Total No. of Questions : 8]

SEAT No. : ____

PA-1464

[Total No. of Pages : 2

[5926]-81

T.E. (Electrical)

CONTROL SYSTEM ENGINEERING

(2019 Pattern) (303150) (Semester - II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer any one question from each pair of questions : Q.1 & Q.2, Q. 3& Q.4, Q.5 & Q.6, Q.7 & Q.8.***
2) ***Figures to the right indicate full marks.***

Q1) a) Using Routh Hurwitz criterion for the unity feedback system having **[9]**

$$G(S) = \frac{K}{S(S+1)(S+2)(S+5)}$$

i) Find the range of k for stability.

ii) Find the value of k for marginally stable and corresponding closed loop poles.

b) Explain the terms Real axis loci, Angle of asymptotes, Centroid and Break away point to draw Root locus. **[8]**

OR

Q2) a) Sketch the root locus of the following feedback systems and commentonstability. **[9]**

$$G(S)H(S) = \frac{K}{S(S+2)(S+3)}$$

b) Explain Routh's stability criterion with its special cases. **[8]**

Q3) a) Define different frequency domain specifications. **[8]**

b) Sketch the Polar plot. Determine stability of the system. **[10]**

$$G(S)H(S) = \frac{1}{S(S+1)(2S+1)}$$

OR

P.T.O.

Q4) a) Explain how will you find stability from the polar plot? **[8]**

b) Sketch the Nyquist plot. Comment on the stability. **[10]**

$$G(S)H(S)=\frac{1}{S(S+2)}$$

Q5) a) Explain how gain margin and phase margin are determined from Bode plot and stability from that. **[6]**

b) Find the stability of the following unity feedback system sketching the Bode plot. **[12]**

$$G(S)=\frac{10(S+20)}{(S+1)(S+2)(S+3)}$$

OR

Q6) a) Explain the nature of bode plots for : **[6]**

i) poles at origin

ii) simple pole

iii) simple zero

b) Find the stability of the following unity feedback system sketching the Bode plot. **[12]**

$$G(s)=\frac{20(S+2)}{S(S+10)}$$

Q7) a) Draw electrical network for Lag compensator and derive its transfer function. Draw pole zero plot. **[9]**

b) Describe working of potentiometers. **[8]**

OR

Q8) a) Draw electrical network for Lead compensator and derive its transfer function. Draw pole zero plot. **[9]**

b) Explain tunning of PID controllers using Ziegler-Nichols method. **[8]**

Total No. of Questions : 4]

SEAT No. :

PA-10048

[Total No. of Pages : 2

[60091-331
T.E. (Electrical) (Insem)
CONTROL SYSTEM ENGINEERING
(2019 Pattern) (Semester - II) (303150)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Clearly differentiate between open loop and closed loop control system. **[5]**

b) Using block diagram reduction technique, find the transfer function for the system as shown in Figure 1 below. **[5]**

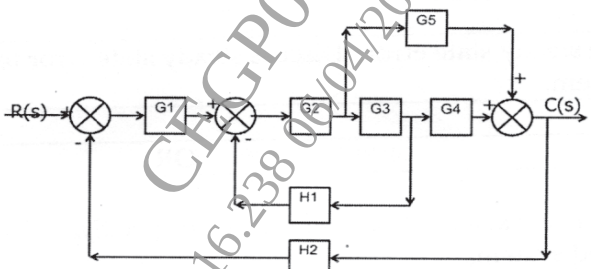

Figure 1

c) Determine the transfer function C/R for the signal flow graph given below in Figure 2 using Mason's gain formula. **[5]**

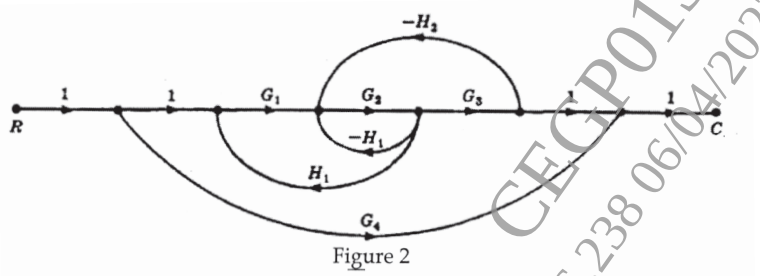

Figure 2

OR

P.T.O.

Q2) a) Give classification of control systems. **[5]**

b) Obtain the transfer function for RLC parallel circuit. **[5]**

c) Determine the transfer function C(s)/R(s) for the block diagram given below in Figure 4 using Mason's gain formula. **[5]**

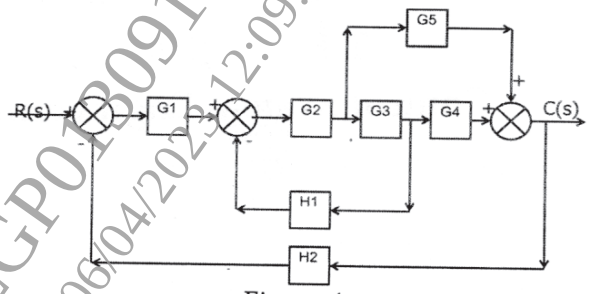

Figure 4

Q3) a) Define and explain standard test signals. **[4]**

b) A unity feedback system is characterized by an open loop transfer function. $G(S) = \frac{10}{s(s+4)}$ Determine delay time, rise time, settling time, peak overshoot and peak time for a unit step input. Also write expression for its response. **[6]**

c) Define steady state error. Discuss steady state error for type '0', type '1' and type '2' system. **[5]**

