

**II B.Tech Supplementary Examinations, Aug/Sep 2008**  
**CONTROL SYSTEMS**  
 (Instrumentation & Control Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
 All Questions carry equal marks

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1. (a) Obtain the transfer function of the following system and draw its analogous electrical circuit. Figure 1a

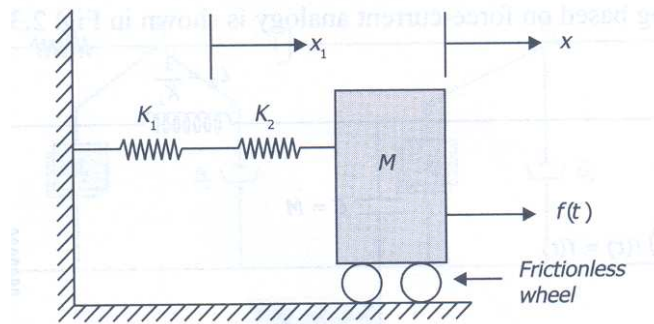


Figure 1a

- (b) Explain the advantages and features of transfer function. [10+6]
2. (a) From the block diagram shown in figure 2a draw the corresponding signal flow graph and evaluate closed loop transfer function relating the output and input.

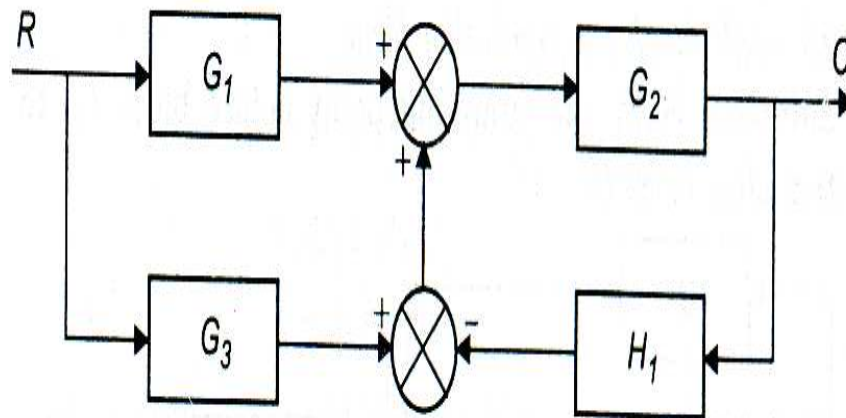


Figure 2a

- (b) Explain the advantages of AC servomotor over DC servomotor. [8+8]
3. (a) What are the types of controllers that are used in closed loop system? Explain them?
- (b) The response of a system subjected to a unit step input is  $c(t) = 1 + 0.2e^{-60t} - 1.2e^{-10t}$ . Obtain the expression for the closed loop transfer function? Also determine the Un damped natural frequency and damping ratio of the system? [8+8]

4. (a) Apply RH criterion for the equation to determine the stability  $S^4 + 5S^3 + 2S^2 + 3S + 2 = 0$ . Find the number of roots lying in the right half of the s-plane.
- (b) According to RH Stability criteria, how can you analyzing the stability of the control system? [8+8]
5. Sketch the Bode plots for a system  

$$G(s) = \frac{15(s+5)}{s(s^2+16s+100)}$$
 Hence determine the stability of the system. [16]
6. (a) Explain the selection criteria of Nyquist contour in stability analysis of linear control systems.
- (b) Discuss the effect of adding poles & zeros on the stability of a system with the help of Nyquist plots. [8+8]
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? [3+3+10]
8. (a) The system is represented by the differential equation  
 $\dot{y} + 5y + 6y = u$   
 Find the transfer from state variable representation.
- (b) Consider the RLC network shown in figure 8b. Write the state variable representation. [16]

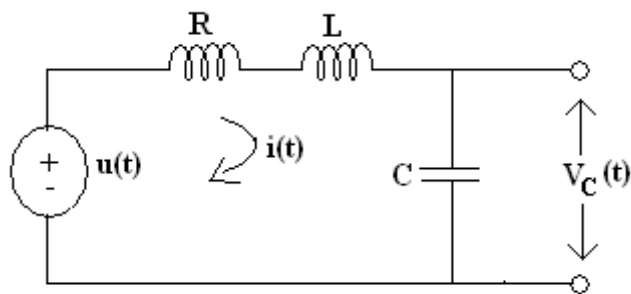


Figure 8b

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