P5214

[6188]-167
B.E. (Electrical Engineering) (Insem)
ADVANCED CONTROL SYSTEM
(2019 Pattern) (Semester - VII) (403142)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) *Solve Q.1 or Q.2 ; Q.3 or Q.4.*
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) Draw the circuit diagram and hence derive the transfer function for a phase lag network, and state its importance. **[7]**

b) The open loop Transfer function of a unity feedback control system is given by $G(s) = K / S(1 + 0.2S)$. Design a suitable lead compensator such that the given system has static velocity error constant 10 and Phase margine 50°. **[8]**

OR

Q2) a) Draw the circuit diagram and hence derive the transfer function for a phase lead network and also state its importance. **[7]**

b) Design a lag compensator network for $G(s) = K / S(S + 2)$, with velocity error constant >= 10 and Phase margin greater than 60°. **[8]**

Q3) a) Explain the following with respect to non-linear system. **[7]**

Support the answers with figures.

i) Limit Cycle

ii) Sub harmonic oscillations.

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b) In a unity feedback control system an ideal relay is connected in series with linear element having transfer function $G(s) = 6 / S(S + 2) (S + 3)$. The output of the relay is ± 2 units. Check for the existence of limit cycle and if it exists determine the amplitude and frequency. **[8]**

OR

Q4) a) Derive the mathematical expression for the describing function of an ideal relay. Support the answer with a figure. **[7]**

b) Explain any four common non linearities with their characteristics. **[8]**