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PES University, Bangalore

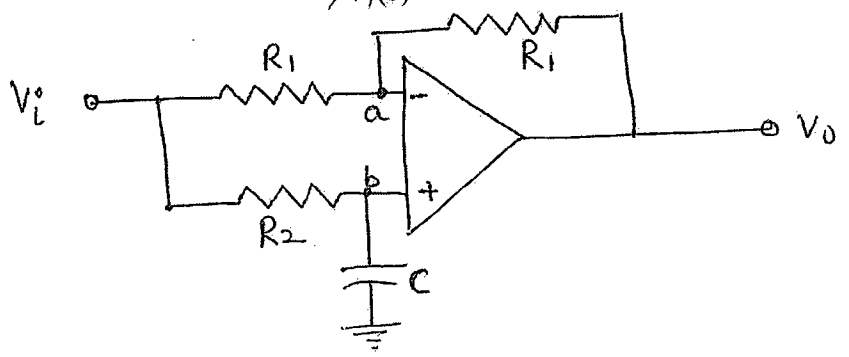
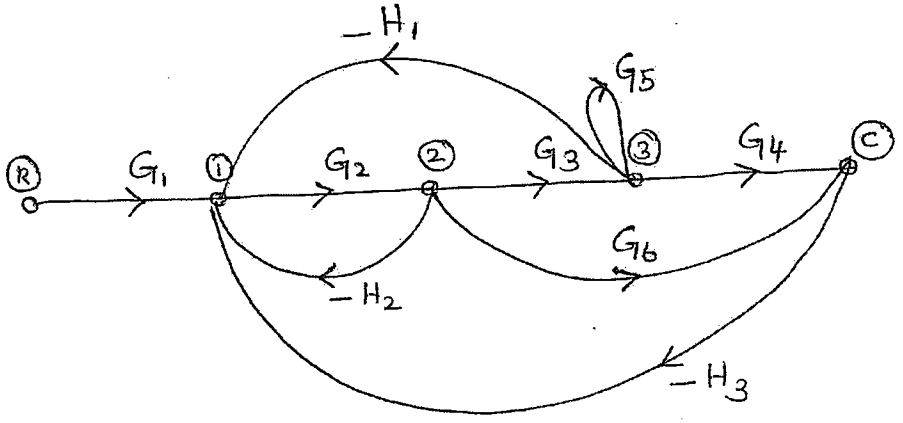
(Established under Karnataka Act No. 16 of 2013)

UE14EE352

MAY 2017: END SEMESTER ASSESSMENT (ESA) B.TECH. VI SEMESTER

UE14EE352- CONTROL SYSTEMS

Time: 3 Hrs | Answer All Questions | Max Marks: 100

1.	a)	Compare the closed loop systems and open loop systems in terms of BANDWIDTH.	4M
	b)	Find the transfer function $V_o(s)/V_i(s)$ for the following circuit. 	6M
	c)	For the system given below, find the overall transfer function C(s)/R(s) using Mason's Gain rule. 	10M
2.	a)	List any 4 properties of the state transition matrix.	4M
	b)	Obtain the state model of a field controlled DC servomotor.	6M
	c)	A unit ramp input is applied to a unity feedback system with transfer function $T(s)=\frac{100}{s^2+5s+100}$. Find the time response c(t) and the steady state error e_{ss} for the system.	10M
3.	a)	Draw the response and the pole zero plot for a system whose response is given by $c(t)=\frac{1}{b}e^{-at}\sin bt$. Is the system stable?	4M

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	b)	Construct the Routh array for a system described by its characteristic equation $s^5+3s^4+2s^3+6s^2+6s+9=0$. Comment on the stability of the system.	6M
	c)	The open loop transfer function of a unity feedback system is given by $G(s)=\frac{K}{s(s+4)(s^2+8s+32)}$. Sketch the ROOT LOCUS diagram.	10M
4.	a)	The open loop transfer function of a unity feedback system is given by $G(s)=\frac{1}{(s^2+3s+2)}$. Draw the NYQUIST PLOT and analyze the stability of the system.	8M
	b)	The open loop transfer function of a unity feedback system is given by $G(s)=\frac{80}{s(s+2)(s+8)}$. Sketch the BODE DIAGRAM. Determine the GAIN MARGIN and PHASE MARGIN.	12M
5.	a)	Draw the schematic of a PI controller using OP-AMPs.	2M
	b)	For the system given in Q4(b), design a lag compensator to meet a desired phase margin of 35°.	8M
	c)	Find the state feedback gain matrix for the following system to place the closed loop poles at $-2,-1\pm1j$. $\dot{X}=\begin{bmatrix}0&1&0\\0&0&1\\0&-2&-3\end{bmatrix}X+\begin{bmatrix}0\\0\\10\end{bmatrix}U$	10M