Code No: C2EC03 **N5/05**

II B.Tech(ccc) Regular Examinations, December 2007
CONTROL SYSTEMS ENGINEERING
(Electronics & Communication Engineering)

Time: 3 hours Max Marks:100

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Find the transfer function of the network given figure 1

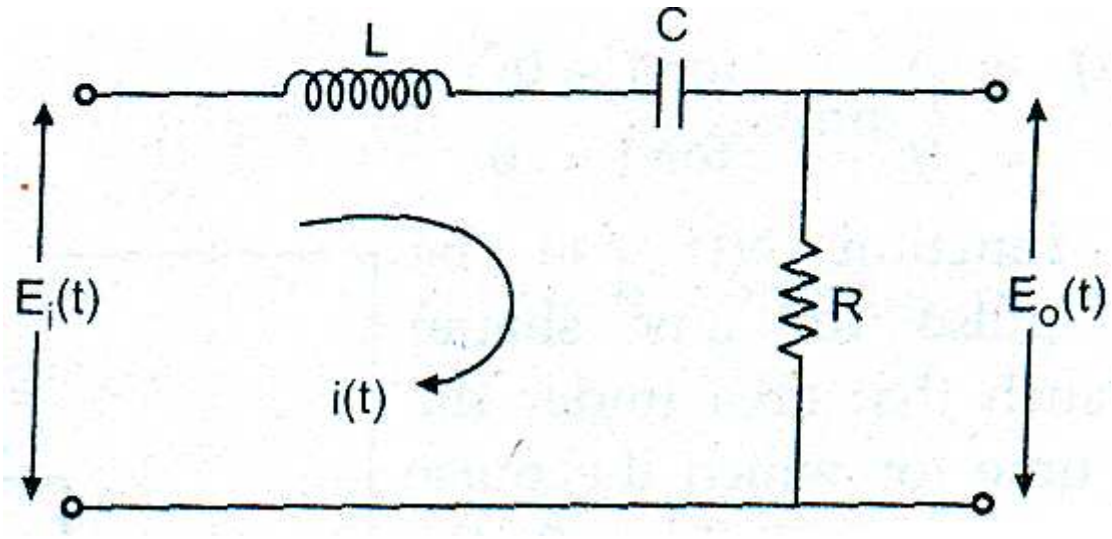

Figure 1:

(b) Explain the basic elements of control systems. [10+10]

2. (a) Determine the transfer function $\frac{C(s)}{R(s)}$ for the following block diagram (figure.2) [1 2+8]

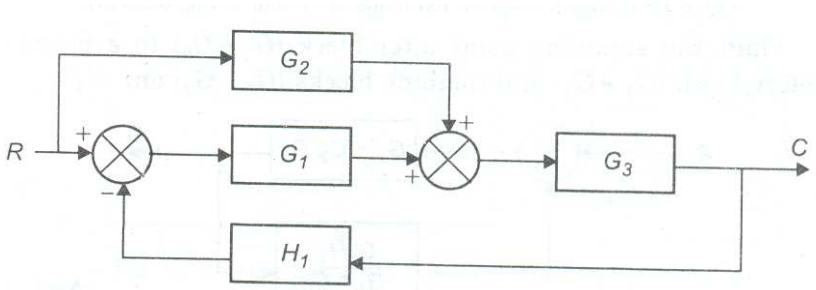

Figure 2:

(b) Explain the properties of signal flow graphs.

3. (a) Establish the relation relation between ξ and M_p for a step response of a second order system?

(b) A system is given by differential equation $\frac{d^2y}{dt^2}+4\frac{dy}{dt}+8y=8x$, where y=output x= input. Determine all the time domain specifications and obtain output response for unit step input ? [4+16]

4. (a) The open loop t.f. of a unity feed-back system is given by $G(s)=\frac{K}{s(1+0.25s)(1+0.4s)}$. Find the restriction on K so that the closed loop system is absolutely stable?

   (b) A feed-back system has an an open loop t.f of $G(s)H(s)=\frac{Ke^{-s}}{s(s^2+5s+9)}$ Determine by the use of the RH criterion ,the max. value of K for the closed loop system to be stable? [10+10]

5. (a) Bring out the relevance of Bode plots from stability point of view

   (b) Sketch the log magnitude plot of loop transfer function
   $G(s)=\frac{0.75(1+0.2s)}{s(1+0.16s+0.01s^2)}$
   Hence find the gain cross over frequency. [8+12]

6. (a) What is "Nyquist Contour"?

   (b) A system is given by
   $G(s)=\frac{4s+1}{s^2(s+1)(2s+1)}$ Sketch the Nyquist plot & hence determine the stability of the system. [3+17]

7. (a) What is compensation? what are the different types of compensators?

   (b) What is a lag compensator, obtain the transfer function of lag compensator and draw pole-zero plot?

   (c) Explain the different steps to be followed for the design of compensator using Bode plot? [4+4+12]

8. (a) Consider the network shown in figure 3. Obtain the state equation of the system.

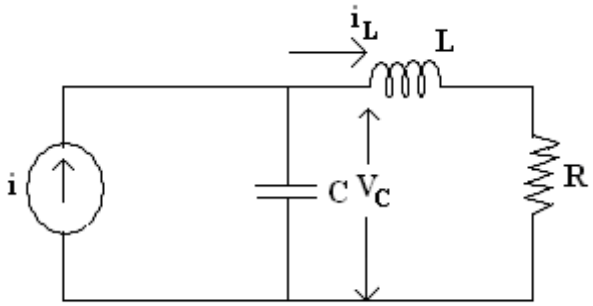

Figure 3:

(b) Consider the system $\dddot{y}+6\ddot{y}+11\dot{y}+6y=6u$. where y is the output and u is the input. Obtain the state-space representation of the system. [10+10]

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