CUILADAT TECHNOLOCICAL **T** T

Subjee Time: Instruct	t Name: Control Theory 10:30 AM to 01:00 PM Total ions: 1. Attempt all questions. 2. Make suitable assumptions wherever necessary. 3. Figures to the right in direct for months	Marks: 70
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	2. Make suitable assumptions wherever necessary.	
	5. Figures to the right indicate full marks.	
		MARKS
0.1	Short Questions	14
X	1 Define stable control system.	
	2 Define linear system.	
	3 Give the advantages of transfer function.(any two)	
	4 What are the basic components of block diagram?	
	5 Define peak overshoot.	
	6 What is steady state response?	
	7 Draw the time response of first order system with step input.	
	8 State Hurwitz criterion.	
	9 What is meant by modeling?	
-	0 Give the properties of transfer functions.	
-	1 Define step signal.	
-	2 What is bode plot?	
-	3 State the Nyquist stability criterion?	
-	4 What is the effect on system performance, when a Proportiona	1
	Integral (PI) controller is introduced in a system?	
Q.2 (a) Compare open loop and close loop control system.	03
(b) Explain Force-Voltage analogous system.	04
(c) A motor drives two loads. Find the system equations for Fig. 1	07

Fig.1

OR

	(c)	Write a short note on Gear Train and derive all the required equation.	07
Q.3	(a)	Give the difference between block diagram and SFG method.	03
	(b)	Explain poles and zeros with an example.	04
	(c)	Find the closed loop transfer function for the system shown in Fig. 2	07





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		OR	
Q.3	(a)	Define : 1) delay time, 2) rise time, 3) pick time.	03
	(b)	Sketch and explain, how damping ratio affects the time response of a second order system?	04
	(c)	Refer Fig.3 and determine the transfer function.	07
		$R_{5} \xrightarrow{1} G_{1} G_{2} G_{3} G_{4} G_{5} G_{6} 1$ $-H_{2} -H_{2}$	

Fig.3

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Q.4	(a)	Define Routh's stability criterion.	03
•	(b)	Define : 1) state variable, 2) state vector, 3) state space	04
	(c)	For the second order control system show the location of the poles in S-plane for the different value of damping ratio. Also show the time	07
		response of the same if unit step is provided as input.	
		OR	
Q.4	(a)	Draw the liquid level system and explain the concept of resistance and capacitance of the system.	03
	(b)	A unity feedback system has $G(s) = \frac{k(s+1)}{s^2 (s+2)(s+5)}$. Using Routh-	04
		Hurwitz criteria find range of k for the closed loop system to be stable.	
	(c)	Derive the expression for static error coefficients. How these coefficients are useful in determining the steady state error?	07
05	(a)	What is state diagram representation for 1) scalar 2) adder 2)	02

- Q.5 (a) What is state diagram representation for 1) scalar, 2) adder, 3) 03 integrator. 04
 - (b) Write advantages and of frequency domain analysis.

(c) A feedback control system has open loop transfer function

$$G(s)H(s) = \frac{k}{s(s+4)(s^2+4s+20)}$$

Plot the root locus for K = 0 to ∞ . Indicate all point on it.

OR

Q.5 (a) Write advantages and disadvantages of nyquist plot. (b) Define and explain following terms with respect to frequency response(i) Gain Margin (ii) Phase Margin (c) For the system having the open loop transfer function $G(s)H(s) = \frac{10}{s(s+1)(s+10)}$ Determine the stability of the system by plotting the Bode plot of the

Determine the stability of the system by plotting the Bode plot of the system.

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