SSLC, HSE, DIPLOMA, B.E/B.TECH, M.E/M.TECH, MBA, MCA

Notes Syllabus Question Papers Results and Many more...

Available @

www.AllAbtEngg.com

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019 Third/Fourth/Fifth Semester Electronics and Communication Engineering EC8391 - CONTROL SYSTEMS ENGINEERING (Common to Medical Electronics/ Electronics and Telecommunication Engineering/ Mechatronics Engineering) (Regulations 2017) Time: Three Hours Answer ALL questions PART - A 1. Distinguish between feed forward control system and feedback control systems. 2. Specify the usefulness of AC servomotors in motion control systems. 3. Write the performance measures in transient response analysis of second order system. 4. For the given transfer function, find the type and order of the system $\frac{C(s)}{R(s)} = \frac{10(s+2)}{s(s^2+3s+5)}$ 5. In minimum phase system, how the starting and end point of polar plot are identified? 6. Why compensators are necessary in feedback control systems? 7. Comment on the stability of the system, when the roots of characteristic equation are lying on imaginary axis. 8. How do you define relative stability? 9. Write the canonical form of state model for nth order system. 10. Justify how digital Control System is superior to conventional control theory.		Reg. No.:			
Third/Fourth/Fifth Semester Electronics and Communication Engineering EC8391 - CONTROL SYSTEMS ENGINEERING (Common to Medical Electronics/ Electronics and Telecommunication Engineering/ Mechatronics Engineering) (Regulations 2017) Time: Three Hours Maximum: 100 Mar Answer ALL questions PART - A (10×2=20 Mark 1. Distinguish between feed forward control system and feedback control systems. 2. Specify the usefulness of AC servomotors in motion control systems. 3. Write the performance measures in transient response analysis of second order system. 4. For the given transfer function, find the type and order of the system $\frac{C(s)}{R(s)} = \frac{10(s+2)}{s(s^2+3s+5)}.$ 5. In minimum phase system, how the starting and end point of polar plot are identified? 6. Why compensators are necessary in feedback control systems? 7. Comment on the stability of the system, when the roots of characteristic equation are lying on imaginary axis. 8. How do you define relative stability? 9. Write the canonical form of state model for nth order system.		Question Pap	er Code : 9	90177	
Answer ALL questions PART - A (10×2=20 Mark 1. Distinguish between feed forward control system and feedback control systems. 2. Specify the usefulness of AC servomotors in motion control systems. 3. Write the performance measures in transient response analysis of second order system. 4. For the given transfer function, find the type and order of the system $ \frac{C(s)}{R(s)} = \frac{10(s+2)}{s(s^2+3s+5)}. 5. In minimum phase system, how the starting and end point of polar plot are identified? 6. Why compensators are necessary in feedback control systems? 7. Comment on the stability of the system, when the roots of characteristic equation are lying on imaginary axis. 8. How do you define relative stability? 9. Write the canonical form of state model for nth order system.$	E	Third/Fourth Electronics and Com C8391 – CONTROL S Medical Electronics/ Engineering/ Mech	VFifth Semester munication Eng YSTEMS ENGI Electronics and atronics Engine	ineering NEERING Telecomm	
PART – A (10×2=20 Mark 1. Distinguish between feed forward control system and feedback control systems. 2. Specify the usefulness of AC servomotors in motion control systems. 3. Write the performance measures in transient response analysis of second order system. 4. For the given transfer function, find the type and order of the system $\frac{C(s)}{R(s)} = \frac{10(s+2)}{s(s^2+3s+5)}.$ 5. In minimum phase system, how the starting and end point of polar plot are identified? 6. Why compensators are necessary in feedback control systems? 7. Comment on the stability of the system, when the roots of characteristic equation are lying on imaginary axis. 8. How do you define relative stability? 9. Write the canonical form of state model for nth order system.	Time: Three Hours	3		Maxi	mum : 100 Marl
