Total No. of Questions : 12]

SEAT No. :

P1625

[Total No. of Pages : 3

[5058]-71
T.E.(Electronics)
FEEDBACK CONTROL SYSTEM
(2008 Course)(Semester-I)(304201)

Time :3Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answer three questions from section- I and three questions from section- II.***
3) ***Answer to the two sections should be written in separate books.***
4) ***Neat diagrams must be drawn whenever necessary and Figures to the right indicate full marks.***
5) ***Use of logarthmic tables, slide rule, Molier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

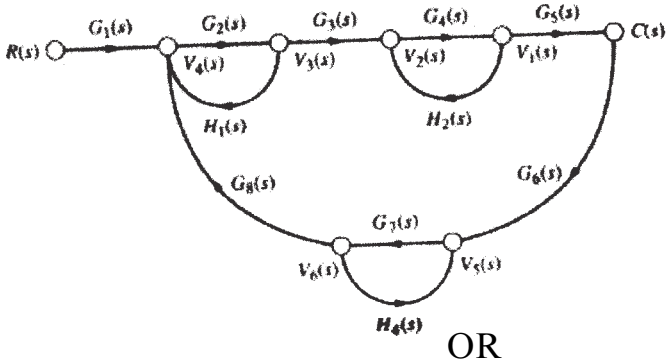
SECTION-I

Q1) a) Distinguish between: **[8]**

i) Block diagram method with signal flow method.

ii) Open loop and closed loop system.

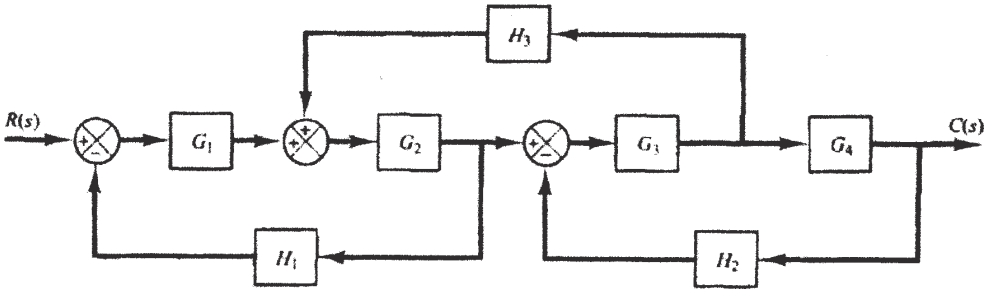
b) Find the transfer Function R(s)/C(s) using Manson's gain Formula. **[8]**



OR

Q2) a) Explain with neat diagram and waveform working principle of synchro error detector. **[6]**

b) Reduce the following block diagram into a single equivalent block using block diagram reduction technique. **[10]**



P.T.O.

Q3) a) An unity feedback system has a loop T.F $G(S)=\frac{40(s+2)}{s(s+1)(s+4)}$

Determine: Type of system, Error coefficients & Error for ramp input with magnitude 4. **[10]**

b) State Routh's criteria. A unity feedback control system has $F(s)= s(s^2+s+1)(s+4)+K$. Find the range of k for the stability of the system using Routh's criteria. **[6]**

OR

Q4) a) A system is given by $H(s)=\frac{25}{s^2+6s+25}$ Determine time domain specifications. **[10]**

b) Use Routh-Hurwitz criterion and determine: $s^4+2s^2+1=0$ **[6]**

i) Number of roots in left of s -plane

ii) Number of roots in right of s-plane

iii) Number of roots on imaginary axis.

Q5) a) A unity feedback control system has open loop transfer function as: $G(s)=\frac{100}{s(1+0.1s)(1+0.2s)}$. Sketch bode plot and determine from it:

i) Gain Crossover frequency

ii) Phase crossover frequency

iii) Gain margin

iv) Phase margin

v) Closed loop stability of a system. **[12]**

b) Write short note on Frequency Domain Specifications **[6]**

OR

Q6) a) Sketch the Nyquist plot and determine the stability of the following open loop transfer function of unity feedback control systems.

$$G.H(s)=\frac{K(s+2)}{s^2(s+4)}$$ **[12]**

b) Explain Nyquist stability criterion based on mapping theorem. **[6]**

SECTION-II

Q7) a) Obtain the state model of the system whose transfer function is given by

$$T(s)=\frac{5s^2+6s+8}{s^3+3s^2+7s+9}$$ **[8]**

b) Consider a control system with state model

$$\begin{bmatrix} X_1 \\ X_2 \end{bmatrix}=\begin{bmatrix} -2 & 0 \\ 1 & -1 \end{bmatrix}\begin{bmatrix} X_1 \\ X_2 \end{bmatrix}+\begin{bmatrix} 0 \\ 1 \end{bmatrix}u(t)$$ **[8]**

OR

Q8) a) Explain the following terms: **[8]**

i) State

ii) State variables

iii) State equations

iv) State transition matirx.

b) Obtain state model for system represented by

$(d^3y/dt^3)+6(d^2y/dt^2)+11(dy/dt)+ 10y = 3u(t)$ **[8]**

Q9) a) Draw a ladder diagram for an elevator system. **[10]**

b) Explain different types level meter. **[8]**

OR

Q10)a) What is PLC? Draw and explain architecture of PLC **[10]**

b) Explain PID control mode, stating its characteristics. **[8]**

Q11)a) Explain with neat diagram the biological and artificial neuron models. **[8]**

b) Distiguish between feed forward neural network and recurrent neural network. **[8]**

OR

Q12)a) Explain how Fuzzy logic control scheme can be applied for temperature control of process. **[8]**

b) What is Fuzzy set and membership function? Explain with suitable example. **[8]**