Code :EE05149

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III B.Tech I Semester(R05) Supplementary Examinations, May 2011
CONTROL SYSTEMS
(Electronics & Computer Engineering)
For students of RR regulation readmitted to III B.Tech I Semester R05

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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1. What is control system? Explain various types of control systems with examples and their advantages.
2. (a) Determine the overall transfer function relating C and R for the system whose block diagram is given (figure 2a).

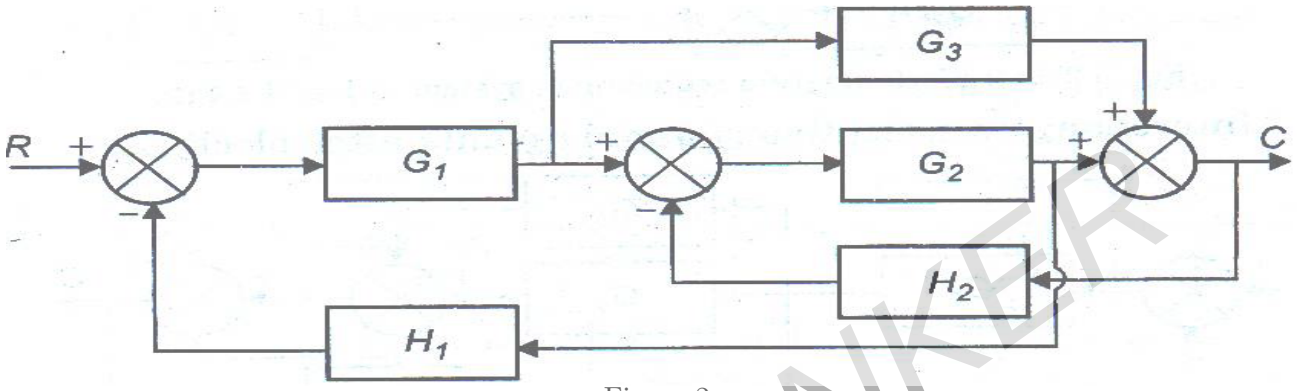

Figure 2a

(b) Explain the properties of block diagrams.

3. Define the various time domain specifications for a standard second order control system? Derive the expression for each of them?
4. The open loop T.F. of a control system is given by $G(s)H(s) = \frac{K}{s(s+6)(s^2+4s+13)}$ Sketch the root locus plot and determine
   (a) the break-away points
   (b) The angle of departure from complex poles
   (c) the stability condition.
5. (a) Define
      i. Phase cross over frequency
      ii. Gain cross over frequency
   (b) A linear time invariant system is given by $G(s) = \frac{10}{s(s+10)}$ If this system is excited by r(t) = 10 Sin 10t find the response of the system at steady state.
   (c) If $G(s) = \frac{K}{s^r}$, show that the slope of the Bode magnitude plot is -20r dB / dec.
6. (a) A unity feed back system has
   $G(s) = \frac{K}{s(1+sT_1)(1+sT_2)}$
   Discuss the effect on Nyquist plot when the value of K is
      i. low (<critical value)
      ii. = critical value
      iii. high (>critical value)
   (b) Pure time delay usually deteriorates the stability. Explain with the help of Nyquist plots.
7. (a) What is compensation? What are the different types of compensator?
   (b) What is lag-lead compensator, obtain the transfer function of lag-lead compensator and draw it's pole-zero plot?
   (c) Explain the different steps to be followed for the design of lag lead compensator using Bode plot?
8. Obtain the two differential state representation for the system with transfer function.
   $\frac{y(s)}{u(s)} = \frac{2}{S^3+6S^2+11S+6}$.

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