Total No. of Questions : 8]

SEAT No. :

**PB4400**

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## T.E. (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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

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

b) Sketch the root locus, for unity feedback system determines range of values of K and comment on stability. **[10]**

$$G(s) = k/s(s+3)(s+6)$$

OR

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

b) The OLTF of a unity feedback system is given by **[10]**

$$G(s) = k / s(s+1)(s+3)(s+4).$$

Find value of K for the stability of system, using Rouths stability criteria.

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

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

$G(s)\,H(s) = k/s\,(s+1)\,(s+2)$. **[10]**

OR

***P.T.O.***

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***Q4)*** a) Explain briefly stability criteria for Nyquist plot with example. **[7]**

b) Draw Nyquist plot for the system whose open loop transfer function is

$G(s) = k/(s+2)(s^2+4)$ **[10]**

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

b) Draw Bode plot for a unity feedback system with G(S) given as. Also GM, PM and comment on stability of system.

$G(s) = 100(s+3) / s\,(s+1)\,(s+5)$. **[12]**

OR

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

b) Sketch bode plot and Find the gain margin and phase margin for a unity feedback system having

$G(s) = 10 / s\,(s+1)\,(s+10)$ **[12]**

***Q7)*** a) Obtain the tuning of PID controller for a unity feedback system with open loop transfer functions as using Ziegler Nichols method

$G(s) = 1 / s\,(s+1)\,(s+3)$ **[10]**

b) Derive the transfer function of armature control D.C. servo motor? **[07]**

OR

***Q8)*** a) Draw block diagram and Explain P, PI, PID controller. **[10]**

b) Draw the circuit diagram of lead compensator network and derive transfer function also plot pole-zero location in S-plane? **[07]**

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