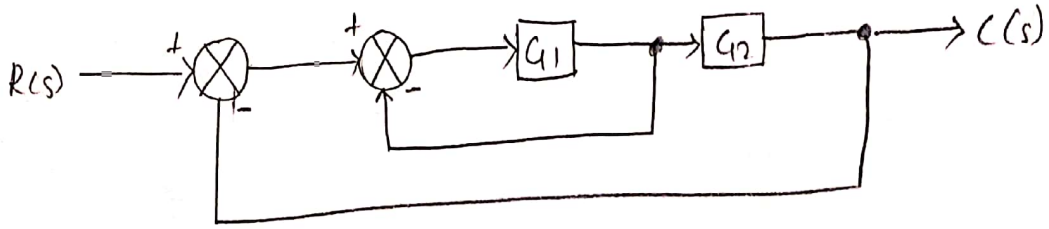
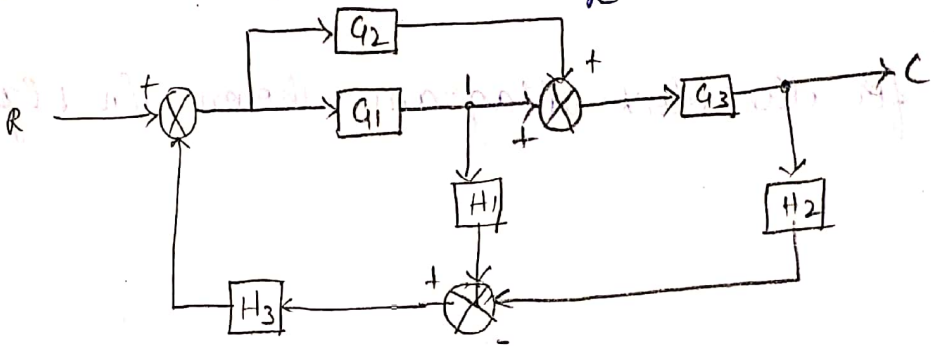
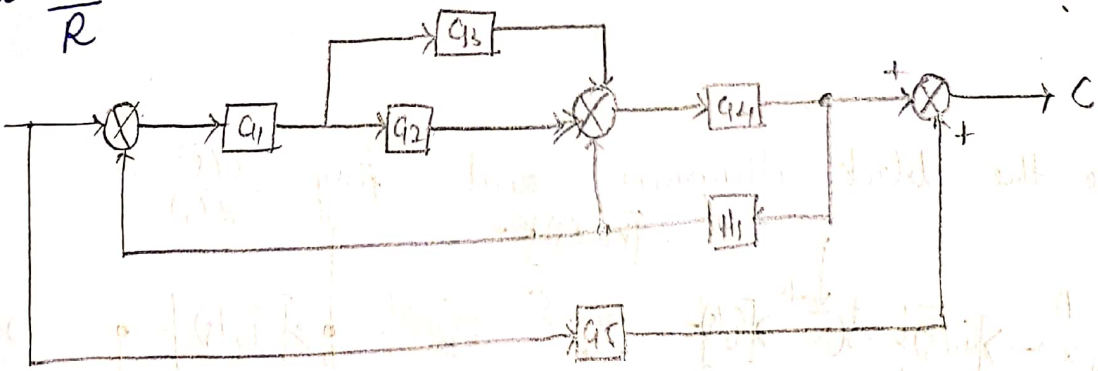
① Refer the block diagram shown in Fig. Using block diagram reduction techniques, find the overall transfer function $\frac{C(s)}{R(s)}$.



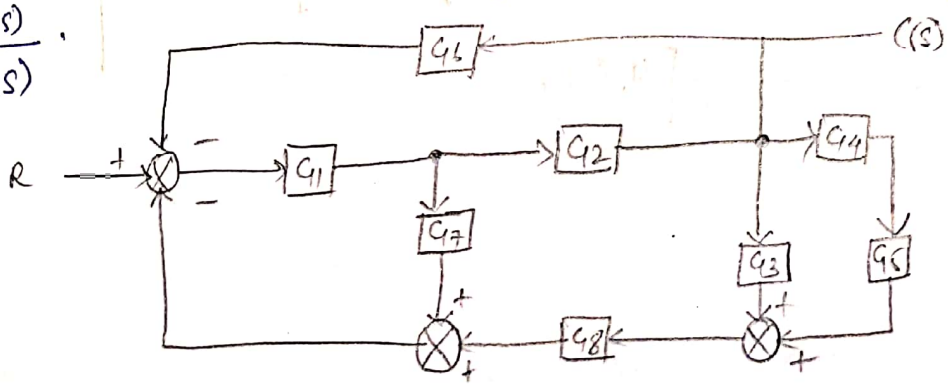
② Reduce the Block diagram shown in Fig and find the overall transfer function $\frac{C}{R}$.



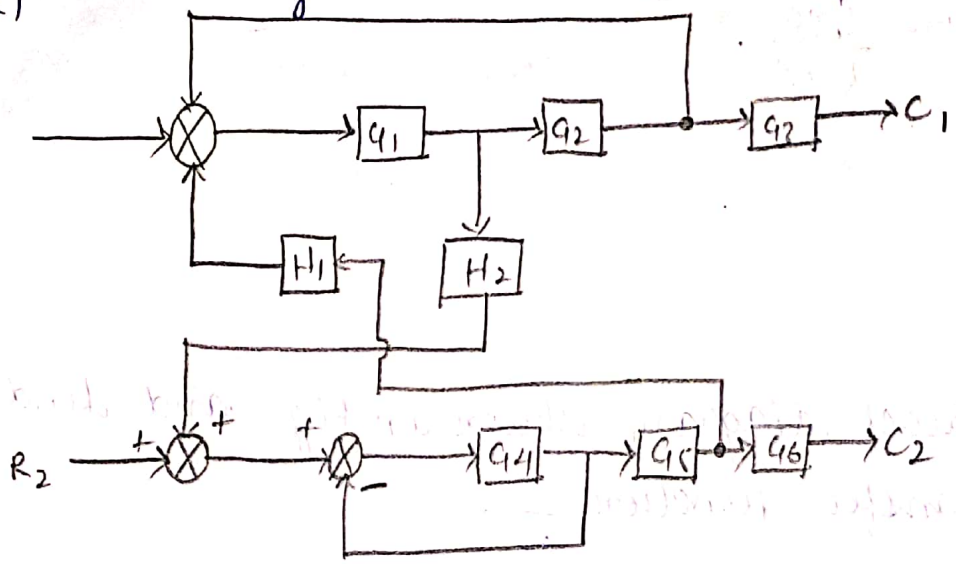
③ Reduce the block diagram shown in Fig and then find $\frac{C}{R}$.



