Code: R7311003

R07

B.Tech III Year I Semester (R07) Supplementary Examinations, May 2013

CONTROL SYSTEMS

(Electronics & Instrumentation Engineering)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions
All questions carry equal marks

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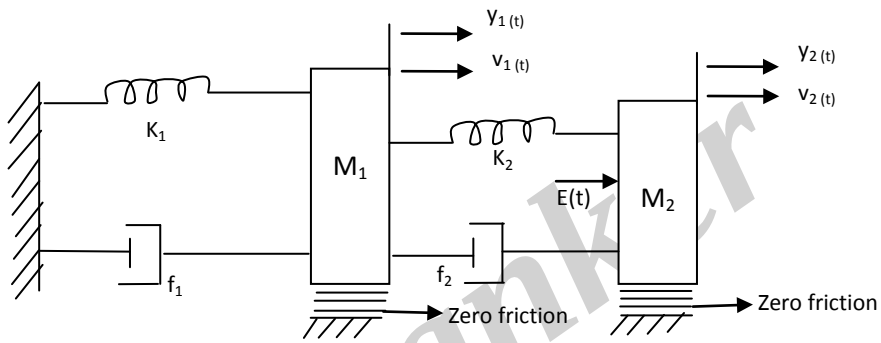
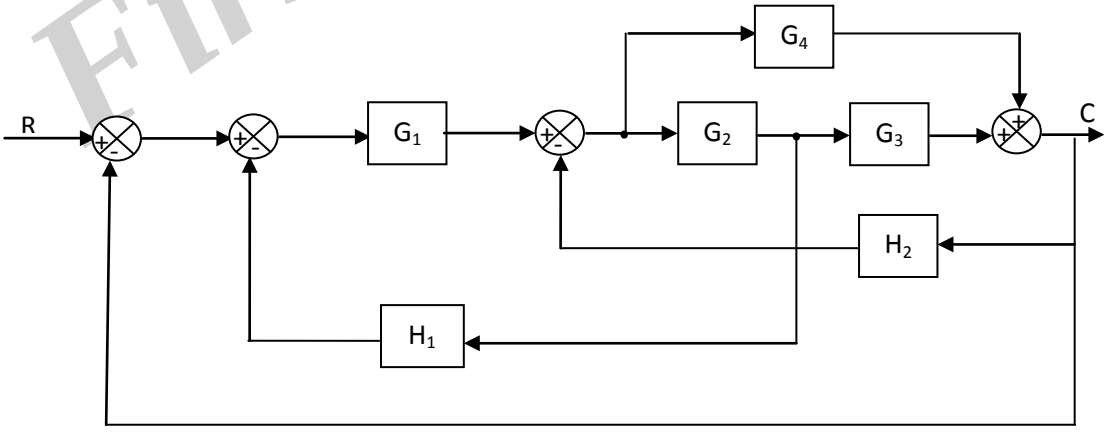
1. Consider the given mechanical system shown below. Write the differential equations, electrical analogous circuit and also verify them by using mesh and nodal analysis.



2. (a) Explain the method of signal flow graph using one example in detail.
   (b) Using black diagram reduction technique, find the closed loop transfer function of system, whose block diagram is in below figure.



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3. (a) Draw and explain the transient response of a second order system for each of three damped cases.
   (b) Explain the effect of proportional integral system in assessing the steady state errors of a system.

4. (a) Check the stability of given system represented by $F(S) = S^5+S^4+4S^3+3S^2+10S-14=0$ using Routh-Hurwitz method.
   (b) What are the limitations of Routh's stability?

5. Draw the bode phase plot for the system having the following transfer function $G(S) = 10(1+4S)/(1+2S)(1+0.5S)$.

6. Determine the stability of the given system defined by $G(S) = \frac{10}{S^3(1+0.1S)(1+0.2S)}$, by Nyquist criterion.

7. Find the transfer function from given ABC matrices of a state model.

$$A = \begin{bmatrix} 4 & -1 & 0 \\ 2 & 1 & -2 \\ 3 & 4 & -1 \end{bmatrix} \quad B = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} \quad C = [1 \quad 0 \quad 0]$$

8. Write short notes on the following:
   (a) State variables.
   (b) Properties of state transition matrix.
   (c) Observability.

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