Total No. of Questions – [3]

Total No. of Printed Pages: 2

G.R. No.	

PAPER CODE	U223-241(ESE)

May 2023 (ENDSEM) EXAM

S.Y. (E & Tc) (AY 2022-23 SEMESTER -II)

COURSE NAME: CONTROL SYSTEMS

COURSE CODE: ETUA22201

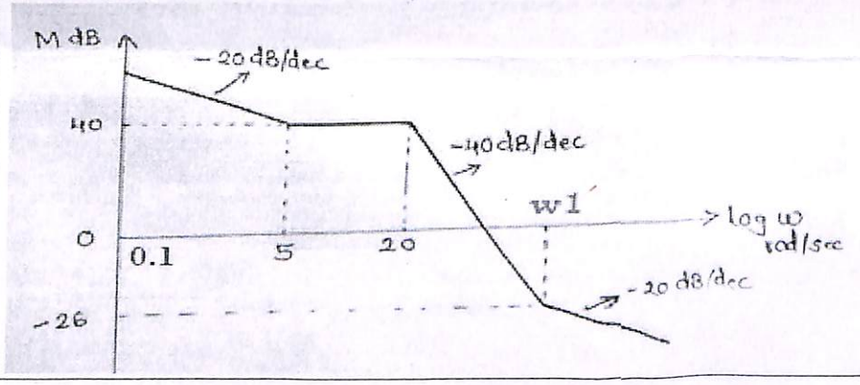
(PATTERN 2020)

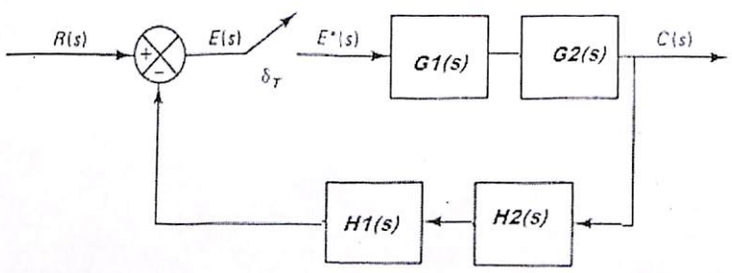
Time: [1Hr]

[Max. Marks: 30]

(*) Instructions to candidates:

1) **Use of scientific calculator is allowed**
2) **Use suitable data where ever required**
3) **All questions are compulsory**
4) **Use suitable data where ever required**

Question No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a)Construct Nyquist Plot for the open loop transfer function G(s)H(s) $=\frac{10}{s(s+1)(s+2)}$.	[4]	[4]	Apply
	b) Predict stability of the given system using Bode Plot. G(s)H(s) $=\frac{100(s+5)}{(s+10)(s+20)}$	[6]	[4]	Analysis
	OR			
	c) Calculate the transfer function form the Asymptotic Bode plot given- 	[6]	[4]	Apply
Q.2	a) Realize state space representation of the given system using Observable Canonical Form	[4]	[5]	Apply

	$F(s)=\frac{s+3}{(s^2+2s+7)}$			
	b) Investigate for complete state controllability and observability of the system with state model matrices $A=\begin{bmatrix}-2 & 4\\ 2 & -1\end{bmatrix}$; $B=\begin{bmatrix}0\\1\end{bmatrix}$; $C=[1 \quad 0]$	[6]	[5]	**Apply**
	OR			
	c) Calculate the transfer function for the system whose state space model is given below – $\dot{x}(t)=\begin{bmatrix}0 & 1\\ -1 & -2\end{bmatrix}x(t)+\begin{bmatrix}1\\0\end{bmatrix}u(t)$ $y(t)=[1 \quad 2]\,x(t)$	[6]	[5]	**Apply**
Q.3	a) Calculate Pulse Transfer Function of the following Digital System using starred laplace transform.(T=1) 	[4]	[6]	**Apply**
	b) Express advantages of digital control systems. Explain working of PID controller.	[6]	[6]	**Understand**
	OR			
	c) Elaborate working of PLC. Explain ladder diagram with one example.	[6]	[6]	**Understand**