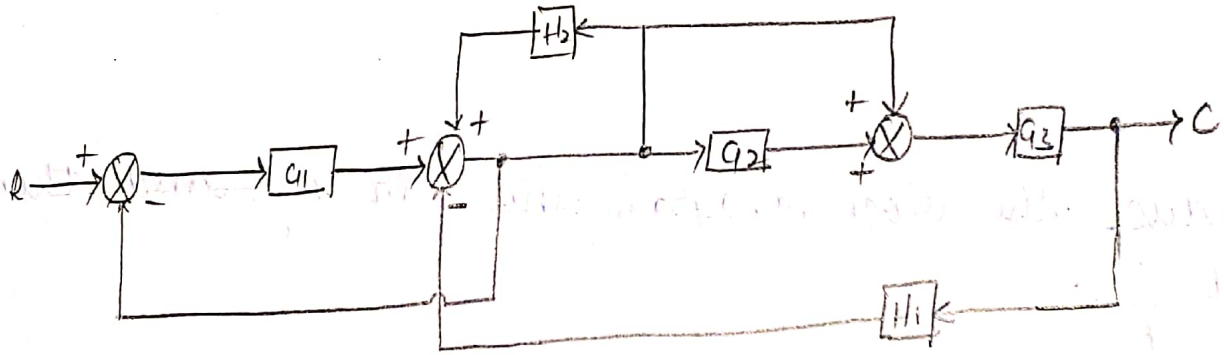
④ Reduce the block diagram shown in Fig and find $\frac{C(s)}{R(s)}$.



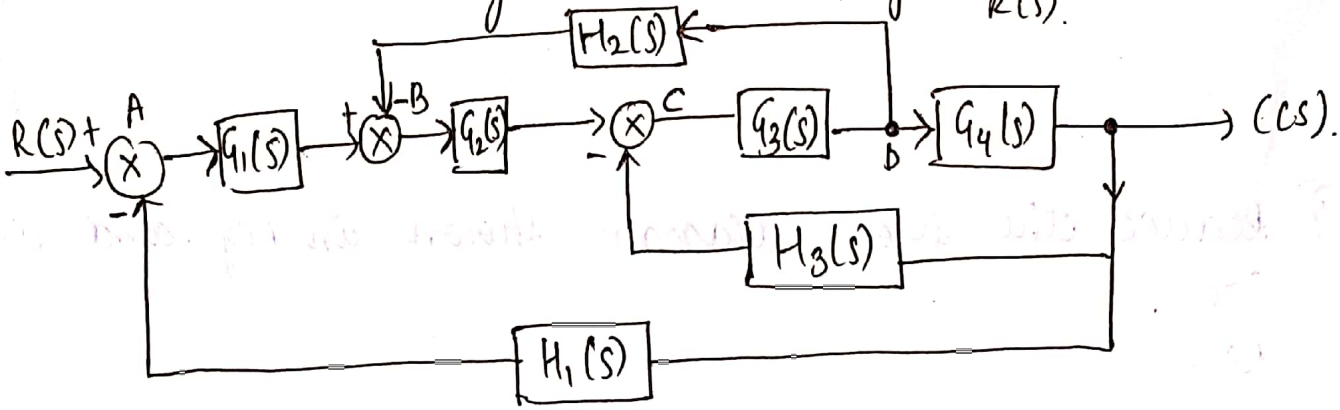
(5) Using block diagram reduction technique, find $\frac{C_1}{R_1}$ and $\frac{C_2}{R_1}$ assuming $R_2 = 0$



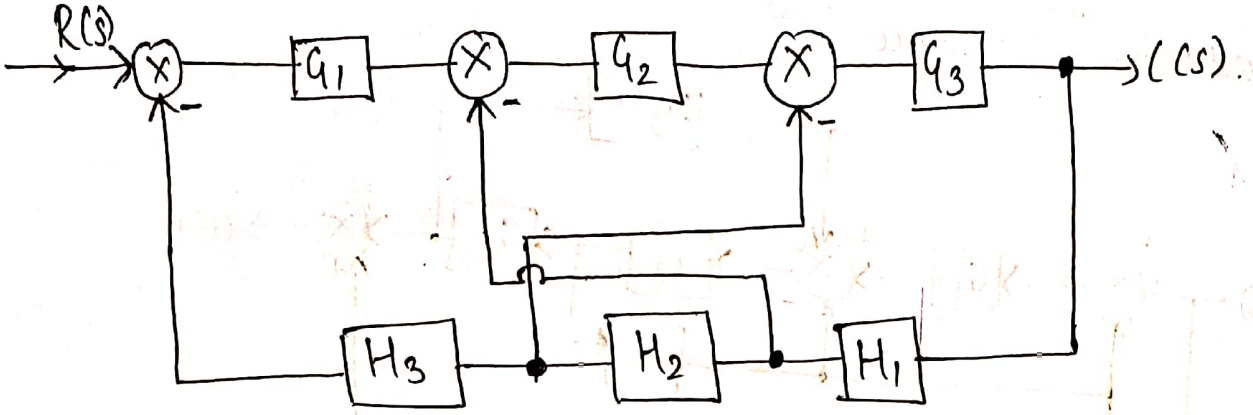
(6) Find $\frac{C}{R}$ for the block diagram shown in Fig



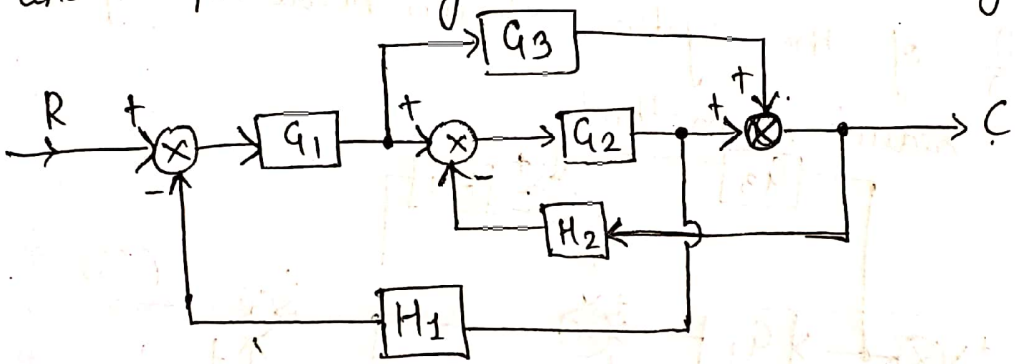
(7) Reduce the block diagram and find $\frac{C(s)}{R(s)}$.



