

Total No. of Questions : 8]

SEAT No. :

P-1610

[Total No. of Pages : 2

[6002]-240

**S.E. (Robotics & Automation Engineering)**  
**CONTROL SYSTEM ENGINEERING**  
**(2019 Pattern) (Semester - IV) (211509)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) All questions are compulsory i.e. Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q. 6. and Q.7 or Q.8.
- 2) Assume suitable data, if necessary.
- 3) Use of electronic pocket calculator is allowed.
- 4) Neat diagrams must be drawn wherever necessary.

Q1) a) A feedback control system with loop gain

$$GH(S) = K \frac{(S+2)}{S(S+1)(S^2+2S+5)}$$

Determine value of K for critical stability of the system, also write the system is stable or unstable. [8]

- b) Explain Routh's stability criteria, state advantages and Necessity of Routh's criteria. [9]

OR

Q2) a) If  $G = K / S(S+6)(S+8)$  and  $H(S) = S+2$ . Comment on stability. [8]

- b) What is stability? Explain stable, unstable, marginally and conditionally stable system with locations of roots in s plane. [9]

Q3) a) Sketch root locus for  $G H(S) = K(S+4)(S+5) / (S+3)(S+1)$ . [8]

- b) What is frequency domain analysis? Explain any one stability criteria used in frequency domain to check the stability of system. [9]

OR

Q4) a) State Nyquist theorem and explain Nyquist stability criteria. [8]

- b) Define polar plot and draw the polar plot for  $G(S) = S$ . [9]

P.T.O.

- Q5) a)** Explain digital control system in detail. Enlist its advantages and Applications. [9]
- b)** Explain the architecture of PLC with neat diagram. [9]

OR

- Q6) a)** Explain any four selection parameters of PLC also enlist functions of PLC. [9]
- b)** What is sampling? Explain the process of sampling with waveform.[9]

- Q7) a)** Why compensation is needed? Explain series compensator with diagram. [9]
- b)** Explain the feedback compensator with example. [9]

OR

- Q8) a)** Explain phase lead design steps using bode diagram with effects, advantages disadvantages of phase lead compensation. [9]
- b)** What is phase lag compensation? Enlist effects, advantages, disadvantages of phase lag compensation. [9]

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