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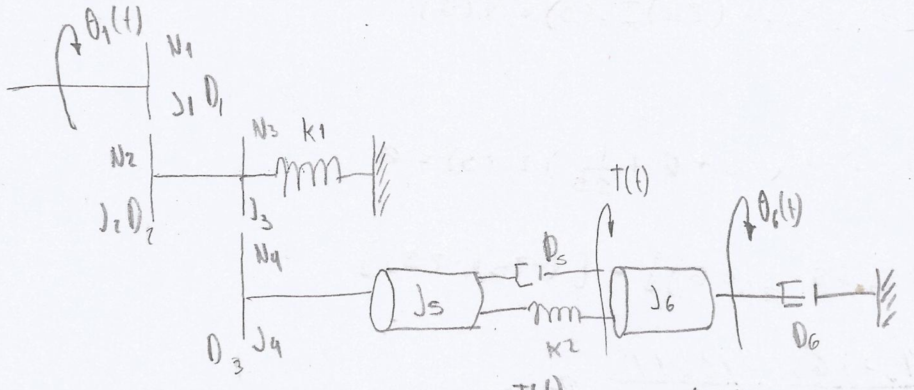
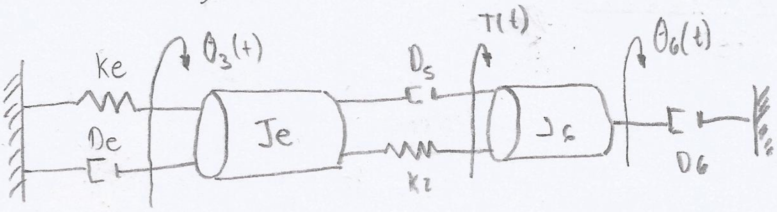
Para el sistema rotacional de la fig encuentre las ecuaciones dinámicas $N_1=N_3=8$, $N_2=16$, $N_4=24$, D=último digito de número de cuenta, si es cero usar 1, k_2=penúltimo número de cuenta, si es cero usar 2, todas las $J=1$ $k_1=k_2$





$$J_e=\left[J_4+J_5+(J_2+J_3)\left(\frac{N_4}{N_3}\right)^2+J_1\left(\frac{N_4}{N_3}\right)^2\left(\frac{N_2}{N_1}\right)^2\right] \qquad K_e=k_1\left(\frac{N_4}{N_3}\right)^2$$

$$D_e=D_1\left(\frac{N_2}{N_1}\right)^2\left(\frac{N_4}{N_3}\right)^2+D_2\left(\frac{N_4}{N_3}\right)^2+D_3$$

$$(J_es^2+D_es+k_e+D_ss+k_2)\theta_3(s)-(D_ss+k_2)\theta_6(s)=0 \quad \ldots ①$$

$$-(D_ss+k_2)\theta_3(s)+((D_s+D_6)s+k_2+J_6s^2)\theta_6(s)=T(s) \quad \ldots ②$$

Datos:

$N_1=N_3=8$ $\quad N_4=24$

$N_2=16$ $\quad D=6$

$k_1=k_2=9$ $\quad J=1$

Sustituyendo:

$$J_e=\left(1+1+(2)\left(\frac{24}{8}\right)^2+(1)\left(\frac{24}{8}\right)^2\left(\frac{16}{8}\right)^2\right)=\underline{56}$$

$$D_e=6\left(\frac{16}{8}\right)^2\left(\frac{24}{8}\right)^2+6\left(\frac{24}{8}\right)^2+6=\underline{276}$$

$$K_e=9\left(\frac{24}{8}\right)^2=\underline{81}$$

Susten: ①

$$(56s^2+276s+81+6s+9)\theta_3(s)-(6s+9)\theta_6(s)=0$$

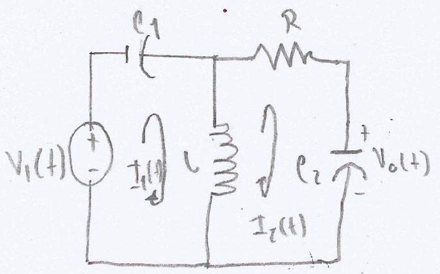
$$(56s^2+282s+90)\theta_3(s)-(6s+9)\theta_6(s)=0$$

Sust en ②:

$$(-6s-9)\theta_3(s)+(12s+9+s^2)\theta_6(s)=T(s)$$

2) Escriba la funcion de transferencia para el voltaje de entrada V_1 y el voltaje de la resistencia R $G(s) = V_r(S)/V_1(s)$, $C_1=1$, $L=2$, $C_2=2$, R= Último digito de número de cuenta si es cero R=3