 Distinguish between feed forward control system and feedback control systems. Specify the usefulness of AC servomotors in motion control systems. Write the performance measures in transient response analysis of second order system. For the given transfer function, find the type and order of the system \[\frac{C(s)}{R(s)} = \frac{10(s+2)}{s(s^2+3s+5)}. \] In minimum phase system, how the starting and end point of polar plot are identified? Why compensators are necessary in feedback control systems? Comment on the stability of the system, when the roots of characteristic equation are lying on imaginary axis. How do you define relative stability? Write the canonical form of state model for nth order system. 		Answer A	LL questions		
 Specify the usefulness of AC servomotors in motion control systems. Write the performance measures in transient response analysis of second order system. For the given transfer function, find the type and order of the system \[\frac{C(s)}{R(s)} = \frac{10(s+2)}{s(s^2+3s+5)}. \] In minimum phase system, how the starting and end point of polar plot are identified? Why compensators are necessary in feedback control systems? Comment on the stability of the system, when the roots of characteristic equation are lying on imaginary axis. How do you define relative stability? Write the canonical form of state model for nth order system. 		PA	RT – A	(10×2=20 Mark
 Write the performance measures in transient response analysis of second order system. For the given transfer function, find the type and order of the system \frac{C(s)}{R(s)} = \frac{10(s+2)}{s(s^2+3s+5)}. In minimum phase system, how the starting and end point of polar plot are identified? Why compensators are necessary in feedback control systems? Comment on the stability of the system, when the roots of characteristic equation are lying on imaginary axis. How do you define relative stability? Write the canonical form of state model for nth order system. 	1. Distinguish bet	tween feed forward cont	rol system and fe	edback cont	trol systems.
 system. 4. For the given transfer function, find the type and order of the system \[\frac{C(s)}{R(s)} = \frac{10(s+2)}{s(s^2+3s+5)}. \] 5. In minimum phase system, how the starting and end point of polar plot are identified? 6. Why compensators are necessary in feedback control systems? 7. Comment on the stability of the system, when the roots of characteristic equation are lying on imaginary axis. 8. How do you define relative stability? 9. Write the canonical form of state model for nth order system. 	2. Specify the use	fulness of AC servomote	ors in motion con	trol systems	3.
 C(s) = 10(s+2)/(s(s²+3s+5)). 5. In minimum phase system, how the starting and end point of polar plot are identified? 6. Why compensators are necessary in feedback control systems? 7. Comment on the stability of the system, when the roots of characteristic equation are lying on imaginary axis. 8. How do you define relative stability? 9. Write the canonical form of state model for nth order system. 		ormance measures in tr	ansient response	analysis of	second order
 identified? 6. Why compensators are necessary in feedback control systems? 7. Comment on the stability of the system, when the roots of characteristic equation are lying on imaginary axis. 8. How do you define relative stability? 9. Write the canonical form of state model for nth order system. 	4. For the given $\frac{C(s)}{R(s)} = \frac{10(s+1)}{s(s^2+3s)}$	transfer function, fi 2) +5)	nd the type an	d order of	the system
 7. Comment on the stability of the system, when the roots of characteristic equation are lying on imaginary axis. 8. How do you define relative stability? 9. Write the canonical form of state model for nth order system. 	5. In minimum p identified?	hase system, how the	starting and end	l point of p	olar plot are
are lying on imaginary axis. 8. How do you define relative stability? 9. Write the canonical form of state model for n th order system.	6. Why compensa	tors are necessary in fe	edback control sy	stems?	
9. Write the canonical form of state model for n^{th} order system.			, when the roots o	of characteri	stic equation
will all exercises the same and	8. How do you def	fine relative stability?			
10. Justify how digital Control System is superior to conventional control theory.	9. Write the canon	nical form of state mode	l for n th order sys	stem.	
	10. Justify how dig	rital Control System is s	uperior to conver	ntional contr	rol theory.