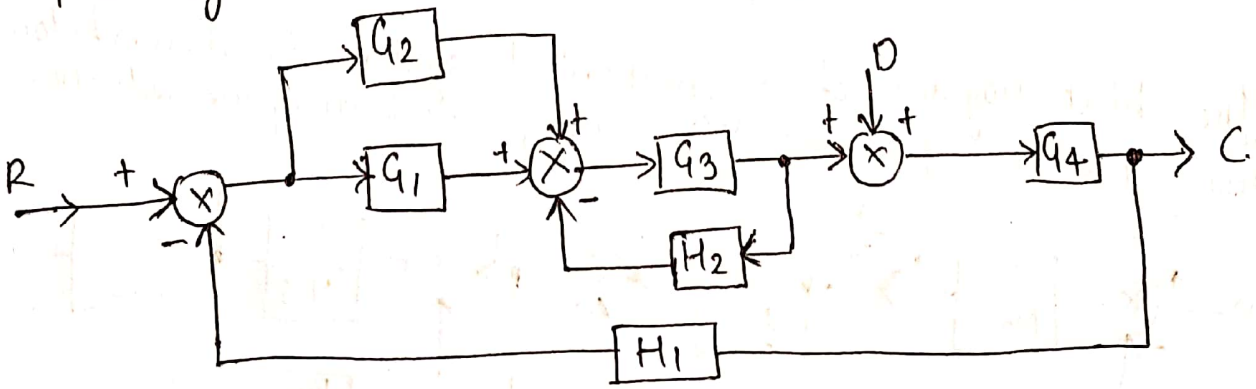
(8) Obtain C(s)/R(s) using block diagram reduction rules.



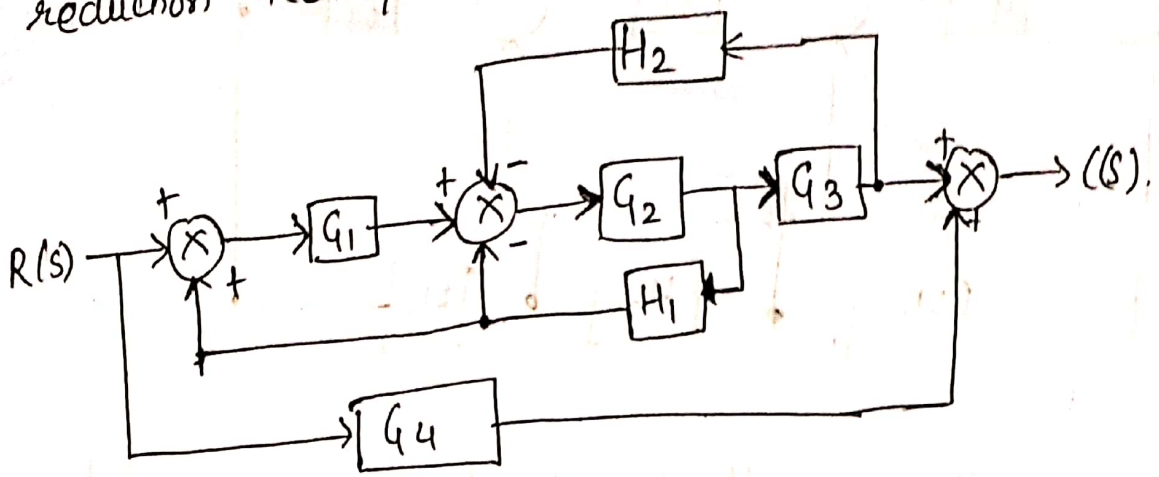
(9) Determine the overall transfer function relating C and R for the system whose block diagram is shown:



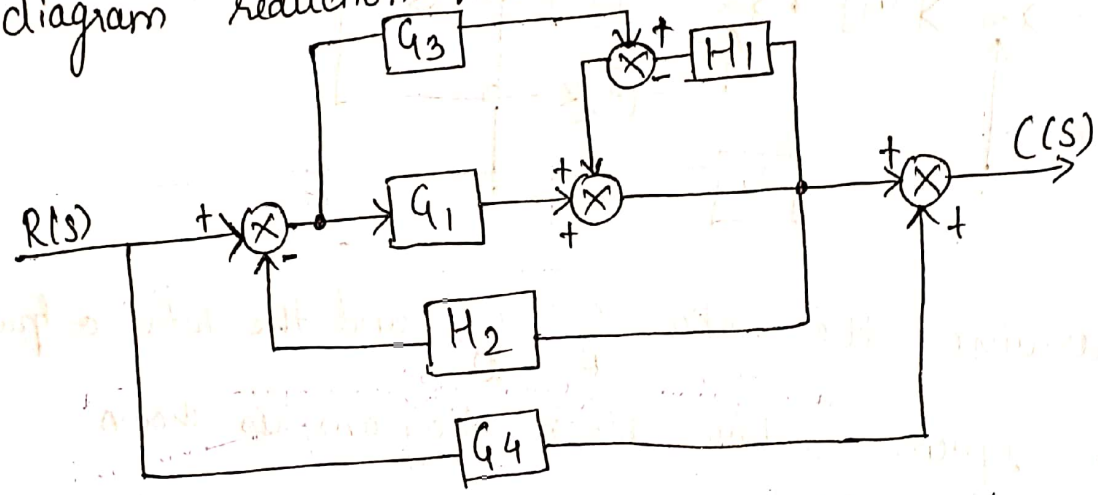
(10) Determine the ratio $\frac{C}{R}$, $\frac{C}{D}$ and the total output for the system whose block diagram is shown.



