

$$a) k_x = mg$$

$$k = \frac{mg}{x} \Rightarrow k = \frac{0,2 \cdot 9,81}{0,2}$$

$$\boxed{k = 9,81 \frac{N}{m}}$$

$$b) E_0 = \frac{kx_0^2}{2} \Rightarrow \frac{9,81 \cdot (0,05)^2}{2} = 0,01226 J$$

$$\boxed{E_0 = 1,223 \cdot 10^{-2} J}$$

C-)

$$A_n = A_0 e^{-n\gamma t}$$

$$\omega_0 = \sqrt{\frac{k}{m}}$$

$$\frac{1}{5} A_0 = A_0 e^{-5\gamma t}$$

$$\omega_0 = \sqrt{\frac{9,81}{0,2}}$$

$$\ln\left(\frac{1}{5}\right) = -5\gamma t$$

$$\omega_0 = \sqrt{49,05}$$

$$\gamma t = \frac{\ln(1/5)}{-5}$$

$$\underline{\omega_0 = 7,00}$$

$$\gamma t = 0,322$$

$$\omega = \sqrt{\omega_0^2 - \gamma^2}$$

$$\gamma = \frac{0,322}{0,9}$$

$$\omega = \sqrt{(7,00)^2 - (0,358)^2}$$

$$\underline{\gamma = 0,358}$$

$$\omega = \sqrt{48,92}$$

$$\underline{\omega = 6,99}$$