Reg. No. : ....

Name : ....

VI Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013 (2007 Admn. Onwards) PT 2K6/2K6 EC/AEI 602 : CONTROL SYSTEMS

Time : 3 Hours   Max. Marks : 100

Instruction : Answer all questions.

I. a) Explain the concept of feedback. What are the advantages of closed loop system over open loop system ?

   b) Define pole, zeros, order and type of a system.

   c) Explain Nyquist stability criterion.

   d) Draw the circuit of a lag network. Sketch its Bode plots.

   e) State any five properties of Z transforms.

   f) What is bilinear transformation ? How it is useful for stability analysis of discrete system ?

   g) Define state, state variables and state space.

   h) Derive the relation between transfer function and state model of a discrete system.   (8×5=40)

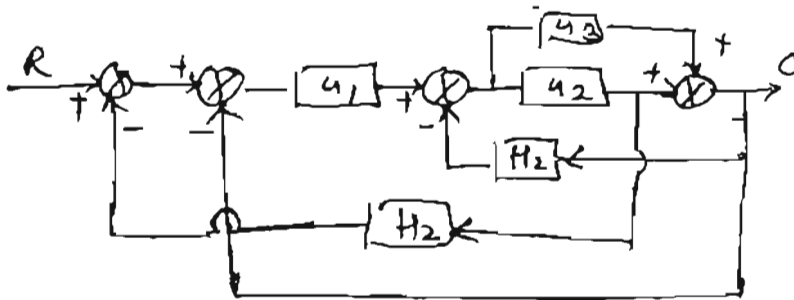II. a) Find the transfer function of the system whose signal flow graph is shown below   15
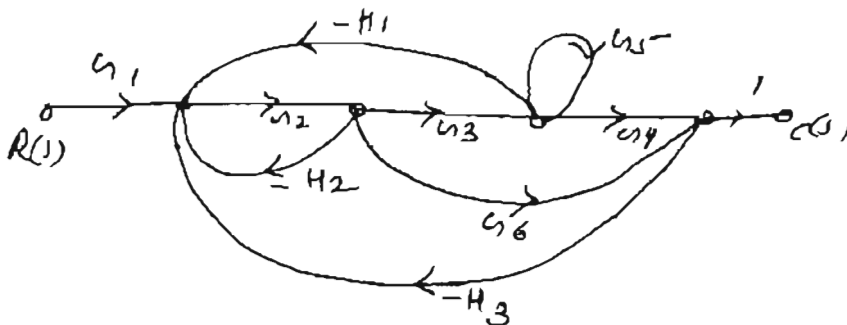
OR

b) Find C/R of the following system. **15**

III. a) Find the values of K and K_n for the system shown below such that the peak over shoot for unit step input is 0.2 and peak time is 1 sec. With these values find rise time and settling time. **12**

b) Define phase margin and gain margin. **3**

OR

c) Sketch the polar plot and find gain margin and phase margin for the system

with open loop transfer function $\dfrac{1}{S(1+S)(1+2S)}$. **15**

IV. a) Find the Z transforms of

   i) $t\,e^{-t}$ and

   ii) $\sin \omega t$. **10**

b) Explain cyclic and multirate sampling. **5**

OR

c) Solve the difference equation :

   $c(k+2) + 3c(k+1) + 2c(k) = u(k)$;

   $c(0) = 1, c(1) = -3; c(k) = 0, k < 0$. **10**

d) Explain Jury's stability test. **5**

V. a) A discrete system is given by

   $y(k + 2) + 5y(k + 1) + 6y(k) = u(k)$

   $y(0) = y(1) = 0$, $T = 1$ sec.

   Find :

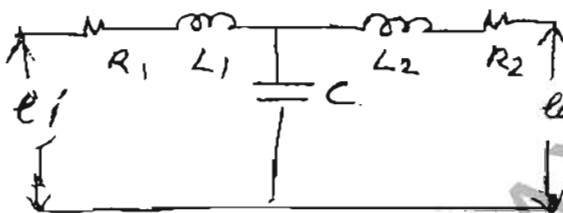   i) A state model in Canonical form

   ii) State transition matrix

   iii) For $u(k) = 1$, $k \geq 1$, find $y(k)$.   15

   <p style="text-align:center">OR</p>

   b) Obtain a state model for the network given below :   10

   c) What is state transition matrix ? Explain its properties.   5