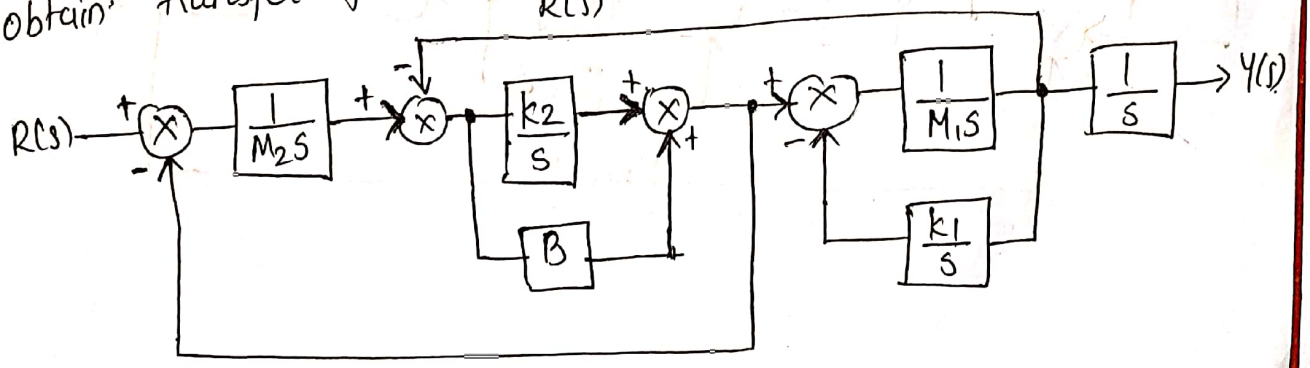
(11) Determine the transfer functions of a system whose block diagram is given using the block diagram reduction technique.



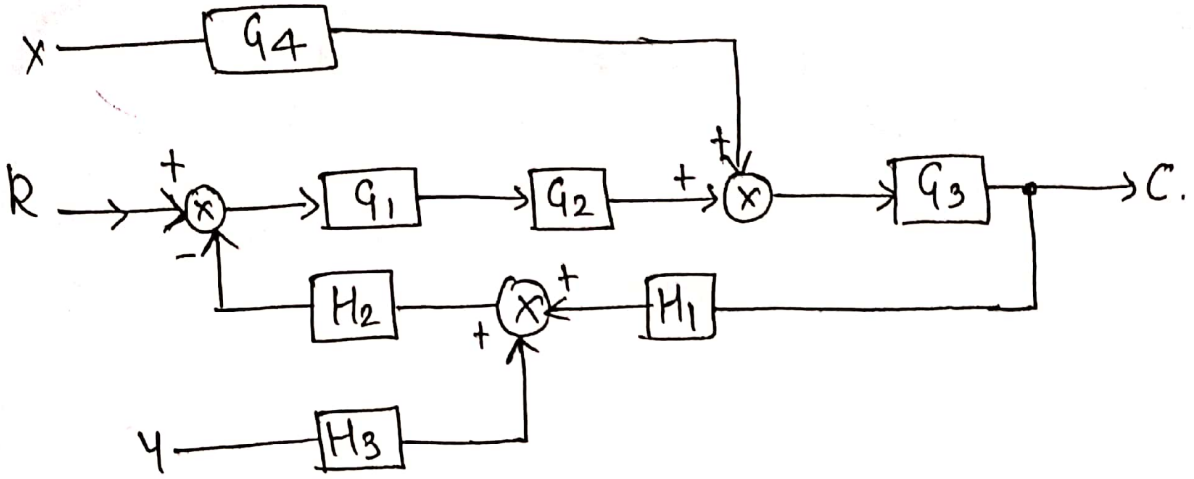
(12) Obtain $\frac{C(S)}{R(S)}$ of the system shown below using block diagram reduction method.



(13) The block diagram of a mechanical system is shown below. Obtain transfer function $\frac{Y(S)}{R(S)}$ using block diagram reduction rules

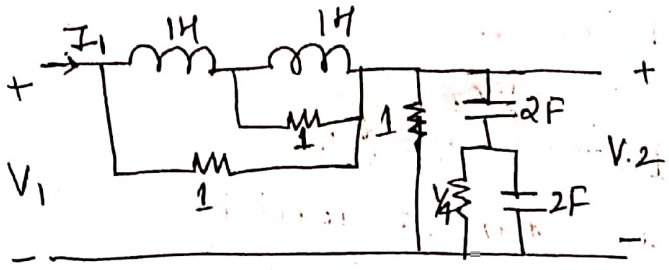


(14) Using block diagram reduction, find the transfer function from each i/p to o/p C. $\left[\frac{C}{R}, \frac{C}{X}, \frac{C}{Y}\right]$



1) For the two port network shown. obtain the transfer function

i) $\frac{V_2(s)}{V_1(s)}$ ii) $\frac{V_1(s)}{I_1(s)}$



2) For a single loop unity feed back system the unit step response is given by $c(t) = 1 - 3e^{-2t} + 2e^{-3t}$ Evaluate

i) closed loop Transfer function

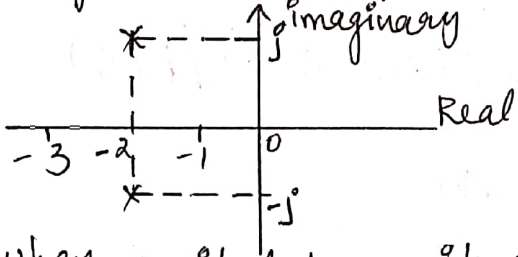
ii) open loop Transfer function

3) A certain system is described by a differential equation $\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 11\,y(t) = 5\,x(t)$ where $y(t)$ is the output and the $x(t)$ is obtain, obtain the transfer function of the system

4) A certain system has its transfer as $\frac{C(s)}{R(s)} = \frac{2s+1}{s^2+s+1}$ obtain its differential equation

