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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