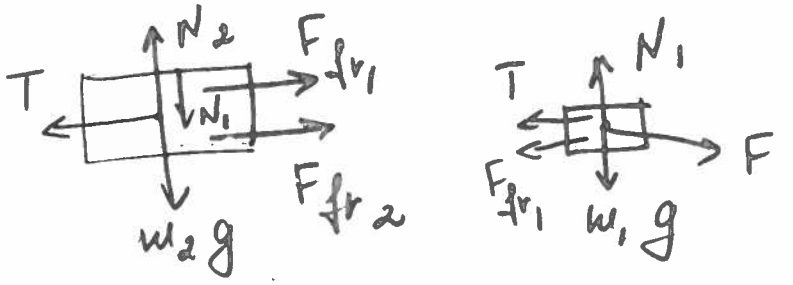
Answers Exam 2 2011

1. a) 

b) $F\cos\varphi - T - \mu_1 N_1 = m_1 a_x$

$N_1 - F\sin\varphi - m_1 g = 0$

$\mu_1 N_1 + \mu_2 N_2 - T = -m_2 a_x$

$N_2 - N_1 - m_2 g = 0$

2. a) $v_a = \sqrt{\frac{2}{m}\left(\frac{\alpha A^2}{2} + \frac{\beta A^6}{6} - \mu m g A + \frac{m v_1^2}{2}\right)}$

b) $v(t=T) = \frac{\alpha T^2}{2m} + \frac{\beta T^6}{6m} - \mu g T + v_1$

3. a) $x_s = v_1\sqrt{\frac{m}{k_1}}$

b) $-\frac{k_1 S^2}{2} - \frac{k_2}{2}(x_s^2 - S^2) + k_2 S(x_s - S) - k_1 S(x_s - S) = -\frac{m v_1^2}{2}$

4. a) $U = -c_1 x + \text{Const}$

b) $F_x = \frac{c_2 x^2}{2} + \frac{c_3}{2x^2} + \text{Const}$

c) $x = \frac{c_1}{c_2}$