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Question Paper Code: 99404

B.E	. / B.Tech. DEGI	REE EXA	MINAT	ION, NOV 202	23	
		Electiv	/e			
	Electronics and	Commu	nication l	Engineering		
	19UEC904- C	ONTRO	L ENGIN	NEERING		
	(R	Regulation	n 2019)			
ration: Three hours				Max	ximum: 100	Marks
	Ansv	ver ALL	Question	S		
	PART A	A - (5 x 1	= 5 Mar	·ks)		
A control system in voutput is known as	which the control	l action is	s someho	w dependent o	on the	CO1-U
(a) Closed loop system ((b) Op	en loop system	l	
(c) Semi closed loop system (d) None the above						
The damping ratio an	d peak overshoot	are meas	ures of:			CO1- U
(a) Relative stability	(b) Speed of re	sponse	(c) Stea	dy state error	(d) Absolu	ute stability
• •		nsfer fund	ction to	zero, which a	mong the	CO1- U
(a) Poles	(b) Zeros	(c) Both	a and	(d) None of	the above	
• •	` '	$-2s^2+3s+$	15=0 the	number of roo	ots which	CO2- App
(a) 4	(b) 3		(c) 2		(d)1	
Which among the foldynamic system?	llowing plays a c	rucial rol	e in dete	ermining the sta	ate of	CO5- U
(a) State variables	(b) State vector	ſ	(c) Stat	e space	(d) St	ate scalar
	PART -	-B (5 x 3	= 15 Mai	rks)		
Compare the Open lo	op System with C	Closed loc	op Syster	n.		CO1-U
	A control system in voutput is known as (a) Closed loop system (b) Semi closed loop The damping ratio and (a) Relative stability By equating the dent following will be obtated (a) Poles For the polynomial India in the right half of the dynamic system? (a) State variables	Electronics and 19UEC904- Comparison. Three hours Answard PART: A control system in which the control output is known as (a) Closed loop system (b) Semi closed loop system The damping ratio and peak overshoot (a) Relative stability (b) Speed of real By equating the denominator of transfollowing will be obtained? (a) Poles (b) Zeros For the polynomial $R(s) = s^5 + s^4 + 2s^3 + 1$ lie in the right half of S plane is (a) 4 (b) 3 Which among the following plays a condition of the polynomial system? (a) State variables (b) State vectors	Electronics and Community Electronics and Community Electronics and Community Electronics and Control (Regulation action: Three hours Answer ALL Operator Action is output is known as (a) Closed loop system (b) Semi closed loop system The damping ratio and peak overshoot are meas (a) Relative stability (b) Speed of response By equating the denominator of transfer function following will be obtained? (a) Poles (b) Zeros (c) Both For the polynomial $R(s) = s^5 + s^4 + 2s^3 + 2s^2 + 3s + 1$ lie in the right half of S plane is (a) 4 (b) 3 Which among the following plays a crucial roll dynamic system? (a) State variables (b) State vector PART – B (5 x 3)	Elective Electronics and Communication I 19UEC904- CONTROL ENGIN (Regulation 2019) Fation: Three hours Answer ALL Question PART A - (5 x 1 = 5 Mar A control system in which the control action is somehor output is known as (a) Closed loop system (b) Op (c) Semi closed loop system (d) No The damping ratio and peak overshoot are measures of: (a) Relative stability (b) Speed of response (c) Steat By equating the denominator of transfer function to following will be obtained? (a) Poles (b) Zeros (c) Both a and For the polynomial $R(s) = s^5 + s^4 + 2s^3 + 2s^2 + 3s + 15 = 0$ the lie in the right half of S plane is (a) 4 (b) 3 (c) 2 Which among the following plays a crucial role in detection depends on the polynomial system? (a) State variables (b) State vector (c) State PART - B (5 x 3= 15 Mar)	Electronics and Communication Engineering 19UEC904- CONTROL ENGINEERING (Regulation 2019) ration: Three hours Mar. Answer ALL Questions PART A - (5 x 1 = 5 Marks) A control system in which the control action is somehow dependent of output is known as (a) Closed loop system (b) Open loop system (c) Semi closed loop system (d) None the above The damping ratio and peak overshoot are measures of: (a) Relative stability (b) Speed of response (c) Steady state error By equating the denominator of transfer function to zero, which are following will be obtained? (a) Poles (b) Zeros (c) Both a and (d) None of For the polynomial $R(s) = s^5 + s^4 + 2s^3 + 2s^2 + 3s + 15 = 0$ the number of rocalie in the right half of S plane is (a) 4 (b) 3 (c) 2 Which among the following plays a crucial role in determining the stadynamic system?	Electronics and Communication Engineering 19UEC904- CONTROL ENGINEERING (Regulation 2019) Tation: Three hours Answer ALL Questions PART A - $(5 \times 1 = 5 \text{ Marks})$ A control system in which the control action is somehow dependent on the output is known as (a) Closed loop system (b) Open loop system (c) Semi closed loop system (d) None the above The damping ratio and peak overshoot are measures of: (a) Relative stability (b) Speed of response (c) Steady state error (d) Absolute By equating the denominator of transfer function to zero, which among the following will be obtained? (a) Poles (b) Zeros (c) Both a and (d) None of the above For the polynomial $R(s) = s^5 + s^4 + 2s^3 + 2s^2 + 3s + 15 = 0$ the number of roots which lie in the right half of S plane is (a) 4 (b) 3 (c) 2 (d) 1 Which among the following plays a crucial role in determining the state of dynamic system? (a) State variables (b) State vector (c) State space (d) State PART – B (5 x 3= 15 Marks)

