Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

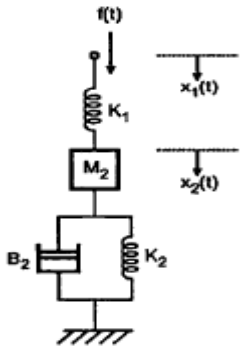
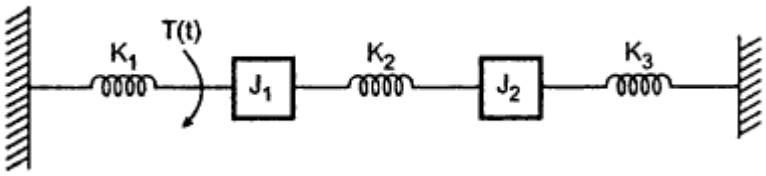
USN | | | | | | | | | | |

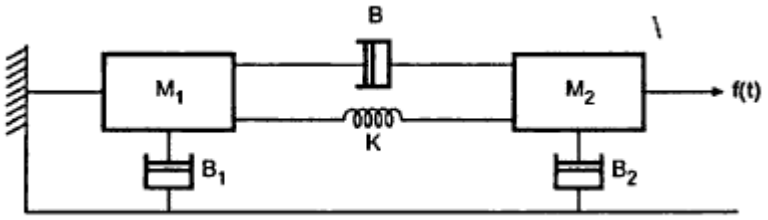
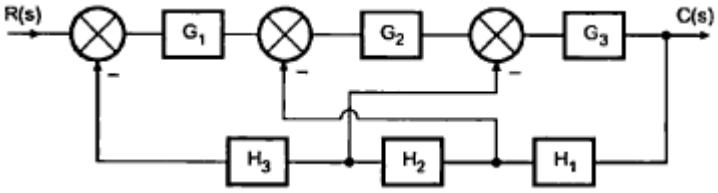
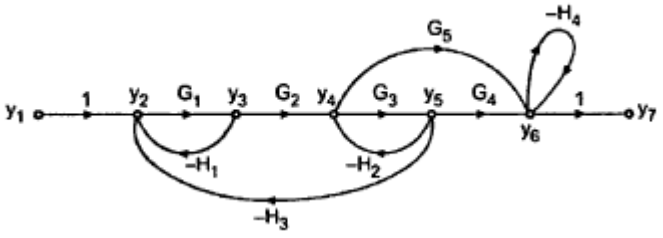
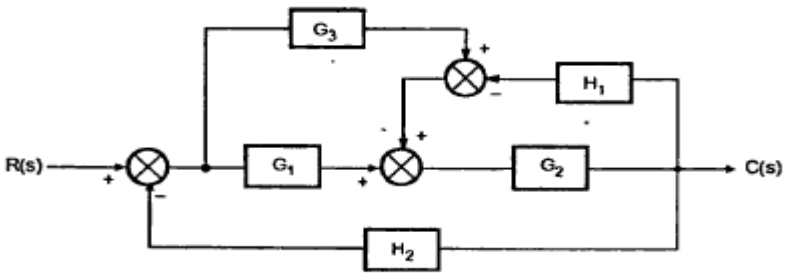
Fourth Semester B.E. Degree Examination
Control Systems

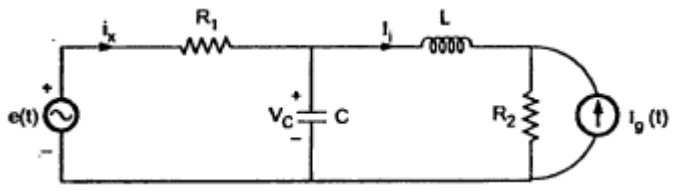
TIME: 03 Hours **Max. Marks: 100**

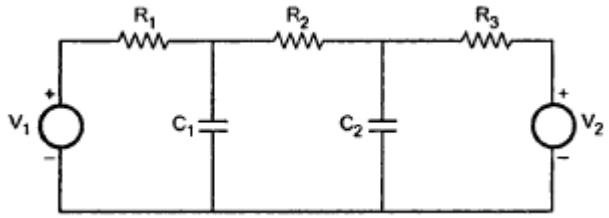
Note: 01. Answer any **FIVE FULL QUESTIONS**, choosing at least **ONE QUESTION** from each **MODULE**.