$V = R I_2$



Malla 1:

$$\left(\frac{1}{s} + 2s\right) I_1(s) - (2s) I_2(s) = V_1(s)$$

Malla 2:

$$-(2s) I_1(s) + \left(2s + 6 + \frac{1}{2s}\right) I_2(s) = 0$$

$$\begin{vmatrix} \left(\frac{1}{s}+2s\right) & -2s \\ (-2s) & \left(2s+\frac{1}{2s}+6\right) \end{vmatrix} \quad \left[\left(\frac{1}{s}+2s\right)\left(2s+\frac{1}{2s}+6\right)\right] - \left[(-2s)(-2s)\right]$$

$$= \frac{24s^3+6s^2+12s+1}{2s^2} \quad D_T$$

$$=$$

$$\begin{vmatrix} \frac{1}{s}+2s & V_1(S) \\ -2s & (0) \end{vmatrix} \quad = +2s V_1(S)$$

$$\Rightarrow I_2 = \frac{+2\cancel{s} V_1(s)}{\frac{24s^3+6s^2+12s+1}{2s^{\cancel{2}}}}$$

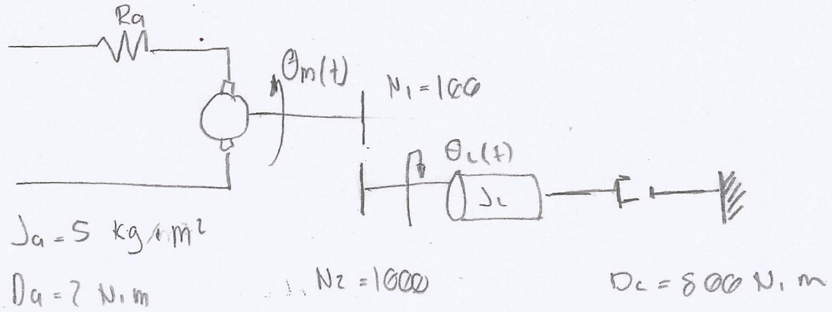
$$I_2 = \frac{+V_1(S)}{S(24s^3+6s^2+12s+1)}$$

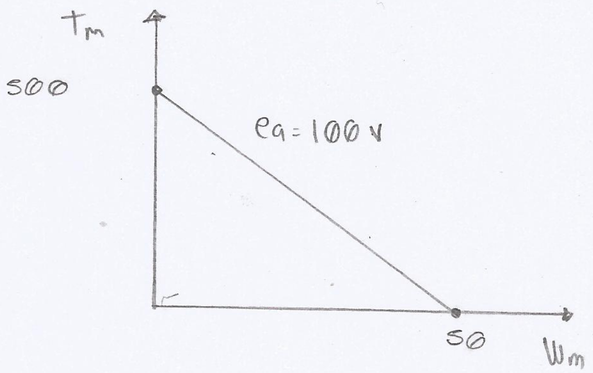
$$G(S) = \frac{R I_2}{V_1(S)} = \frac{\frac{+6 V_1(\cancel{S})}{S(24s^3+6s^2+12s+1)}}{V_1(\cancel{S})}$$

$$\boxed{G(S) = \frac{+6/s}{S(24s^3+6s^2+12s+1)}}$$

Para el siguiente sist, encontrar una función de transferencia donde la salida sea $\omega_L(s)/V_e(s)$

$J_L = 700$





$$J_m = J_a + J_L\left(\frac{N_1}{N_2}\right)^2 = 5 + 700\left(\frac{100}{1000}\right)^2 = 12$$

$$D_M = D_a + D_L\left(\frac{N_1}{N_2}\right)^2 = 2 + 800\left(\frac{100}{1000}\right)^2 = 10$$

$T_{PARMAX} = 500 \ N \cdot m$

$V_e = 100 \ |V|$

$W_{SN\,CARGA} = 50 \ rd/s$

Sabemos:

$$\frac{k_T}{R_M} = \frac{T_{PARMAX}}{V_E} \Rightarrow \frac{k_T}{R_M} = \frac{500}{100} = 5$$

$$\frac{N_1}{N_2} = 0.1$$

Sabemos:

$$K_b = \frac{V_o}{W_{SNCARGA}} = k_b = \frac{100}{50} = 2$$

Sabemos:

$$\frac{\theta_m(s)}{V_e(s)} = \frac{\frac{k_T}{R_M J_M}}{s\left[s + \frac{1}{J_m}\left(D_M + \frac{k_T K_b}{R_M}\right)\right]} = \frac{(5)/(12)}{s\left[s + \frac{1}{(12)}(10 + (5)(2))\right]} = \frac{5/12}{s\left[s + 5/3\right]}$$

$$\frac{\theta_m(s)}{V_e(s)} = \frac{5/12}{s^2 + 5/3\,s}$$

$\Rightarrow$ Sabemos:

$$\frac{\theta_L(s)}{\theta_M(s)} = \frac{N_1}{N_2} \qquad \theta_M(s) = \frac{N_2}{N_1}\theta_L(s)$$

$$\frac{\theta_L(s)}{V_e(s)} = \frac{1/10\,(5/12)}{s^2 + 5/3\,s} = \frac{1/24}{s^2 + 5/3\,s} = \boxed{\frac{1}{24s^2 + 40s}}$$