PRN:		Course Code :	ECE202R1

Second Year **B. Tech** End Semester Examination Summer 2023

Control System

Day and Date: Tuesday, 13/06/23 Max Marks: **100**

Time : 2:00 – 5:00 pm Duration: **03** hrs

Instructions: 1. All questions are compulsory.
2. Assume suitable data wherever necessary
3. Semi log paper and graph papers will be provided

Q.1		**Attempt the following**	**Marks**	**Bloom's Level**	**CLO**
	a)	State and explain Force- Voltage analogy in detail.	08	2	1
	b)	Using Masson's gain formula, find transfer function of Signal Flow Graph(SFG) given in fig. no. 1	08	2	1

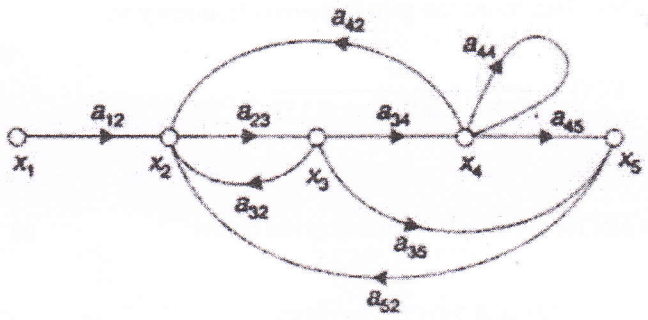


fig. no. 1

OR

	b)	Obtain overall transfer function using block diagram reduction rules whose block diagram is given in fig. no.2	08	2	1

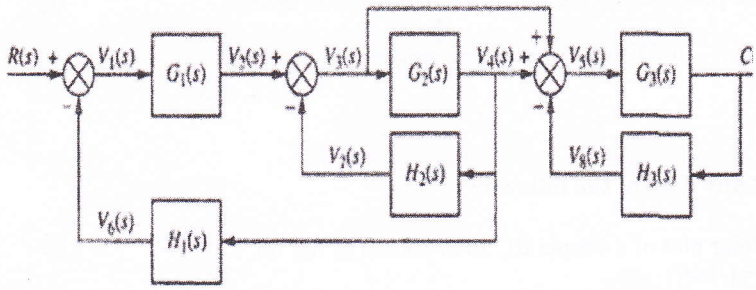


fig. no.2

Q.2		**Attempt the following**			
	a)	Draw and explain a unit step response of first order system.	08	3	2
	b)	Derive a transfer function of series L-R-C circuit.	08	3	2

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OR

	b)	Derive a transfer function of Parallel L-R-C circuit.	08	3	2
Q.3		**Attempt any two from the following**			
	a)	Identify stability of given characteristic equation as below. $S^6+2S^5+8S^4+12S^3+20S^2+16S+16=0$	08	3	3
	b)	Sketch the root locus for transfer function is- $\frac{k(s+1)(s+2)}{s(s+3)(S+4)}$	08	3	3
	c)	Sketchthe root locus for transfer function is $\frac{k(s+3)}{s(s+1)(s+2)(s+4)}$	08	3	3
Q.4		**Attempt any two from the following**			
	a)	Sketch the BODE PLOTS showing the magnitude in decibels and phase angle in degree as a function of log frequency for the transfer function given below. Determine the gain cross-over frequency w_c $G(S)=\frac{10}{S(1+0.5S)(1+0.1S)}$	08	3	4
	b)	Sketch the Bode plot for the transfer function given below $G(S)=\frac{(1+0.2S)(1+0.025S)}{S(1+0.005S)(1+0.001S)}$	08	3	4
	c)	Sketch the polar plot of the transfer function given below- $G(S)=\frac{1}{(1+ST1)(1+ST2)(1+ST3)}$	08	3	4
Q.5		**Attempt any Two of the following**			
	a)	Sketch Polar plot of a simple RC filter shown in fig. no. 3 i.e. G(S)=1/1+ST	09	3	3

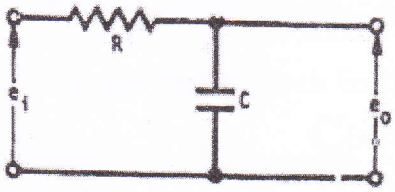


fig. no. 3

b)	Convert given differential equations into STATE SPACE model $y^4 + 6y^3 - 5y^2 + 10y = 2u(t)$	09	3	2
c)	State and explain with example Nyquist stability criterion.	09	3	2
Q.6	**Attempt any Two of the following**			
a)	Explain the design procedure for a lag compensation network.	09	2	2
b)	Write a note on PID controllers.	09	2	4
c)	What is effect of PD controller on second order system	09	2	3

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