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]**