Total No. of Questions : 8]

SEAT No. :

P-7569

[Total No. Of Pages : 2

[6180]-84
TE (Electrical Engineering)
CONTROL SYSTEM ENGINEERING
(2019 Pattern) (Semester - II) (303150)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8***
2) ***Use of Electronic Calculator is permitted.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain terms angle of asymptotes, angle of departure, centroid, real axis root loci **[8]**

b) Sketch root locus for given OLTF $G(s)H(s) = \frac{K}{s(s+4)(s+5)}$. Determine marginal value of K and comment on stability. **[8]**

OR

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

b) Using Routh's Hurwitz Criterion for stability analysis determine stability of following system $\mathbf{P(s) = s^5 + 3s^4 + 5s^3 + 4s^2 + s + 3}$ From that determine how many roots are there in left half s plane, right half s plane, and on imaginary axis. **[8]**

Q3) a) Explain correlation between frequency domain and time domain **[8]**

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

$$G(s) = \frac{50}{s(s+3)(s+6)}$$

OR

P.T.O.

Q4) a) Explain Nyquist stability criterion **[8]**

b) Sketch the Nyquist plot, for given system and comment on stability $G(s)=\frac{10}{s(s+2)(s+3)}$. **[10]**

Q5) a) Sketch bode diagram showing GM, PM for a) stable system b) unstable system c) marginally stable system **[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. $G(s)=\frac{10(s+10)}{s(s+2)(s+5)}$. **[12]**

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) Using Ziegler Nicholas method design a PID controller for a system with unity feedback and $G(s)=\frac{1}{s(s+1)(s+3)}$ **[9]**

OR

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

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