

Roll No. ....

Total No. of Questions : 09]

[Total No. of Pages : 02

## Paper ID [IC204]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 4<sup>th</sup>)

LINEAR CONTROL SYSTEM (IC - 204)

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

### Section - A

Q1)

(10 × 2 = 20)

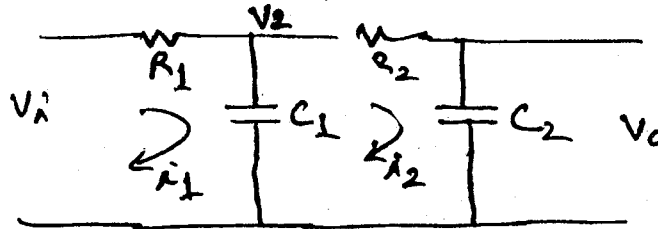
- a) What are the advantages of closed loop control system over open loop control system.
- b) Find the Inverse Laplace Transform of  $F(s) = \frac{s + 6}{s(s^2 + 4s + 3)}$ .
- c) Differentiate between time variant & invariant system Give example of each system.
- d) What will be the response of a first order system with unit step input?
- e) What is the use of Laplace Transform in control system?
- f) What is the relation of location of Pole zeros on the stability of a system?
- g) What is compensating network why is this used?
- h) How Routh-Hurwitz Criterion is helpful in determining the stability of a control system.
- i) What are the various control components, what is there use?
- j) How we do the Mapping from the S Plane to Z Plane.

### Section - B

(4 × 5 = 20)

- Q2) What are the various steps for design of Phase Lag network? What will be the effect of phase lag network?

- Q3)** What are the advantages of sampled data control system over the continuous data control system. Draw the block diagram of sampled data control system.
- Q4)** Draw the Nyquist Plot for the open loop transfer function given below.  
 $G(s)H(s) = 1/s(1+2s)(1+s)$  and obtain the gain margin & phase margin.
- Q5)** Draw a block diagram of the circuit shown below



- Q6)** Determine the stability of system having characteristic equation :  
 $S^6 + S^5 + 5S^4 + 3S^3 + 2S^2 - 4S - 8 = 0$  using Routh Hurwitz Criterion.

**Section - C**

(2 × 10 = 20)

- Q7)** Derive the time response of a second order control system subjected to Impulse input function.
- Q8)** The open loop transfer function of a control system is given by  
 $G(s)H(s) = k/s(s+4)(s^2 + 4s+20)$   
 Sketch the root locus and show all the salient points on the locus.
- Q9)** Sketch the Bode Plot for the transfer function given by  
 $G(s) = 23.7(1+j\omega)(1+j0.2\omega) / (j\omega)(1+j3\omega) (1+j0.5\omega) (1+j0.1\omega)$ .  
 & from plot find Gain Margin & Phase Margin.

