

Total No. of Questions : 4]

PC208

SEAT No. :

[Total No. of Pages : 2

[6361]-68

B.E. (Electrical) (Insem)
ADVANCED CONTROL SYSTEM
(2019 Pattern) (Semester - VII) (403142)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4.
- 2) Figures to the right indicates full marks.
- 3) Draw neat diagrams wherever necessary.
- 4) Assume suitable data, if necessary.

Q1) a) Define a lag compensator. Explain lag compensator with the electrical circuit and derive transfer function. Draw Pole zero plot. [5]

b) The open loop transfer function of an uncompensated system is

$$G(S) = \frac{k}{s^2(0.2s+1)}$$

Design a suitable lead compensator such that the system will have $k_a = 10$ and Phase Margin ≥ 35 degrees. Draw a bode plot of the uncompensated system and write the overall transfer function of the compensated system. (No need to draw a bode plot of the compensated system). [10]

OR

Q2) a) Explain the approach to the control system design using a compensator. [5]

b) A unity feedback system has an open loop transfer function, $G(s) =$

$$\frac{k}{s(s+1)}$$

Design a lag compensator such that the system will have $k_v = 10$ and Phase margin at least 45 degrees. Draw a bode plot of the uncompensated system and write the overall transfer function of the compensated system. (No need to draw a bode plot of the compensated system). [10]

P.T.O.

- Q3)** a) List out the common nonlinearities and explain any two. [8]
- b) Explain limit cycles. Define stable limit cycles and unstable limit cycles. [7]

OR

- Q4)** a) Define stability, asymptotic stability, asymptotic stability at large, and in stability in the sense of Lyapunov with graphical interpretation. [8]
- b) The open loop transfer function of a certain unity feedback control system is given by, $G(s) = \frac{5}{(s+1)(0.1s+1)^2}$. An ideal relay having output ± 1 is used to improve the system performance. Determine amplitude, frequency and time period of limit cycle, if it exists. [7]