Answers Exam 2 2008

(1) a) $W^{Gravity} = 0$

b) $W^{friction} = -2\mu mg\cos\theta B$

c) $W^{max} = 2\mu mg\cos\theta B$

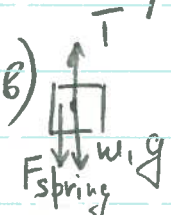
(2) a) $x_s = A + \frac{v_1^2}{2\mu g}$

b) $\left(-\mu_0 x_s - \frac{\mu_0 x_s^2}{2L} + \mu_0 A + \frac{\mu_0 A^2}{2L}\right)mg = -\frac{mv_1^2}{2}$

c) $v(t^*) = -\mu_0 g\left(t^* + \frac{t^{*2}}{2s}\right) + v_1 = 0 \Rightarrow$ find t^*

$$x(t^*) = -\mu_0 g\left(\frac{t^{*2}}{2} + \frac{t^{*3}}{6s}\right) + v_1 t^* + A$$

(3) a) 

b) 

c) $W^{(1)} = \int_0^H (T - w_1 g - kx)\,dx = \frac{w_1 v_{1f}^2}{2}$

$W^{(2)} = \int_0^H (w_2 g - T)\,dx = \frac{w_2 v_{2f}^2}{2}$

d) $v = \sqrt{\frac{2}{w_1 + w_2}\left((w_2 - w_1)gH - \frac{kH^2}{2}\right)}$

(4) a) $U = +\frac{\beta x^2}{2} - \beta c x + C$

b) $v_2 = \sqrt{\frac{2}{m}\left(\frac{3\beta A^2}{8} - \frac{\beta c A}{2} + \frac{m v_1^2}{2}\right)}$

c) $\frac{dU}{dx} = \beta(x-c) = 0 \Rightarrow U_{min}$ at $x = c$

$\frac{mv^2}{2}$ is maximum at $x = c$