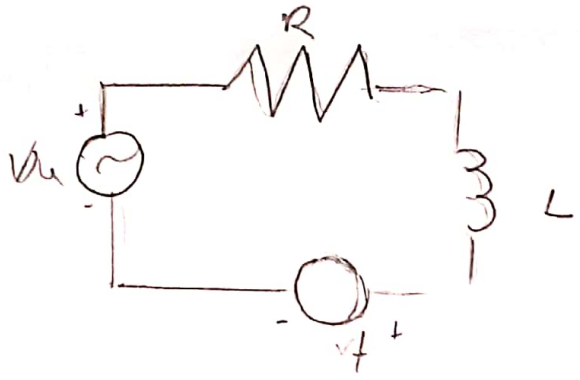
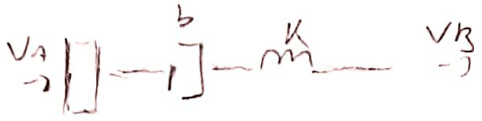
Samuel Alves 107 64 634

1.





Lagrange: $T = \frac{m\dot{x}}{2}$ $V = \frac{\lambda^2}{2L}$ $R = \frac{b\dot{x}^2}{2} + \frac{\dot{\lambda}^2}{2R}$

Para x:

$\frac{\partial L}{\partial \dot{x}} = M\dot{x}$ $\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{x}}\right) = M\ddot{x}$ $\frac{\partial L}{\partial x} = 0$ $\frac{\partial R}{\partial \dot{x}} = b\dot{x}$

$$M\ddot{x} + b\dot{x} = lBi$$

Para λ:

$\frac{\partial L}{\partial \dot{\lambda}} = 0$ $\frac{\partial L}{\partial \lambda} = \frac{-\lambda}{L}$ $\frac{\partial R}{\partial \dot{\lambda}} = \frac{\dot{\lambda}}{R}$

$$\frac{\lambda}{L} + \frac{\dot{\lambda}}{R} = \frac{V_a}{R} + \frac{lBx}{L}$$

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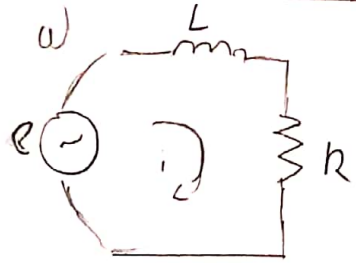
2. a)



$e(t) = (LD + R)i$

Lagrange

Para θ: $L = \frac{J\dot{\theta}^2}{2}$ $R = \frac{B\dot{\theta}^2}{2}$

$\frac{\partial L}{\partial \dot{\theta}} = J\dot{\theta}$ $\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{\theta}}\right) = J\ddot{\theta}$ $\frac{\partial L}{\partial \theta} = 0$ $\frac{\partial R}{\partial \dot{\theta}} = B\dot{\theta}$

$$J\ddot{\theta} + B\dot{\theta} = T = Kq$$

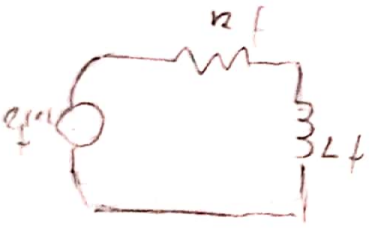
Para q: $L = \frac{Li^2}{2}$ $R = \frac{Rq^2}{2}$

$\frac{\partial L}{\partial \dot{q}} = L\dot{q}$ $\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{q}}\right) = L\ddot{q}$ $\frac{\partial L}{\partial q} = 0$ $\frac{\partial R}{\partial \dot{q}} = R\dot{q}$ $\rightarrow$ $L\ddot{q} + R\dot{q} = e(t)$

Supondo $L = 0$ $\quad \dot{q} = \frac{\varepsilon}{R}$

$$J\ddot{\theta} + B\dot{\theta} = \frac{\varepsilon K}{R}$$

b)



$i_0 = cte$

$B(t) = K_t i_0$ $\qquad T(t) = K_t I(t)$

Lagrange:

$$T = \frac{J\omega^2}{2} + \frac{Li^2}{2} = \frac{J\dot{\theta}^2}{2} + \frac{L\dot{q}^2}{2} \qquad V = 0$$

$$R = \frac{B\omega^2}{2} + \frac{Ri^2}{2} = \frac{B\dot{\theta}^2}{2} + \frac{R\dot{q}^2}{2}$$

$B\omega$ 0:

$$\frac{\partial L}{\partial \dot{\theta}} = J\dot{\theta} \qquad \frac{d}{dt}\left(\frac{\partial L}{\partial \dot{\theta}}\right) = J\ddot{\theta} \qquad \frac{\partial L}{\partial \theta} = 0 \qquad \frac{\partial R}{\partial \dot{\theta}} = B\dot{\theta}$$

$$J\ddot{\theta} + B\dot{\theta} = K\dot{q}_1(t)$$