

LAST Name: _____

ANSWERS-

First Name: _____

Student Number: _____

MIE 200F - Quiz number 4b – October 11, 2001

quiz duration = 25 minutes

The small slider of mass 15 kg moves from "B" to "C" along a frictionless rod. A constant force $P = 80$ Newtons is being applied to the rope in the direction shown. The spring has a relaxed length of 100 mm, and a stiffness of $k = 200 \text{ N/m}$.

- Find the work done by the spring on the slider as the slider moves from "B" to "C".
- Find the work done by the rope on the slider as the slider moves from "B" to "C".
- Find the work done by gravity on the slider as the slider moves from "B" to "C".

$$T_2 = T_1 + U_{1 \rightarrow 2}$$

$$g = 9.81 \text{ m/s}^2 \downarrow$$

$$U_{\text{spring}} = \frac{1}{2} k (x_1^2 - x_2^2)$$

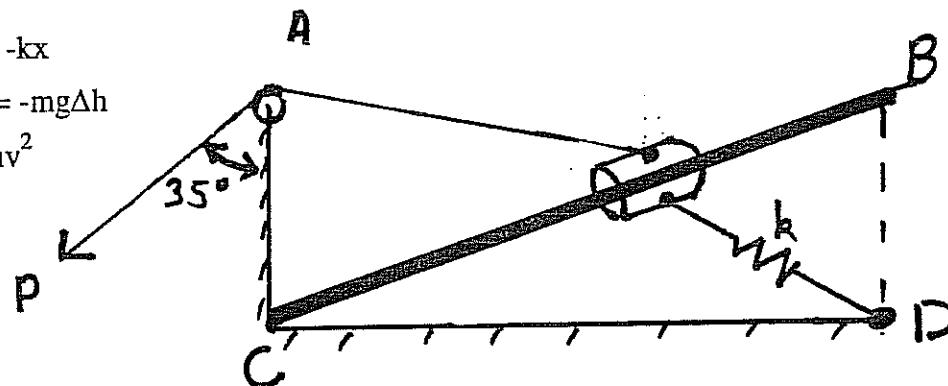
$$F_{\text{spring}} = -kx$$

$$U_{\text{gravity}} = -mg\Delta h$$

$$T = \frac{1}{2} mv^2$$

$$CD = 0.4 \text{ m}$$

$$AC = BD = 0.2 \text{ m}$$



$$(a) U = \frac{1}{2} k (x_1^2 - x_2^2)$$

$$= (200)(0.01)([0.2 - 0]^2 - [0.4 - 0]^2)$$

$$= 100 (0.01 - 0.09) = -8 \text{ Joules}$$

$$(b) U = \int \vec{F} \cdot d\vec{s} = (P)(0.4 - 0.2)$$

$$U = (80)(0.2) = 16 \text{ Joules}$$

$$(c) U = -mg\Delta h$$

$$U = -(15)(9.81)(-0.2) = 29.43 \text{ Joules}$$