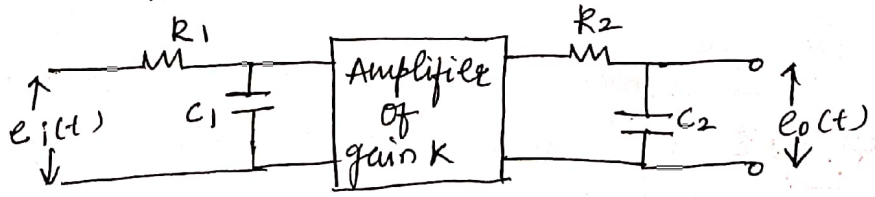
5) If a system equation is given as $3\frac{dc(t)}{dt} + 2c(t) = r(t-T)$ where $c(t)$ is output & $r(t)$ is input shifted by T seconds. obtain its transfer function

6) Determine the transfer function if the dc gain is equal to 10 for the system whose pole-zero plot is shown below



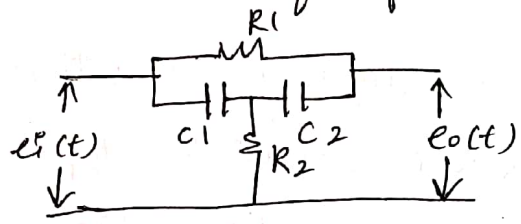
7) A system when excited by unit step type of input gives following response $c(t) = 1 - 2e^{-t} + 4e^{-3t}$ obtain its transfer function $C(s)/R(s)$

8) Derive the transfer function of the system as shown in fig. the amplifier gain is K

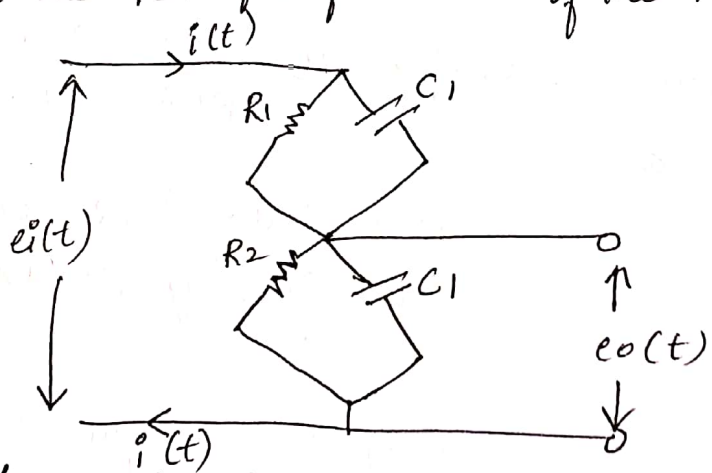


9) The transfer function of a system is given by $T(s) = \frac{10(s+8)}{s(s+4)(s^2+6s+25)}$ obain its (i) poles ii) zeros iii) order sketch its pole zero plot.

10) obtain the transfer function of the network shown



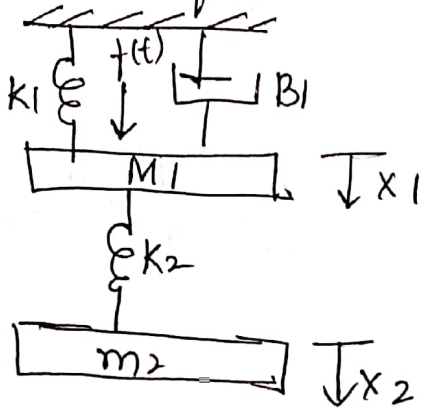
11) obtain the transfer function of the network shown



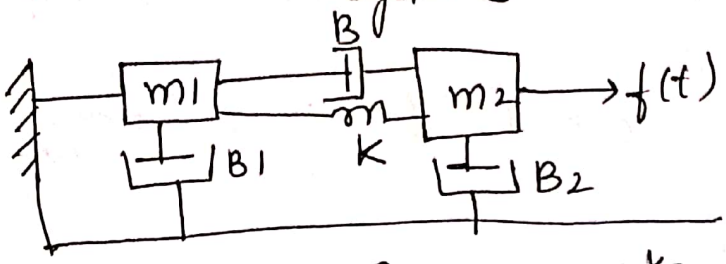
2) for the mechanical system shown

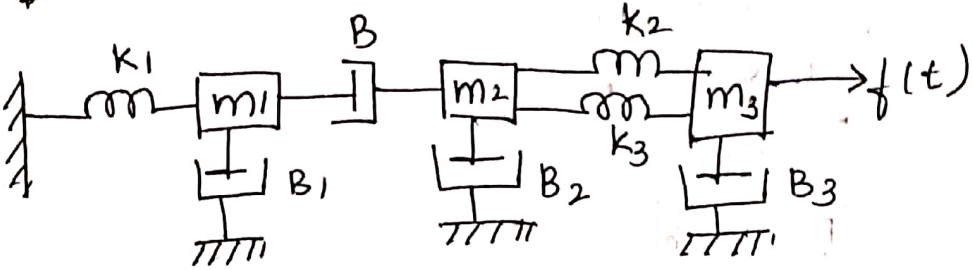
a) obtain the equations of motion for masses M_1 and M_2

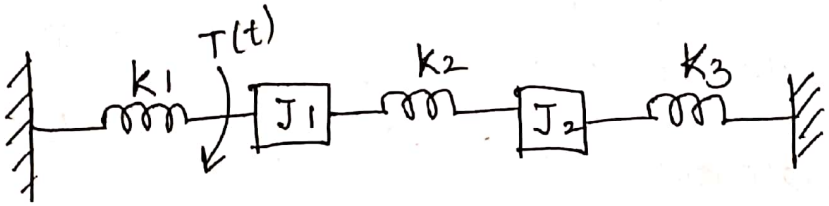
b) find the transfer function $X_2(s)/F(s)$

