PRN:		Course Code :	UEC401

Second Year **B. Tech** End Semester Examination Winter 2024

Control System

000200

Day and Date: Fri 22 NOV 2024 Max Marks: **100**

Time : 02:00PM To 05:00PM 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)	Differentiate between open loop and closed loop control system	08	2	1
	b)	Using Masson's gain formula, find transfer function of Signal Flow Graph given in fig. no. 1	08	2	1

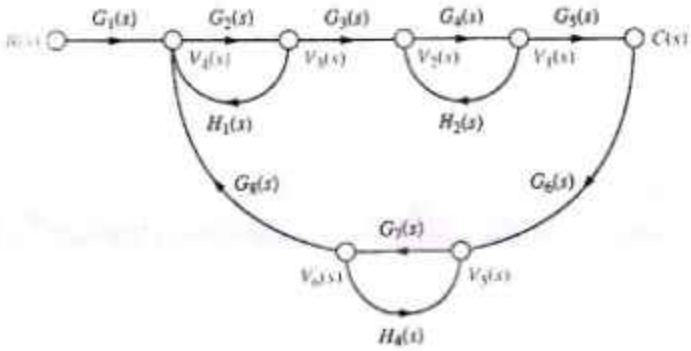


Fig No.1

OR

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

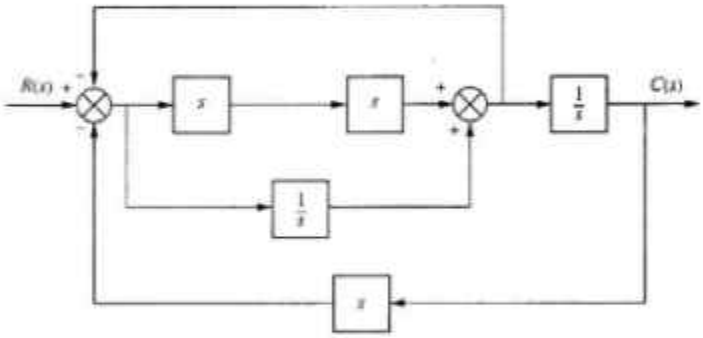


Fig No.2

Backlog

Q.2 **Attempt the following**

a)	Draw and explain a unit step response of first order system.	08	3	2
b)	Derive Transfer Function G(s) of a Close loop control system	08	3	2

OR

b)	Derive Transfer Function G(s) of a Parallel L-R-C circuit	08	3	2

Q.3 **Attempt any two from the following**

a)	Find 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- $$G(S)=\frac{k(S+1)(S+2)}{S(S+3)(S+4)}$$	08	3	3
c)	Sketchthe root locus for transfer function is $$G(S)=\frac{k(S+3)}{S(S+1)(S+2)(S+4)}$$	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-Gain cross-over frequency,Phase cross-over frequency, Gain margin and Phase margin $$G(S)=\frac{1000}{S(S+10)(S+1000)}$$	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

Backlog

Q.5 **Attempt any Two of the following**

a)	Sketch polar plot of the transfer function given below $$G(S) = \frac{1}{(1+ST1)(1+ST2)}$$	09	3	3
b)	Convert given differential equations into STATE SPACE model $$y^4 + 3y^3 - 7y^1 + 10y = 4u(t)$$	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

^^^

Backlog