ANNA UNIVERSITY COIMBATORE

B.E. / B.TECH. DEGREE EXAMINATIONS : DECEMBER 2009

REGULATIONS : 2007

FIFTH SEMESTER : ELECTRONICS AND COMMUNICATION ENGINEERING

070280007 - CONTROL SYSTEMS

TIME : 3 Hours Max.Marks : 100

PART – A

(20 x 2 = 40 MARKS)

ANSWER ALL QUESTIONS

1. What is the use of mason's gain formula?
2. Give two example for open loop and closed loop systems
3. What do you meant by analogous system?
4. What are the frequency domain specifications?
5. What are the advantages and disadvantages of feedback control systems?
6. How can we classify second order system based on damping ratio?
7. Define gain margin
8. Define resonant frequency
9. State Routh Stability criterion
10. Define Nyquist stability criterion
11. What are the difference between state space analysis and Transfer function analysis?
12. What are root loci?
13. What is servomechanism?
14. What are the different types of controller?
15. What is synchro?
16. Name the test signals used in control systems
17. What is polar plot?
18. Give example for frequency response plot?
19. Write down state model and output model of state space systems?

20. What do you meant by decomposition of transfer function?

PART – B

(5 x 12 = 60 MARKS)

ANSWER ANY FIVE QUESTIONS

21. a. A unity feedback system has an open loop transfer function $G(s) = \frac{k}{s(s+10)}$. If the damping ratio is 0.5,determine 8

(i).The value of k

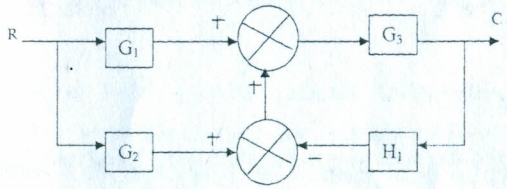
(ii).Peak overshoot

(iii).Time to peak overshoot

(iv).Settling time

b. For a unity feedback system whose $G(s) = \frac{1}{s(s+1)}$ the input signal is r (t) = 4+6t+2t^{3}Find generalized error coefficients. 4

22. For the given block diagram find corresponding signal flow graph and evaluate closed loop transfer function relating to output and input



23. Determine the value of K for a unity feedback control system having open loop transfer function $G(s)H(s) = \frac{k}{s(s+2)(s+4)}$ such that (i) Gain margin=20db(ii).Phase margin=60^0.

24. Investigate the F(s) for Stability using RH criterion

(i) $F(s)=s^4+Ks^2+(k+1)s+(k+2)s+2$

(ii) $F(s)=s^4+s^3+3s^2+s+6$

(iii) $F(s)=s^5+s^4+2s^3+2s^2+6s+6$

25. Obtain the state space model of the system with transfer function

$$\frac{C(s)}{R(s)}=\frac{s^2+3s+2}{s^2+7s+12}$$ in phase variable form

26. A system characterized by the following state equation

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}=\begin{bmatrix} -3, & 1 \\ -2 & 0 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}+\begin{bmatrix} 0 \\ 1 \end{bmatrix}u;\ t>0$$

$Y=[1\ 0]\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ Find (i) Transfer function of the system (ii) State transition matrix.

27. Sketch the root locus for the system with characteristic equation

$$1+G(s)H(s)=1+\frac{k(s+2)(s+3)}{(s+1)(s-1)}$$

28. Find transfer function of field controlled DC Servo motor

*****THE END*****