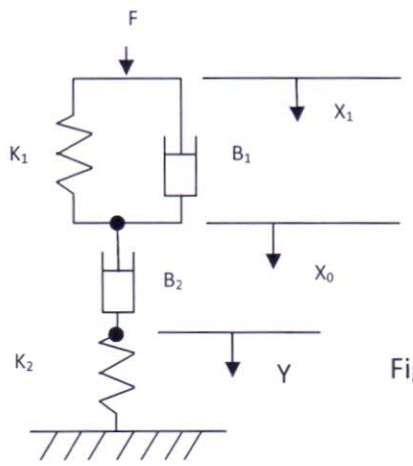
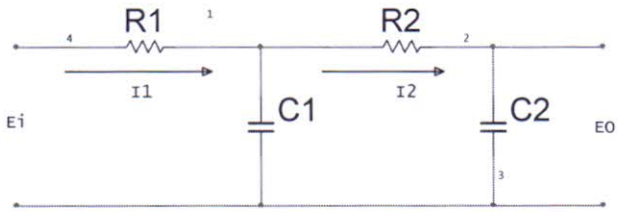
ملاحظة: مرفق ورق رسم بياني لوغاريتمي مع ورق الاسئلة .

Q1:***(10 points)*** The system shown in the figure (1) . Draw the analogues electrical circuit, use *f-v* analogy, Then Find transfer Function $\frac{X_0(s)}{X_1(s)}$



Figure(1)

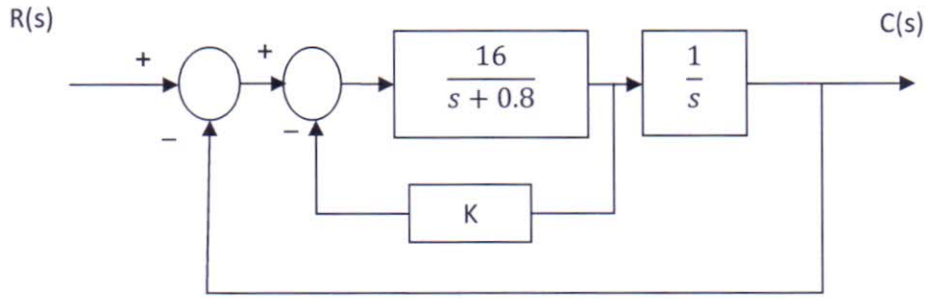
Q2:***(10 points)*** Draw the Block Diagram and signal flow graph and find out the transfer function of the circuit shown in figure (2)



Figure(2)

Q3: ***(10 points)*** Consider the system shown in figuer (3) .

1. Determine the value of k such that the damping ratio $\zeta = 0.5$
2. Obtain the rise time (t_r), Peak time (t_p) maximum overshoot(M_p) and settling time (t_s) in the unit step response.



Figure(3)

بقية الأسئلة خلف الورقة

Q3: ***(10 points)*** The open loop trasfer function of a unity feedback system is given by :

$$G(s) = \frac{108}{s^2(s+4)(s^2+3s+12)}$$

Determine the steady state error of the system. When the input is given by : $r(t) = 2 + 5t + 2t^2$

Q5: ***(10 points)*** A feedback system has an open loop trasfer function:

$$G(s)H(s) = \frac{k(1-s)}{s(s^2+5s+9)}$$

Determine the maximum value of k for the closed loop system to be ɑble.

Q6: ***(10 points)*** Draw the bode plot for the transfer function below :

$$G(s) = \frac{16(1+0.5\,s)}{s^2(1+0.125\,s)(1+0.1s)}$$

From the graph determine

a) Phase crossover frequency
b) Gain crossover frequency
c) P.M , G.M
d) Stability of the system

NOTES: $\frac{1}{s\pm a} \overset{L}{\leftrightarrow} e^{\mp at}$, $u(t) \overset{L}{\leftrightarrow} \frac{1}{s}$, $\frac{t^{n-1}}{(n-1)!} \overset{L}{\leftrightarrow} \frac{1}{s^n}$