Phys 206 – Fall 2019

All *University Physics* Sections

Comprehensive Exam

Short answer

A) i) $W = 0$ [LO 32.1]

ii) $T_B = \frac{1}{27} T_A$ [LO 3.1, 63.1]

B) $v_{A/S} = 8$ m/s [LO 6.1, 20.1]

C) [LO 13.1, 13.2, 13.3, 13.4, 13.5, 13.6]

$\vec{v}$	$\nearrow$	$\rightarrow$	$\searrow$
$\vec{a}$	$\downarrow$	$\downarrow$	$\downarrow$

D) $U(x) = \frac{1}{2}kx^2 + \frac{1}{3}\beta x^3$ [LO 8.1, 37.1]

E) i) $I_{\text{tot}} = \frac{5}{2}MR^2$ [LO 51.1, 51.2, 53.1]

ii) $\omega = \sqrt{\frac{4K}{5MR^2}}$ [LO 35.1]

iii) (a) $\tau = TR$ [LO 54.1]

(b) $P = \omega TR$ [LO 33.1]

F) i) $|\langle \vec{v} \rangle_{t=0\to 2}| = 5$ m/s [LO 2.1, 11.1, 11.2]

ii) $|\langle \vec{v} \rangle_{t=0\to 5}| = 10$ m/s [LO 2.2, 11.3, 11.4]

Problem 1: a) Any position and directions okay as long as clearly indicated [LO 9.1, 9.2]

b) $v_0 = \frac{D}{\cos\theta t}$ [LO 1.1, 14.1, 15.1]

c) $t = \frac{1}{2}$ s and $v_0 = \frac{5}{2}$ m/s [LO 1.2, 4.1, 5.1, 14.2, 15.2]

Problem 2: a) $A = 0.1$ m [LO 65.1]

b) $\omega = 4$ rad/s [LO 21.1, 25.1, 65.2, 66.1]

c) $f = \frac{2}{\pi}$ Hz [LO 65.3]

d) $v_{\text{max}} = 0.4$ m/s [LO 65.4]

e) $a_{\text{max}} = 1.6$ m/s^2 [LO 65.5]

Problem 3:

a) $F_{\mathrm{m,s}} = 7$ N [LO 10.1, 60.1, 60.2]

b) $F_{\mathrm{s,m}} = 7$ N [LO 22.1]

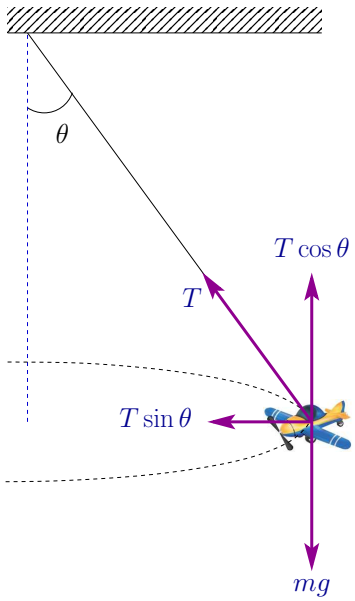
c) $F_{\oplus,\mathrm{s}} = \frac{21}{4}$ N [LO 10.2, 60.3, 60.4]

d) $F_{\mathrm{s},\oplus} = \frac{21}{4}$ N [LO 22.2]

e) $a = \frac{7}{8000}$ m/s$^2 \approx 0.001$ m/s^2 [LO 21.2]

Problem 4:

a) [LO 23.1, 24.1]



b) $\theta = 36.9°$ [LO 2.3, 3.2]

c) $T = 1.25$ N [LO 1.3, 21.3, 23.2, 24.2]

d) $v = 1.5$ m/s [LO 1.4, 16.1, 18.1, 19.1, 21.4]

Problem 5:

a) $W_{\mathrm{fric}} = -\mu_k mg\Delta x$ [LO 21.5, 23.3, 26.1, 28.1, 32.2]

b) $W_{\mathrm{spring}} = \frac{1}{2}k\delta x^2$ [LO 32.3, 38.1]

c) $v = \sqrt{\frac{k}{m}\Delta x^2 - 2\mu_k g\Delta x}$ [LO 3.3, 34.1, 39.1]

d) $D = \frac{k\Delta x^2}{2\mu_k mg} - \Delta x$ [LO 6.2, 36.1, 40.1, 40.2]