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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, Q7 or Q.8.*
2) *Assume suitable data, if necessary.*
3) *Figures to the right side indicates full marks.*
4) *Neat diagrams must be drawn wherever necessary.*

Q1) a) Explain Routh's array with stability criteria, state advantages and disadvantages of Routh's criteria. **[8]**

b) Find range of K for stability unity feedback system with Characteristics equation, $G(S) = K / [S (S+2) (S+4) (S+6)]$. Also define what is pole, zero & S-Plane. **[9]**

OR

Q2) a) State the properties of root locus. **[8]**

b) Sketch root locus of unity feedback system with open loop transfer function $G(S) = K / [S (S+1) (S+3) (S+5)]$. **[9]**

Q3) a) Draw the polar plot for $G(S) = 1 + as$. **[8]**

b) Define phase margin, gain margin? Derive the expression for Resonant frequency and Resonant Peak. **[9]**

OR

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

b) Draw Bode plot of system with open loop transfer function $G(s) = 100 / (S + 1) (S + 2) (S + 5)$ & comment on its stability. **[9]**

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Q5) a) Explain the selection criteria used for PLC. **[9]**

b) Explain Digital Control System with Block diagram. Enlist its advantages and disadvantages. **[9]**

OR

Q6) a) What is sampling? Explain the process of sampling with waveform. **[9]**

b) Explain input and output field devices used in PLC (any 9). **[9]**

Q7) a) What is a compensator? Explain Cascade compensation techniques. **[9]**

b) Explain the Procedure to design of lead compensator using root locus. **[9]**

OR

Q8) a) What is phase lag compensation? Enlist effects, advantages, disadvantages of phase lag compensation. **[9]**

b) Explain the Procedure to design of lag compensator using root locus. **[9]**

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