

Oct-22/BE/Insem-68

B.E. (Electrical)

ADVANCED CONTROL SYSTEM

(2019 Pattern) (Semester - VII) (403142)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates :

- 1) Answer any one question from each pair of questions : Q.1 & Q.2 and Q.3 & Q.4.
- 2) Figures to the right side indicate full marks.

Q1) a) Draw Electrical network & Derive Transfer function of lag compensation network. [5]

b) For a certain system,

$$G(s) = \frac{5}{s(1 + 0.1s)(1 + 0.3s)}$$

Design a suitable lag compensator, phase margin = 50°. [10]

OR

Q2) a) Design lead compensation for the system having open loop transfer function. [10]

$$G(s)H(s) = \frac{25}{s(0.5s + 1)(0.016s + 1)} \text{ \& PM around } 42^\circ$$

b) Explain steps to be taken to design lead network by bode plot approach. [5]

Q3) a) Explain any one peculiar behavior of nonlinear system : [5]

- i) Jump resonance
- ii) Limit cycle
- iii) Sub-harmonic oscillation

P.T.O.

- b) In unity feedback system an ideal relay with output equal to ± 1 unit is connected in cascade with [10]

$G(s) = \frac{20}{s(s+1)(s+3)}$ Determine amplitude and frequency of limit cycle if it Exist by describing function method.

OR

- Q4)** a) Explain Lyapunov stability analysis and its stability conditions. [7]
b) Explain common type of Nonlinearities with diagrams. [8]

