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BTECH (SEM VI) THEORY EXAMINATION 2021-22 CONTROL SYSTEM

Time: 3 Hours

1.

2.

Total Marks: 100

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

temp Q.	et all questions in brief. Questions	CO
No	Compare any four differences between close loop and open loop system.	1
(a)	Compare any four differences between close loop and close loop system.	1
(b)	Draw the Elementary Block Diagram of open loop and close loop system.	2
(c)	Enlist the condition for a system to be controllable.	2
(d)	List any two advantages of space state model over transfer function model.	13
(e)	Define Settling time and Maximum peak overshoot.	13
(f)	Define Rise time and Peak Time.	
(g)	Illustrate how the location of poles of a system related to stability.	4
(h)	Describe the Angle of Departure.	4
$\frac{(ii)}{(i)}$	Define Gain Cross Over Frequency.	5
(i) (j)	Enlist the significant of Polar plot.	5
U/	Linis, the digital	6 0.

SECTION B

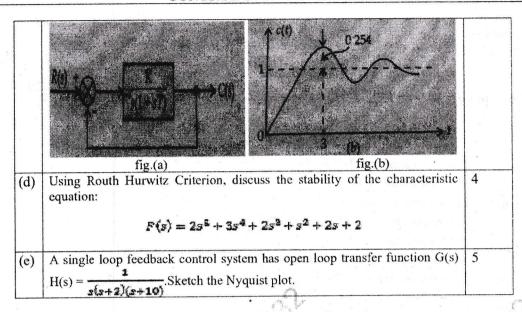
, Çl	Section 5	3 = 30
Q.	pt any three of the following: Questions	CO
No (a)	Obtain overall Transfer function for the given block diagram shown in Figure using Block reduction Method:	1
. 8	$\begin{array}{c c} R(s) & + & G_1 \\ \hline \end{array}$	
v a	H_1	
(b)	Construct the state space model for the system described by the differential equation below. The output matrix should be independent of input and be able to measure each state variable. $\frac{d^3y}{dt^2} + 6\frac{d^3y}{dt^2} + 11\frac{dy}{dt} + 6y = 4u(t)$	2
(c)	The system shown in fig(a) when subjected to a unit step input, the output response is shown in fig(b). Determine the value of K & T from the response	3

3.

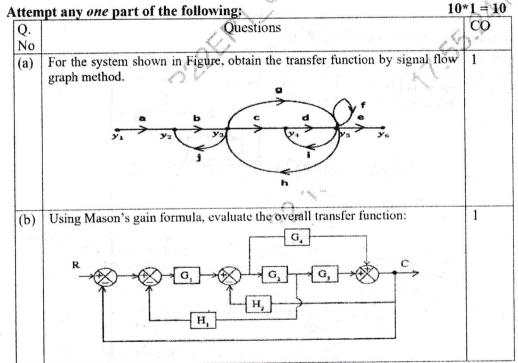
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SECTION C



4	Atten	npt any one part of the following:	*1 = 10
٠,	Q.	Questions	CO
	(a)	A single input single-output system has transfer function, enlist the state	2
	(")	equations, and draw the state diagram.	



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	$\frac{Y(s)}{U(s)} = \frac{1}{S^2 + 7S^2 + 14S + 8}$	
(b)	Examine the Controllability and Observability of the following system:	2
	$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} S = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} C = \begin{bmatrix} 10 & 5 & 1 \end{bmatrix}$	

4.4	npt any one part of the following:	*1 = 10
Q.	Questions	СО
No	A 1 3 A A A A A A A A A A A A A A A A A	3
(a)	The open loop transfer function of a unity feedback system is given by $G(S) = \frac{K}{S(1+ST)}$ Where 'K' & 'T' are positive constants. By what factor should the amplifier gain be reduced so that the peak overshoot of unit step response of the system is reduced from 75% to 25%.	2
(b)	Evaluate the unit step response with proper derivation for an under damped 2 nd order system.	

Q.	ppt any one part of the following: Questions	CC
No		1
(a)	For a unity feedback system of O.L.T.F is given by	4
	$G(S)H(S) = \frac{K}{S(S+1)(S+2)(S+3)}$	
14	 a) Sketch the root locus for 0 ≤ K ≤ ∞. b) At what value of K, the system become unstable. 	
(b)	For a unity feedback system of O.L.T.F is given by	4
	$G(S)H(S) = \frac{1}{S(S+6)(S^2+4S+13)}$	
	a) Sketch the root locus for $0 \le K \le \infty$.	
	b) At what value of K, the system become stable.	

	10*	1 = 10
Attem Q.	pt any one part of the following: 10* Questions	СО
No	Sketch the Bode Plot for the given system and comment on stability of the	5
(a)	Sketch the Bode Plot for the given system and common used systems: $G(s)H(s) = \frac{4}{s(1+0.5s)(1+0.08s)}$	
(b)	S Sketch the Bode Plot for the given system and comment on stability of the	5
	used systems: $G(s)H(s) = \frac{30}{s(1+0.5s)(1+0.08s)}$	