OR

Q4) a) With a neat sketch explain time domain specifications of second order under damped system. **[5]**

b) Find steady state error for an input signal $r(t) = 1+2t+t^2/2$ of unity feedback control system $G(s) = \frac{100}{s(0.1s+1)}$ **[5]**

c) For a unity feedback control system $G(s) = \frac{144}{s^2+12s+144}$ find out damping factor, damping frequency, delay time. maximum over shoot, rise time and settling time. **[5]**

Total No. of Questions : 8]

SEAT No. : ____

P291

[Total No. of Pages : 3

[6003] - 370

T.E. (Electrical Engineering)

CONTROL SYSTEM ENGINEERING

(2019 Pattern) (Semester -II) (303150)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and Q.7 or Q.8.***
2) ***Use of Electronic Calculator is permitted.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain two special cases of routh Hurwitz criterion to determine stability. **[8]**

b) The OLTF of a unity feedback system is given by **[9]**

$G(s) = \frac{k}{(s+1)(s+3)(s^2+4s+13)}$. By applying routh criterion determine stability of system. Find value of K which will cause sustained oscillations. Determine frequency of sustained oscillations.

OR

Q2) a) Explain any four rules for construction of root locus. **[8]**

b) Sketch the root locus, for unity feedback system determine range of values of K and comment on stability. $G(s) = \frac{k(s+1)}{s^2(s+3.6)}$ **[9]**

P.T.O.

Q3) a) Explain different frequency domain specifications. **[7]**

b) Sketch polar plot for the system given. Also determineGM and PM

$$G(s) = \frac{60}{(s+1)(s+2)(s+5)}$$ **[10]**

OR

Q4) a) Explain co relation between frequency domain and time domain **[7]**

b) Sketch the nyquist plot, for given system and comment on stability

$$G(s) = \frac{20}{(s+2)(s+3)}$$ **[10]**

Q5) a) State advantages of Bode plot **[6]**

b) Draw bode plot for a unity feedback system with G(S) given as. Also find GM, PM and comment on stability of system. **[12]**

$$G(s) = \frac{160}{s(s+2)(s+20)}$$

OR

Q6) a) Explain terms gain cross over frequency, phase cross over frequency, gain margin and phase margin in Bode, plot. **[6]**

b) Draw bode plot for a unity feedback system with G(S) given as. Also find GM, PM and comment on stability of system. $G(s) = \frac{20(s+2)}{s(s+10)}$. **[12]**

Q7) a) Derive transfer function of armature controlled DC servo motor. **[9]**

b) Obtain the tuning of PID controller for a unity feedback system with open loop transfer (9) functions as using ziegler Nichols method

$$G(S)= \frac{12}{s(s^2+4s+13)}$$ **[9]**

OR

Q8) a) Explain Lag network and derive its transfer function. **[9]**

b) Explain P,Pl, PID controller. **[9]**

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Total No. of Questions : 8]

SEAT No. : ____

P752

[Total No. of Pages : 2

[5870]-1056

T.E. (Electrical Engineering)

CONTROL SYSTEM ENGINEERING

(2019 Pattern) (Semester - II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Use of electronic calculator is permitted.***
3) ***Assume suitable data, if necessary.***

Q1) a) What is angle and magnitude criterion for a point to be on root locus. Explain any five rules for sketching of root locus. **[9]**

b) The OLTF of a unity feedback system is given by $G(s)=\frac{K}{(s+2)(s+4)(s^2+6s+25)}$. By applying routh criterion determine stability of system. Find value of K which will cause sustained oscillations. Determine frequency of sustained oscillations. **[8]**

OR

Q2) a) Explain routh Hurwitz criterion for stability. Explain special cases of routh's criterion. **[8]**

b) Sketch the root locus, for unity feedback system determine range of values of K and comment on stability. $G(s)=\frac{K}{s(s+2)(s^2+2s+2)}$. **[9]**

Q3) a) Explain different frequency domain specifications. **[7]**

b) Sketch Polar plot for the system given. Also determine GM and PM. **[10]**

$$G(s)=\frac{K}{s(s+2)(s+5)}$$

OR

P.T.O.

Q4) a) Explain co relation between frequency domain and time domain. **[7]**

b) Sketch the nyquist plot, for given system and comment on stability

$$G(s)=\frac{50}{s(s+4)(s+6)}.$$ **[10]**

Q5) a) State advantages of Bode plot. **[6]**

b) Draw bode plot for a unity feedback system with G(s) given as. Also find GM,PM and comment on stability of system. **[12]**

$$G(s)=\frac{10(s+10)}{s(s+2)(s+5)}$$

OR

Q6) a) Explain terms gain cross over frequency, phase cross over frequency, gain margin and phase margin in Bode plot. **[6]**

b) Draw bode plot for a unity feedback system with G(s) given as. Also find GM,PM and comment on stability of system. **[12]**

$$G(s)=\frac{20(s+2)}{s(s+10)}$$

Q7) a) Derive transfer function of armature controlled DC servo motor. **[9]**

b) Using Ziegler Nicholas method design a PID controller for a system with unity feedback and $G(s)=\frac{1}{s(s+1)(s+5)}$. **[9]**

OR

Q8) a) Explain Lead network, its pole zero plot and transfer function. **[9]**

b) Explain P, PI, PID controller. **[9]**

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