AD CARLOS III DE MADRID

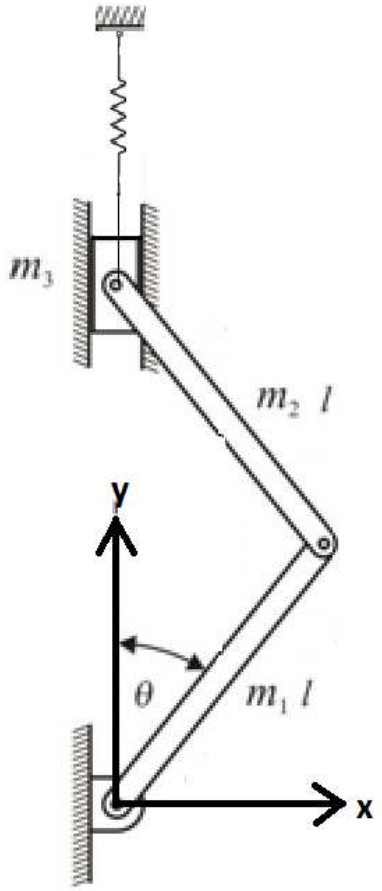
· in Mechanical Engineering — RTIAL EXAM

Theory of Machines — ɔer, 15th 2011

SURNAME:_____
NAME:_____ **NIA:**_____

The mechanism in the figure is composed by two thin and uniform bars 1 and 2 with mass m_1 and m_2 and length l. The bars are connected to a slider of mass m_3. In addition, the slider is connected to a spring with a constant k and l_0 equal to $2\,l$ for θ=-45º according to the reference system given in the figure below. The spring is attached to the slider at its pin joint. Take into account that the mechanism is under the action of gravity.

a) Write a simplified expression for the potential and kinetic energy of the system in terms of the generalized coordinate θ. (2.5p)
b) Find the equations of motion of the mechanism. (2.5p)



UNIVERSIDAD CARLOS III DE MADRID

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A shaft with a 120 mm diameter is supported by a plain bearing with a length of 100 mm with a diametrical clearance of 0.2 mm and it is lubricated with oil that has a viscosity of 60 mPa·s. The shaft rotates at 720 rpm and the radial load is 6000 N. Find the bearing coefficient of friction and the power loss (5 points).

EXPRESSIONS: $f = 2\pi^2 \left(\frac{\mu n}{P}\right)\left(\frac{R}{c_r}\right)$; $T_f = f\,W\,R$; $H = 2\pi T_f n$

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