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 $\geq$ 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]**

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