Question Paper Code: R18A22EC02

R18

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech II Semester Supplementary Examinations, Jan/Feb-2024

CONTROL SYSTEMS

(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours **Max. Marks: 75**

Section – A (Short Answer type questions) (25 Marks)

Answer All Questions		Course Outcome	B.T Level	Marks
1.	What is feedback network?	CO1	L1	2M
2.	Define input node, output node and branch.	CO1	L1	3M
3.	Define Steady state error.	CO2	L1	2M
4.	List the time domain specifications.	CO2	L1	3M
5.	Define absolute and conditional stability.	CO3	L1	2M
6.	Define Centroid. How do you determine the centroid and angle of asymptotes in root locus technique?	CO3	L1	3M
7.	Define Phase Margin, Gain Margin with reference to Bode plot.	CO4	L1	2M
8.	What is the function of P and I Controllers?	CO4	L1	3M
9.	Define state variables.	CO5	L1	2M
10.	State the properties of state transition matrix.	CO5	L1	3M

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

11. A)	List the differences between open loop and closed loop systems with suitable examples.	CO1	L2	10M
	OR			
B)	Obtain the transfer function $\frac{\theta(s)}{E(s)}$ for armature-controlled dc servomotor.	CO1	L2	10M
12. A)	Derive the expressions for rise time, peak overshoot, settling time of Second order system when unit step input.	CO2	L3	10M
	OR			
B)	Find the steady state errors for the unit step, unit ramp and unit parabolic inputs for the following system. $$G(S) = \frac{1000(S+1)}{(S+10)(S+50)}$$	CO2	L3	10M
13. A)	Construct Routh Array and determine the stability of the system whose characteristic equation is $S^6+2S^5+8S^4+12S^3+20S^2+16S+16=0$. Also determine the number of roots lying on right half of s-Plane, left half of s-plane and on imaginary axis.	CO3	L3	10M
	OR			
B)	Explain clearly the steps involved in the construction of Bode plot and define the following terms. i)Gain margin ii) Phase margin iii) Gain cross over frequency iv) Phase cross over frequency	CO3	L3	10M

14. A)	Sketch the polar plot for the following transfer function, Determine phase margin and gain margin. $$G(S) = \frac{k}{S^2(1+S)(1+2S)}$$	CO4	L3	10M
	OR			
B)	What is compensation? What are the different types of compensators? Explain in brief.	CO4	L3	10M
15. A)	Obtain the state transition matrix for the state model whose matrix A is given by $$A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$$	CO5	L3	10M
	OR			
B)	Explain about diagonalization and also obtain the state model of the given transfer function. $$\frac{Y(s)}{U(s)} = \frac{5}{S^2+6S+7}$$	CO5	L3	10M