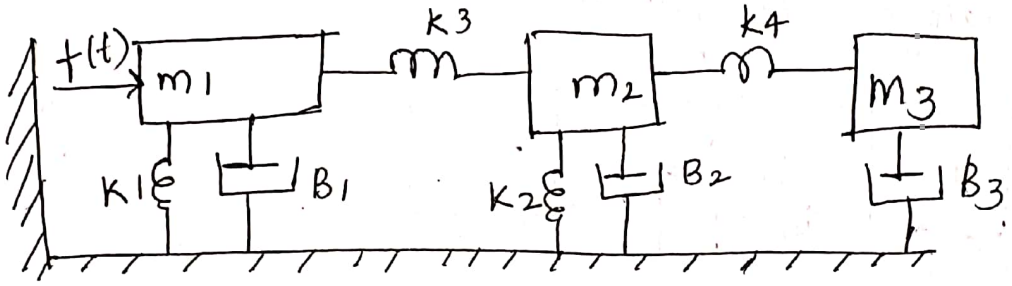


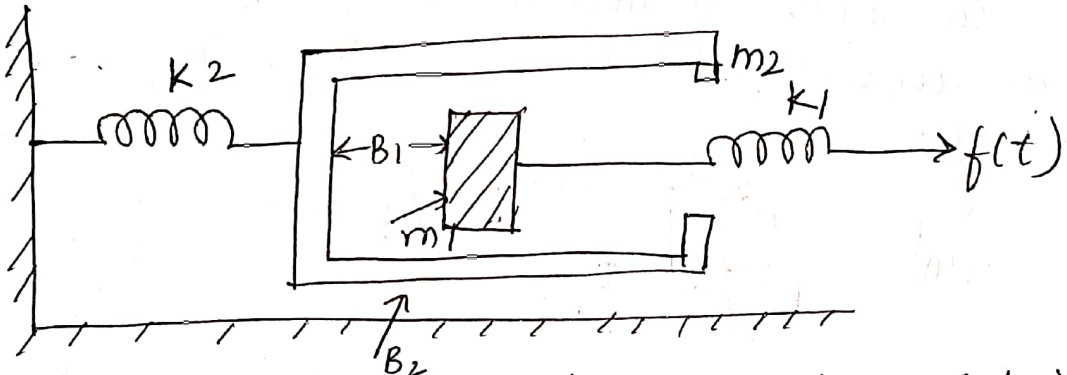
10) Draw the analogous electrical networks based on a) F-V analogy b) F-I analogy of the following mechanical systems



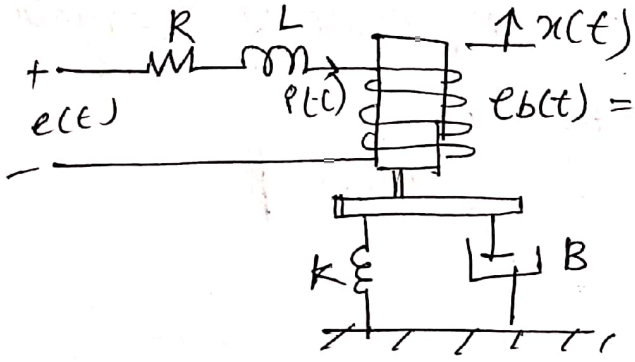






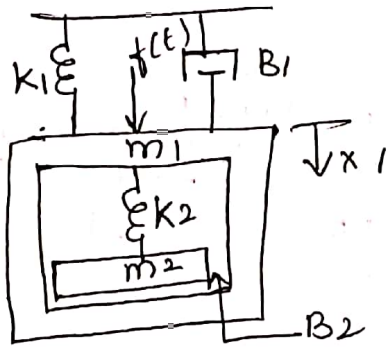


11) Refer the electro mechanical system shown. Determine the transfer function X(s)/E(s)

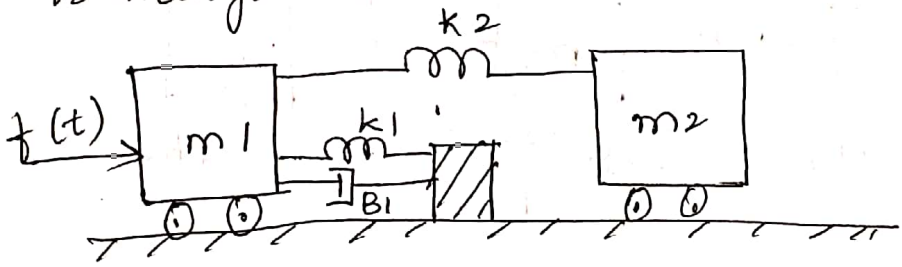


$e_b(t) = k_b \frac{dx}{dt}$ where k_b = Back emf constant in V/m/sec

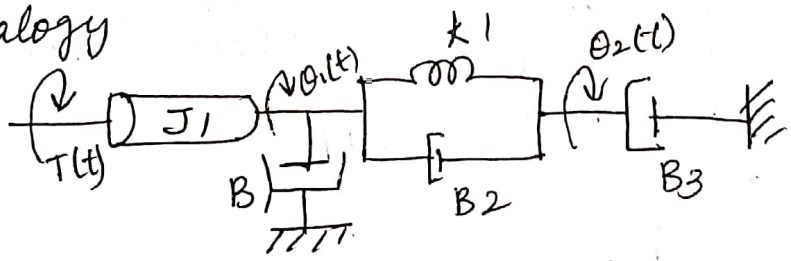
12) Refer the mechanical system shown in fig
a) Draw the mechanical network
b) From the mechanical network drawn, write the differential equations of performance
c) Draw the electrical network based on F-V analogy



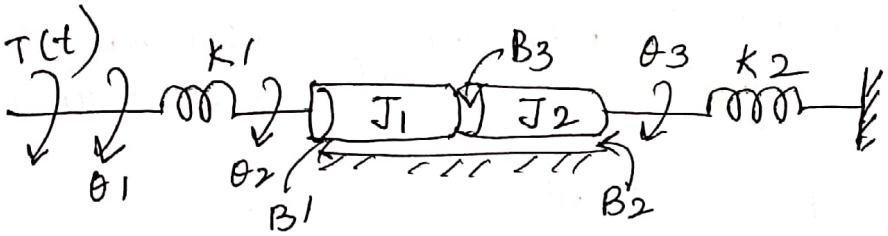
13) a) Draw the mechanical network for the mechanical system shown below
b) Draw the analogous electric circuit in which force is analogous to current



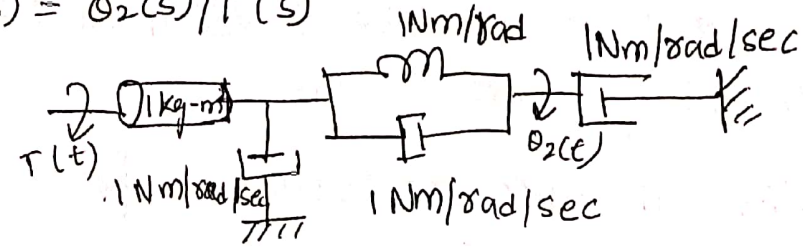
14) For the rotational mechanical system shown in figure draw an electrical network based on torque-Voltage analogy



