Linear Control System
(IC-204, Dec-2007)

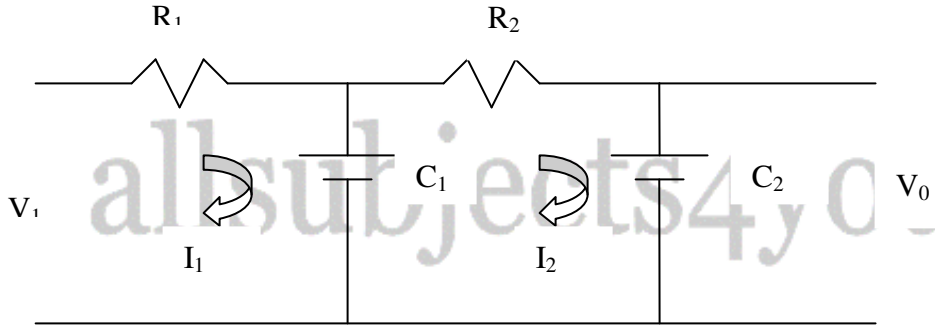
Note: Section A is compulsory. Attempt any four questions from Section-B and any two from Section-C.

Section-A

1. a) What is the difference between a open loop control and a closed loop control system?
   b) What are the advantages of closed loop control system?
   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) Find the inverse Laplace transform of $F(s) = 1/s^2 + 4s + 8$.
   f) What is compensating network? Why it is used?
   g) What is the relation of location of Pole zeros on the stability of a system?
   h) How Routh-Hurwitz Criterion is helpful in determining the stability of a control system?
   i) What are the various control components? What is their use?
   j) How we do the Mapping from the S Plane to Z plane?

Section-B

2. Find the transfer function of network given below:



3. What are the advantages of sampled data control system over the continuous data control system? Draw the block diagram of sampled data control system.
4. Draw the Nyquest Plot for the open loop transfer function given below, also comment on its stability $G(s)\,H(s) = 2.2/s(s+1)(s^2 + 2s + 2)$
5. Determine the stability of a system having characteristics equation:
   $S^6 + S^5 + 5S^4 + 3S^3 + 2S^2 - 4S - 8 = 0$ using Routh Hurwitz Criterion.
6. Draw a phase lead Compensation network. How the effect of zero is dominated in it?

Section-C

7. Derive the time response of a second order control system subjected to impulse input function.
8. The open loop transfer function of a control system is given by
   $G(s)\,H(s) = K/s(s+6)(s^2 + 4s + 13)$
   Sketch the root locus and determine
   (a) The break away points (b) Angle of departure from complex poles
   (c) The stability condition
9. Sketch the Bode Plot for the transfer function given by
   $G(s)\,H(s) = 2(s + 0.25) / s^2(s+1)(s+0.5)$ & from plot find
   (a) Phase & gain cross over frequencies (b) Gain Margin & Phase Margin.
   Is this system Stable?