\,kg$

$$T_2 = \frac{5.69}{10} = \boxed{0.569\,N} \qquad \frac{m_1}{T_1^2} = \frac{m_2}{T_2^2} = T_2 = \sqrt{\frac{m_2}{m_1} \cdot T_1^2}$$

$$= \sqrt{\frac{0.5487}{0.4487} \cdot 0.55^2} \qquad T_2 = \boxed{0.608\,N}$$

Part C calculations:

XA: Distance from center of vertical rotating staff to point A (top of string): 15.5 cm
AM: Distance from point A to the center of mass: 17.5cm
XC: Distance from center of vertical rotating shaft to vertical pointer: 22.4cm
$y_A - y_C$: Vertical distance from point A to pointer: 20.9 cm

$$\theta = \tan^{-1}\left(\frac{x_c - x_A}{y_A - y_C}\right) = \tan^{-1}\left(\frac{22.4cm - 15.5cm}{20.9cm}\right)$$
$$= \tan^{-1}\left(\frac{6.9cm}{20.9cm}\right) = 18.27°$$

$$r = x_A + AM\sin\theta = 0.155m + (0.175m)\sin(18.27°) \approx = 0.21m$$

$$T = \frac{15.21}{10} = 1.521 \; ; \; F_c = g\tan(18.27°) = \boxed{3.52\,N}$$

$$F_c = \frac{4\pi^2(0.21)}{(1.521)^2} = \boxed{3.58N}$$