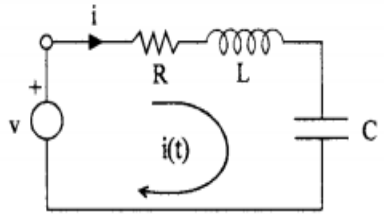
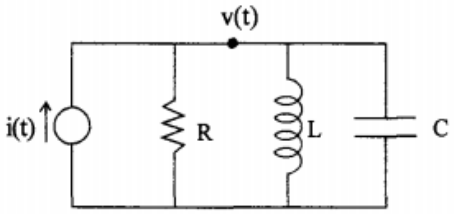
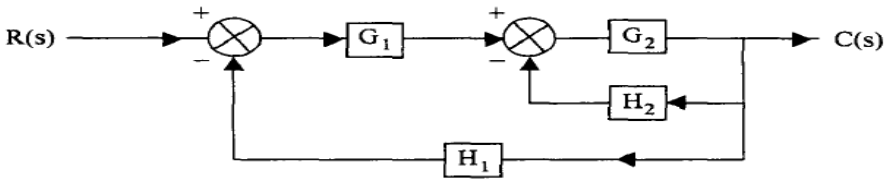
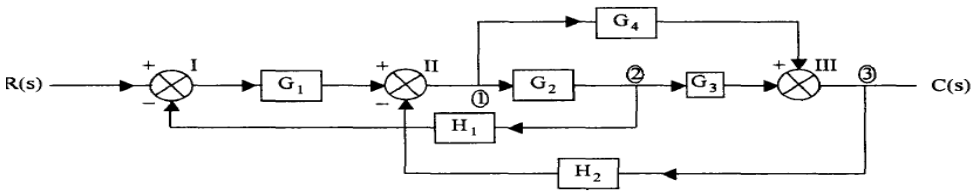
ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

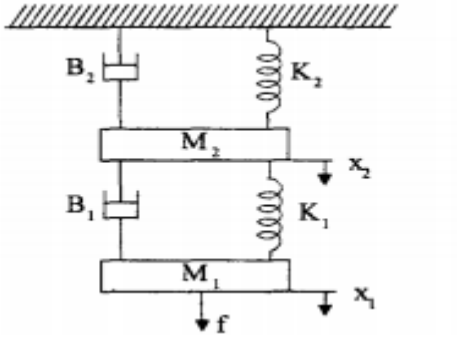
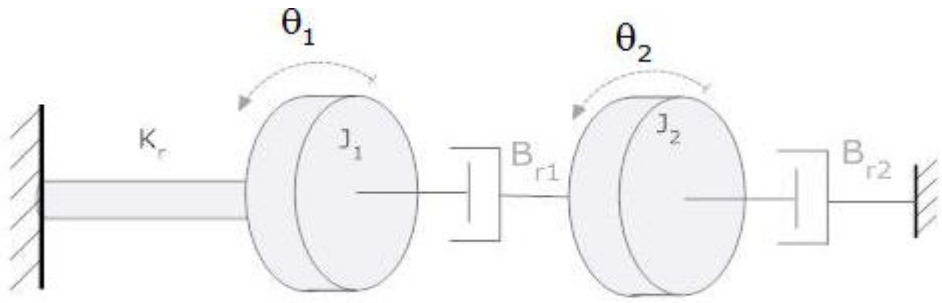
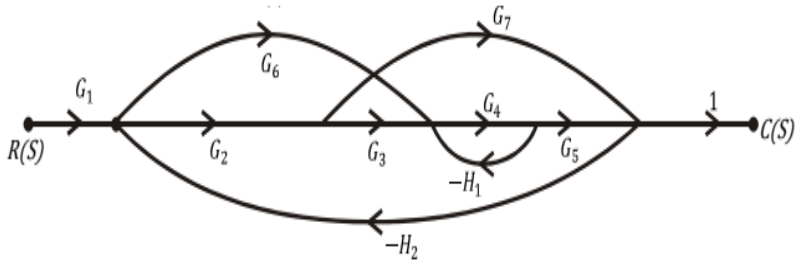
Department of Electrical & Electronics Engineering

III/IV B. Tech., Semester-II

Control systems

ASSIGNMENT-I

1	a	Consider the network in Fig. 1 Obtain the relation between the applied voltage and the current in the form of (a) Differential equation (b) Transfer function 	**CO1**
	b	Consider the parallel RLC network excited by a current source Fig. 2. Find the (a) differential equation representation and (b) transfer function representation of the syst 	**C01**
2		Write the rules of the block diagram reduction technique.	**CO2**
3	a	Obtain the transfer function using block diagram reduction techniques. 	**CO2**
	b	Obtain the transfer function using block diagram reduction techniques. 	**CO2**

4	a	Derive the transfer function for armature controlled D.C Motor.	**CO1**
	b	Derive the transfer function for field controlled D.C Motor.	**CO2**
5	a	Write the importance of Mason's gain formula? Explain the procedure for converting block diagram to signal flow graph.	**CO2**
6	a	Write the equations describing the motion of the mechanical system shown in Fig. Also find the transfer function X1(s)/F(s). 	**CO1**
	b	i) Write the analogous electrical elements in force - voltage analogy for the elements of mechanical translational system. ii) Write the analogous electrical elements in torque - voltage analogy for the elements of mechanical rotational system.	**CO2**
7		Distinguish between open loop and closed loop control systems.	**CO2**
8		Write the equations describing the motion of the mechanical rational system shown in fig. below. Also find the transfer function $\theta_1(s)/T(s)$. 	**CO2**
9		 Obtain the closed loop transfer function for the above signal flow graph.	**CO2**

10	a	Explain how the unit ramp response of first order system is obtained and what is its significance?	**CO3**
	b	The open loop transfer function of a variety of feedback system is given by G(s) = $\frac{k}{s(1+sT)}$. By what factor the gain k should be multiplied so that the damping ratio is increased from 0.2 to 0.8?	**CO3**
11		Describe the time domain specifications of a second order control system.	**CO3**
12		Explain the effect of derivative controller on the time response of a typical second order system.	**CO3**
13	a	Derive an expression to find the rise time of the time response of a typical second order system.	**CO3**
	b	Show that for a second order system, the overshoot of the step response is only a function of the damping ratio.	**CO3**
14		The open loop transfer function of a control system with unity feedback system has G(s) = $\frac{500}{s(1+0.1s)}$. Evaluate the error series for the system and determine the steady state error of the system for an input of $r(t) = 1 + 2t + t^2$; t > 0.	**CO2**