Code No. : 3044

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I Semester (Main) Examination, December 2010

AUTOMATIC CONTROL SYSTEMS

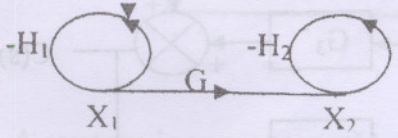
Time : 3 Hours] [Max. Marks : 75

Note : *Answer all questions from Part A. Answer* ***any five*** *questions from Part B.*

PART – A **(25 Marks)**

1. Differentiate the open and closed loop control systems. **3**

2. Find the ratio X_2/X_1 of the following signal flow graph. **3**



3. The Impulse response of a system is 12. 5 e^{-6t} sin 8t, find the steady state value to a step input. **3**

4. Closed loop transfer function of a unity feedback control system is given by $\frac{10}{S^2 - 10S + 11}$ find the steady state error to a step input. **3**

5. Find the gain and phase margins of the system with the OLTF $G(s)H(s) = \frac{1}{S+5}$. **3**

6. Sketch the root locus diagram of a system with OLTF $G(S)H(S) = \frac{K(1-S)}{S(S+3)}$. **2**

7. What is the transportation lag and what is its effect on the stability of a system ? **2**

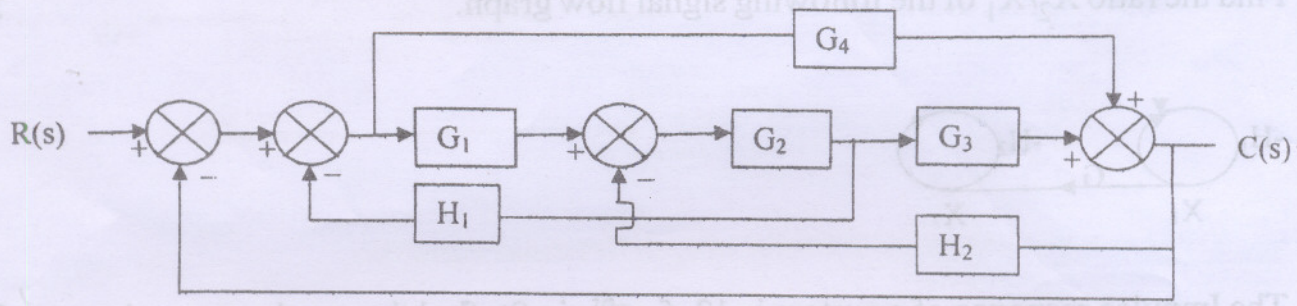
8. Draw the phase response of the following system with transfer function $\frac{(S+2)}{(S-1)(S-4)}$. 2

9. Write the advantages of the digital control system. 2

10. Transfer function of a certain system is given below find the eigen values of a system matrix $\frac{(S+2)}{(S^2+4S+3)}$. 2

PART – B

11. Find the Transfer function C(s)/R(s) of the following block diagram. 10



12. a) The Transfer function of a certain system is $\frac{4(S+3)}{S^2+S+1}$ find the peak overshoot of the system to a step of amplitude two units. 5

b) TF of a certain system is $\frac{(S+6)}{KS^2+S+6}$, if the damping ratio is 0.5 find the value of 'K'. 5

13. OLTF of a certain feed back control system is $\frac{K}{S(S+4)(S^2+4S+5)}$.

a) Draw the root locus diagram of the system and 7

b) Find the value of 'K' at any break away point. 3

14. a) Sketch the Nyquist plot of a certain feedback control system with OLTF. $\frac{K}{S(1+0.2S)(1+0.05S)}$ find the Gain and Phase margins. 6

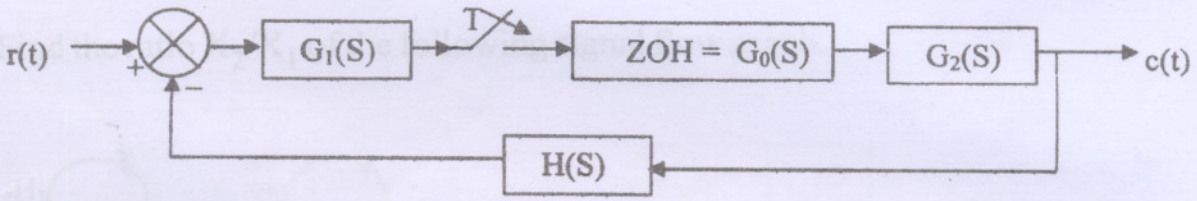
b) From the above Nyquist plot, find the value of 'K' for a

i) Phase Margin of 40°

ii) Gain Margin of 20 dB. (2+2)

15. a) Draw the block diagram of the Discrete data control system. 4

b) Find the output C(Z), of the following Discrete data control system. 6



16. A system is represented by the following differential equation

$$\frac{d^2y(t)}{dt^2}+6\frac{dy(t)}{dt}+8y(t)=2\frac{r(t)}{dt}+r(t).$$

a) Draw the state diagram. 6

b) From the above state diagram obtain the state space representation. 4

17. Write short notes on the following :

a) Force-Voltage analogy. 3

b) Experimental determination of the transfer function from the Bode plot. 3

c) PID controller. 4