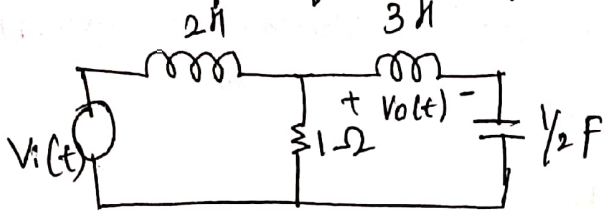
15) For the rotational mechanical system shown in fig. Draw an electrical network based on torque-current analogy. Give all the neccessary cause effect equations



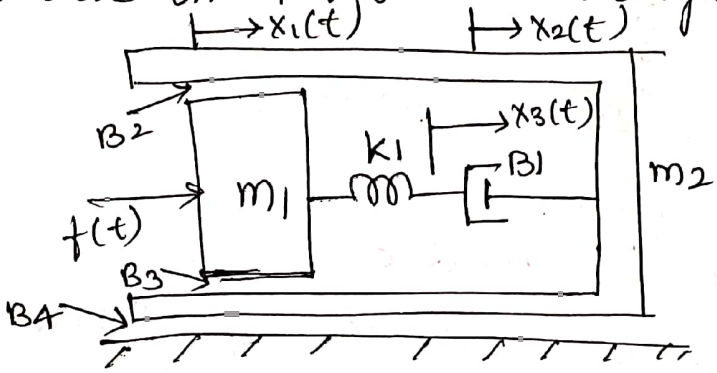
16) For the rotational system shown, find the transfer function $G(s) = \theta_2(s)/T(s)$



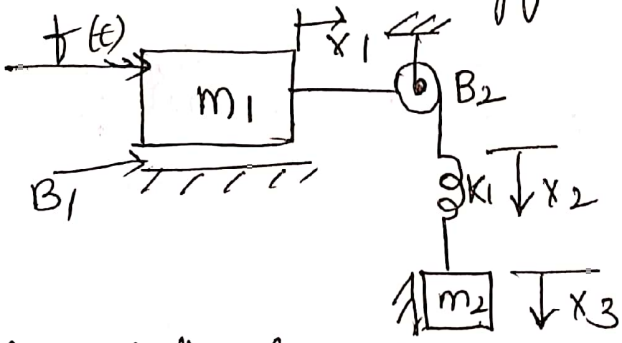
17) Find transfer function $G(s) = \frac{V_o(s)}{V_i(s)}$ for the network shown



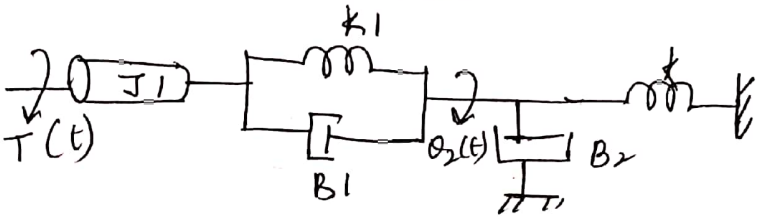
18) For the mechanical system shown in fig. draw an electrical network based on F-V & F-I analogies



19) For the mechanical system shown in fig. draw an electrical network based on F-V analogy



20) For the rotational mechanical system shown in fig. the transfer function $G(s) = \frac{\theta_2(s)}{T(s)}$

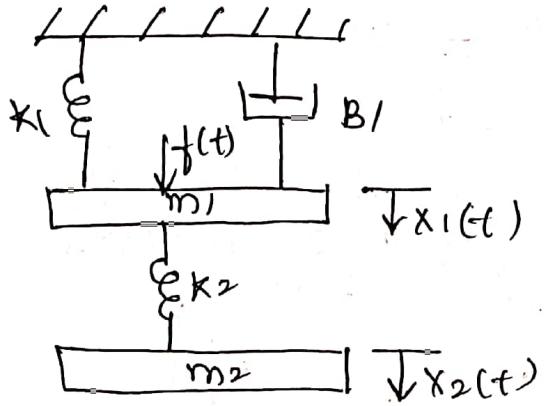


21) An automobile driver uses a control system to maintain the speed of a car at a prescribed level. Sketch the block diagram to illustrate this feedback system

22) A dynamic vibration absorber is shown in fig

a) sketch the analogous electrical ckt based on F-I analogy

b) obtain the differential equations describing the system

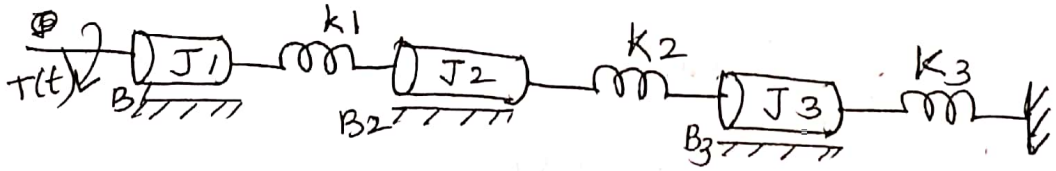


23) For the shown figure

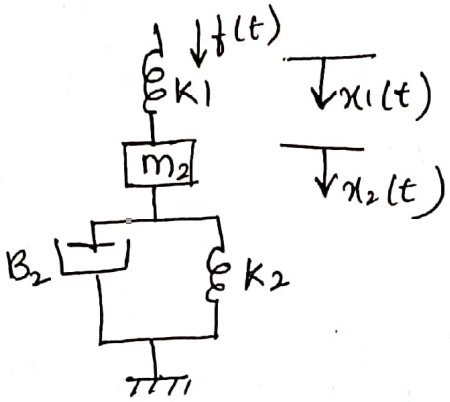
a) Draw the mechanical network

b) write the differential equations of performance

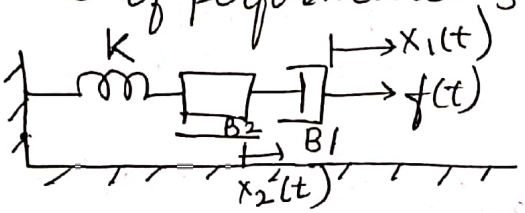
c) Draw the analogous electric circuit.



