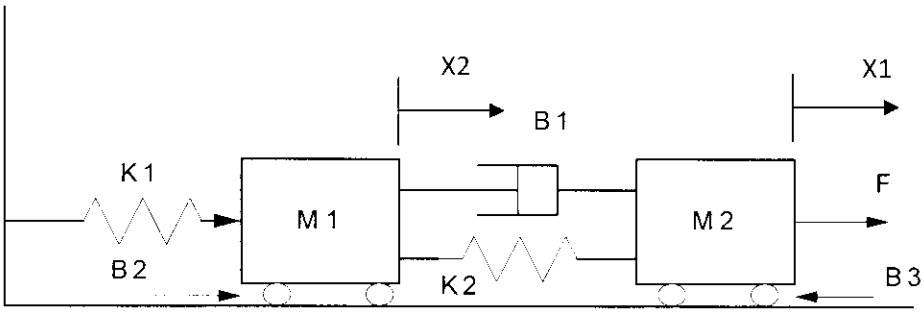
ملاحظة: مرفق ورق رسم بياني لوغاريتمي مع ورق الاسئلة .

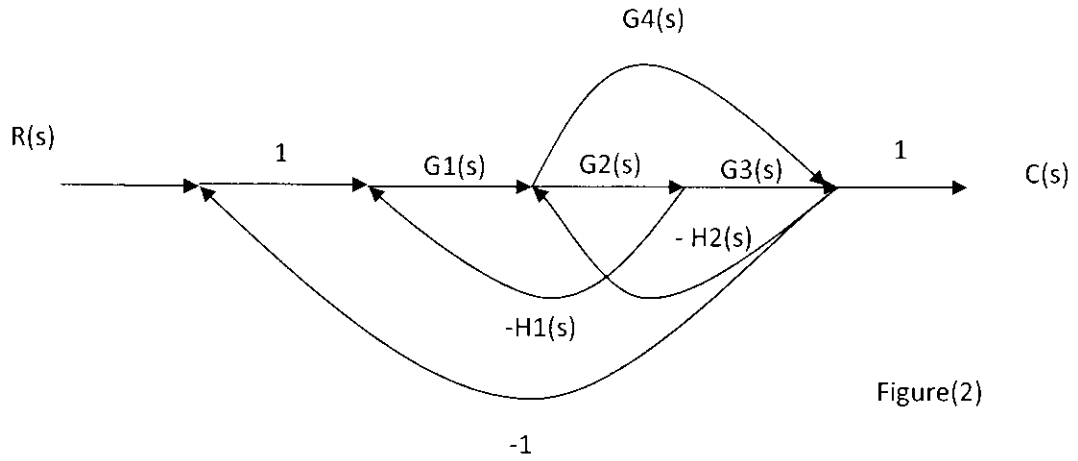
Q1:*(12 points)*

a) For the system shown in the figure (1) . Draw the analogues electrical circuit, use *f-i* analogy.



Figure(1)

b) Draw the Block Diagram from the given signal flow graph shown in fig (2)



Figure(2)

Q2: *(12 points)*

1. Show that the system transfer function Y(s)/X(s) has a zero in right half s-plane .
2. Obtain y(t) when x(t) is a unit step for the system shown in Figure(3).

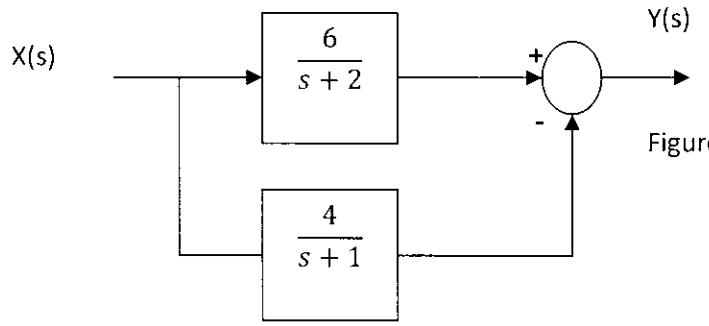


Figure (3)

بقية الاسئلة خلف الورقة

Q3: ***(12 points)***

a) A unity feedback control system is characterized by open loop transfer function.

$$G(s) = \frac{20}{s(s+2)(s^2+2s+20)}$$

Determine the steady state error of the system. When the input is (5t).

b) Consider a unity feedback control system with the closed loop transfer function:

$$\frac{C(s)}{R(s)} = \frac{ks + b}{s^2 + as + b}$$

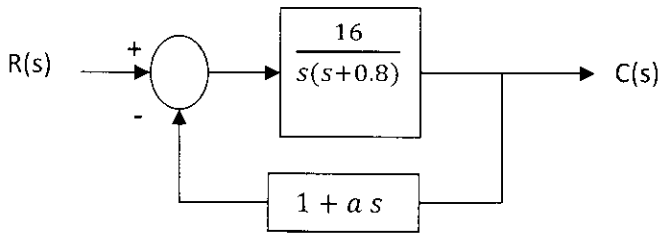
1. *Determine the open loop trasfer function.*
2. *Show that the steady state error in the unit ramp input response is given by :*

$$e_{ss} = \frac{a - k}{b}$$

Q4: ***(12 points)*** Consider the system as shown in figure(4).

a) Determine the value of *(a)* such that damoing ratio is *0.5*

b) Obtain the values of rise time t_r and maximum overshoot M_p in its step response



Figure(4)

Q5: ***(12 points)*** Sketch the bode plot for the transfer function below :

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

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