Code No. 2340 / N

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I-Semester (New)(Main) Examination, November / December 2012

Subject : Automatic Control Systems

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

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. Justify that open loop systems are more stable than closed loop systems. (2)
2. Write the Mason's gain formula. (2)
3. Define order and type of a system. (2)
4. Determine the range of 'K', for the system to be stable using R-H criterion shown in figure 1. (3)

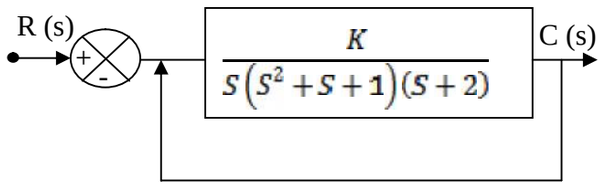
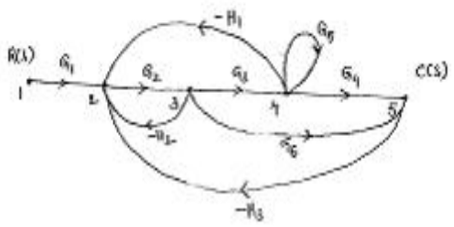


Fig. 1.

5. The step response of a system is $(1-10e^{-t})$ u(t), find the transfer function of a system. (3)
6. What is principle of argument? (2)
7. Define gain margin and phase margin. (2)
8. What is the transfer function of a zero order Hold circuit? (3)
9. List out the advantages of state variable analysis. (3)
10. Define the terms controllability and observability. (3)

PART – B (5x10=50 Marks)

11. Find the overall gain c(s)/R(s) for the signal flow graph shown below. (10)

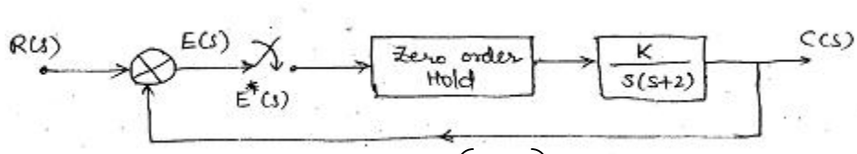


12. (a) A unity feedback control system has an open loop transfer function, $G(s)=\frac{10}{s(s+2)}$. Find the rise time, percentage overshoot, peak time and setting time for a step input of 12 units. (8)
    (b) Define Steady state error. (2)

13. For the system with transfer function, $G(s)=\frac{20}{s(1+3s)(1+4s)}$ draw the bode plot and obtain gain-cross over frequency. (10)

14. Draw the Nyquist plot for the system whose open loop transfer function is $G(s)H(s)=\frac{K}{s(s+2)(s+10)}$ Determine the range of 'K' for which closed loop system is stable. (10)

15. For the system shown in figure find the response at sampling instants to unit step input for T=1 sec. K=1. (10)



16.(a) Find the state transition matrix for A= $\begin{pmatrix} 0 & -1 \\ +2 & -3 \end{pmatrix}$ (6)

(b) Evaluate the controlling of the system with X=AX+BU and $A=\begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}; B=\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ (4)

17. Write short notes on :
    (a) Synchros
    (b) PID controllers
    (c) Response of 2nd order system

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