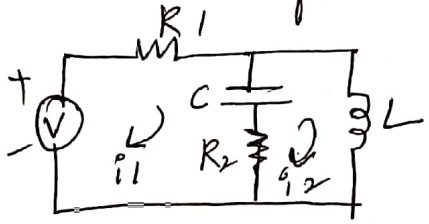
24) Draw the equivalent mechanical system and analogous systems based on F-V and F-I methods for the given system



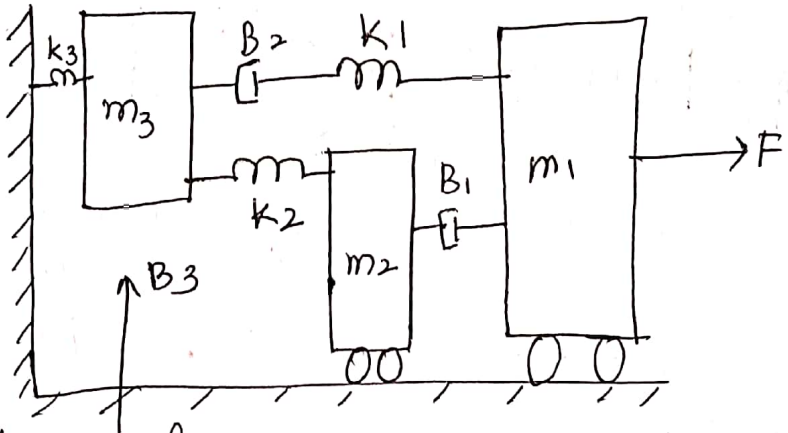
25) For the mechanical system shown in fig. write the differential equations of performance & draw the mechanical network



26) Draw the F-V analogous mechanical system for the electrical circuit shown. writing the loop equations for the electrical circuit, then transforming them to their mechanical analog

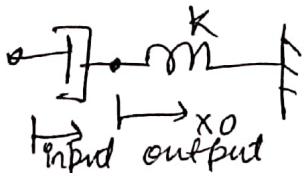


27) For the mechanical system shown in fig i) Draw the mechanical network ii) write the differential equation of the system

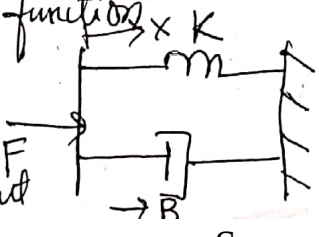


28) For the systems shown in fig. (1) & fig (2) write the differential equations & obtain the transfer function

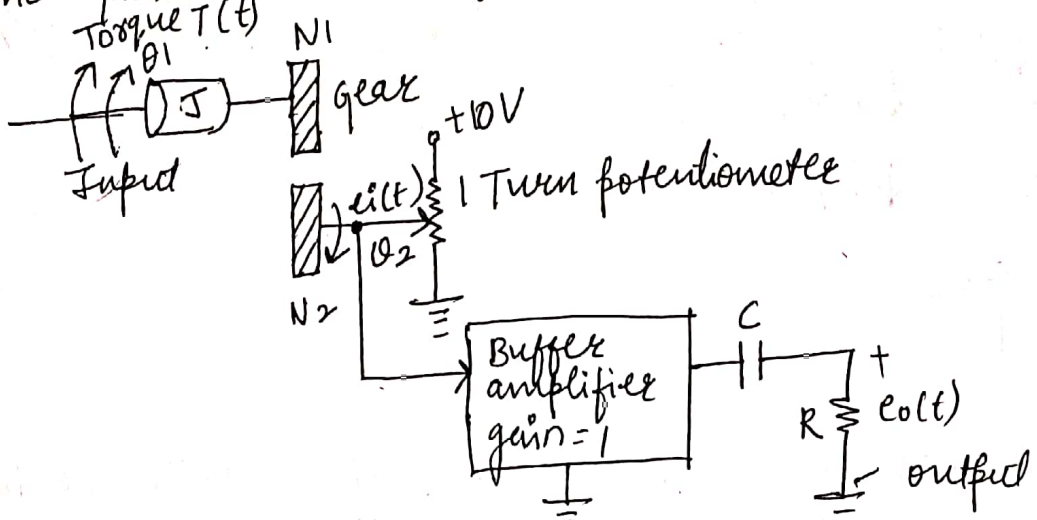
1)



2)

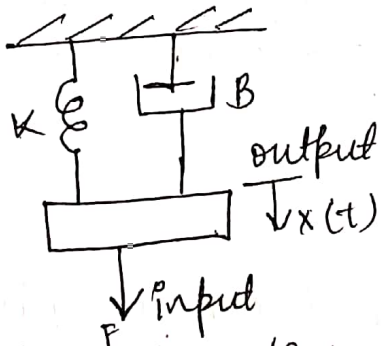


29) Find $G(s) = E_o(s)/T(s)$ for the system shown.

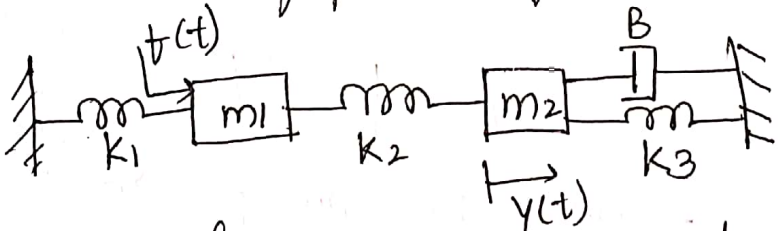


30) i) mass M shown in the mechanical system fig. is subjected to a force of 1 Newton. find the final displacement of mass. Take $K = 1\ N/m$, $B = 0.2\ N\text{-}s/m$, $M = 1kg$

ii) In vertically suspended mechanical system gravitational force 'g' not taken into consideration. Why?



31) For the mechanical system shown, write the differential equations relating position $y(t)$ and force $f(t)$



32) For the ckt shown i) Draw the mechanical network
ii) write the differential equations describing the system
iii) Draw the F-V analogous electrical circuit after writing the corresponding electrical equations