U

The damping ratio and natural frequency of a second order system are 0.5 and 8 CO2- App rad/sec respectively. Calculate resonant peak and resonant frequency.

8. Define Phase margin & gain margin.

CO1-U

9. Brief the computation process of angle of departure.

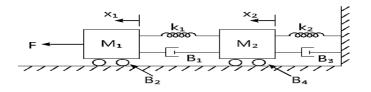
CO2-U

10 Explain the concept of Controllability.

CO₃-U

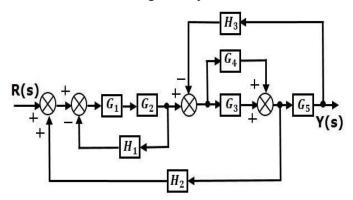
$$PART - C (5 \times 16 = 80 \text{ Marks})$$

11 (a) Write the differential equation of the system and draw the force CO2-App (16) voltage analogous circuits. Also derive the mathematical model of the mechanical system.



Or

(b) Using block diagram reduction technique, Find the closed loop CO2-App (16) transfer function for the given system.



12 (a) Derive the response of under damped and critically damped second CO2-App (16) order system for unit step input.

Or

(b) An unit feedback system has G(s) = 1/s(1+2s). The input to the system CO2- App is described byr(t)=2+4t+6t2+2t3. Determine the generalized error coefficients and express the steady state error as a function of time.

13 (a) Discuss briefly about the lag, lead and lag-lead compensators with CO5-U (16)examples.

Or

- (b) Write down the procedure for designing lead compensators using CO5- U (16)Bode plot.
- (a) Label the Root Locus of the system whose open loop transfer function CO4- Ana 14 (16)is $G(S) = \frac{K}{S(S+1)(S+3)}$. Determine the value of K for damping ratio equal to 0.5. Analyze the stability condition of the system for the damping ratio 0.5.

- characteristic polynomial of a system is CO3- Ana (b) The (16) $s^7 + 9s^6 + 24s^5 + 24s^4 + 24s^3 + 24s^2 + 23s + 15 = 0$. Determine the location of roots on s-plane and hence the stability of the system.
- 15 (a) A system is represented by State equation X = AX + BU; Y = CX CO3- Ana (16)

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & -1 & 1 \\ 0 & -1 & -10 \end{bmatrix}; B = \begin{bmatrix} 0 \\ 0 \\ 10 \end{bmatrix} \text{ and } C = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix}$$

Inspect the Transfer function of the System and analyze the state variables of the system.

Or

(b) Obtain the state model of the electrical network shown in figure by CO2- App (16)choosing V1(t) and V2(t) of state variables; also analyze the stability of the system.