IV IV IV ALLUMIOULINGS.COIN

SSLC, HSE, DIPLOMA, B.E/B.TECH, M.E/M.TECH, MBA, MCA

Notes Syllabus Question Papers Results and Many more...

Available @

www.AllAbtEngg.com

90177

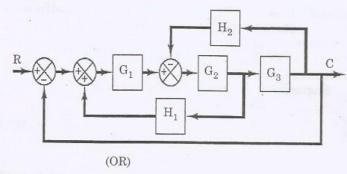
-2-



PART - B

(5×13=65 Marks)

11. a) Draw the signal flow graph for the given system block diagram, and obtain the closed loop transfer function of the system C(S)/R(S) using Mason's Gain formula.



- b) Describe the construction and working principle of Synchros. Also explain how it is used in servo applications.
- 12. a) A unity feedback control system has an open loop transfer function $G(s) = \frac{10}{s(s+5)}$. Determine its closed loop transfer function, damping ratio and natural frequency of oscillations. Also evaluate the rise time, peak overshoot, peak time and settling time for a step input of 12 units.

(OR

- b) What is the need for PID control for feedback control systems? Explain how it is designed for second order systems.
- 13. a) List out the frequency domain specifications of a standard second order system.
 Derive the expressions for Resonant peak and Bandwidth of a second order system.

(OR)

- b) The open loop transfer function of a unity feedback system is G(s) = K/(s(s+1)). It is desired to have the velocity error constant $K_v = 12 \ sec^{-1}$ and phase margin as 40°. Design a lead compensator to meet the above specifications.
- 14. a) Use the Routh stability criterion to determine the location of roots on the s-plane and hence the stability for the system represented by the characteristic equation $S^6 + S^5 + 3S^4 + 3S^3 + 5S^2 + 2S + 1 = 0$.

(OR)

IV IV IV AL TOUR TOUR DINGS . COIL

SSLC, HSE, DIPLOMA, B.E/B.TECH, M.E/M.TECH, MBA, MCA

Notes Syllabus Question Papers Results and Many more...

Available @

www.AllAbtEngg.com

-3-

90177

- b) Using Nyquist Stability Criterion, find the relative stability of the system whose open loop transfer function is defined as $G(s) H(s) = \frac{K(s+1)}{s^2(s+2)(s+4)}$
- 15. a) The state model of the system is given by

$$\begin{bmatrix} \dot{\mathbf{x}}_1 \\ \dot{\mathbf{x}}_2 \\ \dot{\mathbf{x}}_3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 \\ -2 & -3 & 0 \\ 0 & 2 & -3 \end{bmatrix} \begin{bmatrix} \mathbf{x}_1 \\ \mathbf{x}_2 \\ \mathbf{x}_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix} \mathbf{u} \; ; \; \mathbf{y} = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} \mathbf{x}_1 \\ \mathbf{x}_2 \\ \mathbf{x}_3 \end{bmatrix}$$

Determine whether the system is completely controllable or not.

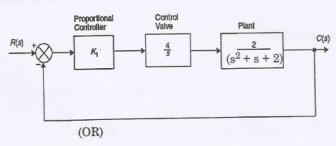
(OR)

b) Obtain the state model of the system whose transfer function s given as

$$\frac{Y(s)}{U(s)} = \frac{10}{s^3 + 4s^2 + 2s + 1}$$

(1×15=15 Marks)

16. a) Sketch the root locus diagram of the control system as shown in figure; find the value of the proportional controller gain K_1 to make the system is just unstable.



b) The open loop transfer function of the plant is

$$G(s) \; H(s) = \frac{10e^{-S\tau_0}}{s(0.1s+1)(0.05s+1)}$$

Use Bode plot, find the gain margin and phase margin when $\tau_{\rm D}=0$.

IN IN IN ALLUMINOUS OF THE