.

Question Number	Question	Marks Allotted
	Module -1	
1. a)	Distinguish between Open loop and Closed loop system.	4
b)	For the Given Mechanical System shown in Fig. Q1 (b). Draw the free body diagram and governing differential equations representing dynamics of the system and give Force Current analogy.  Fig. Q1 (b)	8
c)	For the given rotational mechanical system shown in Fig.Q1(c). write the differential equation and obtain the torque Voltage analogy of the system.  Fig.Q1(c)	8
	OR	

2.a)	Write the differential equation for the mechanical system shown in Fig. Q2(a). obtain the force voltage and force current analogy.  Fig. Q2(a)	10
b)	Find the overall transfer function $\frac{c(s)}{R(s)}$ for the block diagram shown in Fig .Q2(b). using block diagram reduction technique.  Fig .Q2(b)	10
	Module -2	
3 a)	Define the following terms with respect to signal flow graph i) Source Node ii) Sink Node	4
b)	For the given signal flow graph as shown in Fig.Q3(b). find $\frac{c(s)}{R(s)}$.  Fig.Q3(b)	8
c)	Obtain the transfer function $\frac{c(s)}{R(s)}$ as shown by block diagram Fig.Q3(c) using signal flow graph technique.  Fig.Q3(c)	8

	OR	
4.a)	Derive time domain expression for unit step response of a second order under damped system	10
b)	Find Kp, Kv,Ka and steady state error for a system with open loop transfer function as $\frac{10(s+2)(s+3)}{s(s+1)(s+5)(s+4)}$ where the input is r(t)= 3+t+t^2 .	10
	Module -3	
5 a)	Define the Bounded Input Bounded Output System also mention the advantages of Routh's Criteria.	4
b)	For the Given System equation S^5+S^4+2S^3+2S^2+3S+15=0 Find the number of roots with positive real part,negative real part.	8
c)	For the System S4+22S3+10S2+S+K=0, find the Kmar and ω at Kmar	8
	OR	
6.a)	For G(S)H(S)=$\frac{K(S+2)(S+4)}{s2(S+3)}$., find how many break away points exist?	8
b)	Sketch the root locus for the open loop transfer function of a system G(S)H(S)=$\frac{K}{S(S+\{1)(S+2)(S+3)}$.	12
	Module -4	
7.a)	Mention the limitations of Frequency domain methods.	6
b)	Sketch the bode plot for the system having G(S)H(S)=$\frac{20}{S(1+0.1S)}$.	14
	OR	
8.a)	Obtain the polar plot for Type0 system with open loop transfer function G(S)H(S)=$\frac{1}{1+Ts}$ where T is constant.	10
b)	For the given system sketch the nyquist plot and comment on closed loop stability. G(S)H(S)=$\frac{K(S+3)}{S(S-1)}$.	10
	Module -5	
9.a)	Define the following i) state ii) State variable iii) State vector iv)State space v) State trajectory.	5
b)	Obtain the state model for the given electrical system shown in Fig.Q9(b)., consider Vc and Ii are state variable and Ix as the output variable in the circuit.  Fig.Q9(b).	8

c)	Derive the transfer function from state model.	7
	OR	
10.a)	Find the transfer function for the given system where A= $\begin{bmatrix} 0 & -1 \\ 2 & -3 \end{bmatrix}$., B= $\begin{matrix} 3 \\ 5 \end{matrix}$, C=[1 1] and D=0.	8
b)	Determine the state variable matrix for the given circuit shown in Fig.Q10(b).  Fig.Q10(b).	8
c)	List the advantages of state variable analysis.	4