

Total No. of Questions : 8]

SEAT No. :

P291

[6003] - 370

[Total No. of Pages : 3

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 determine GM and PM

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

OR

Q4) a) Explain correlation between frequency domain and time domain [7]

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

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

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

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

OR

- Q8) a) Explain Lag network and derive its transfer function. [9]
- b) Explain P,PI, PID controller. [9]

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