Reg. No. : | | | | | | | | | | |

Question Paper Code: 34050

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fourth Semester

Electronics and Communication Engineering

01UEI422 – LINEAR CONTROL ENGINEERING

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

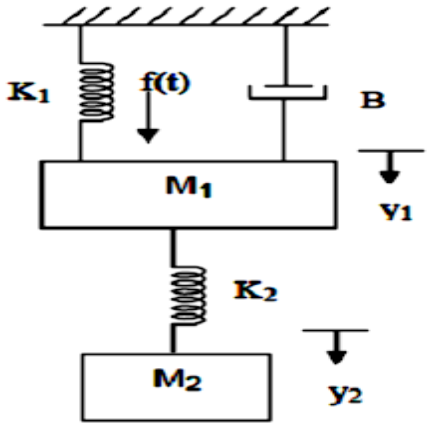
Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Write Masons Gain formula.
2. List the basic properties of signal flow graph.
3. Why derivative controller is not used in control systems?
4. List the time domain specifications.
5. List out the different frequency domain specifications.
6. Define Phase cross over and Gain cross over frequency.
7. State Nyquist stability criterion.
8. Define Relative stability.
9. What are the advantages of State Space analysis?
10. State the reason for using state space analysis rather than using transfer function method.

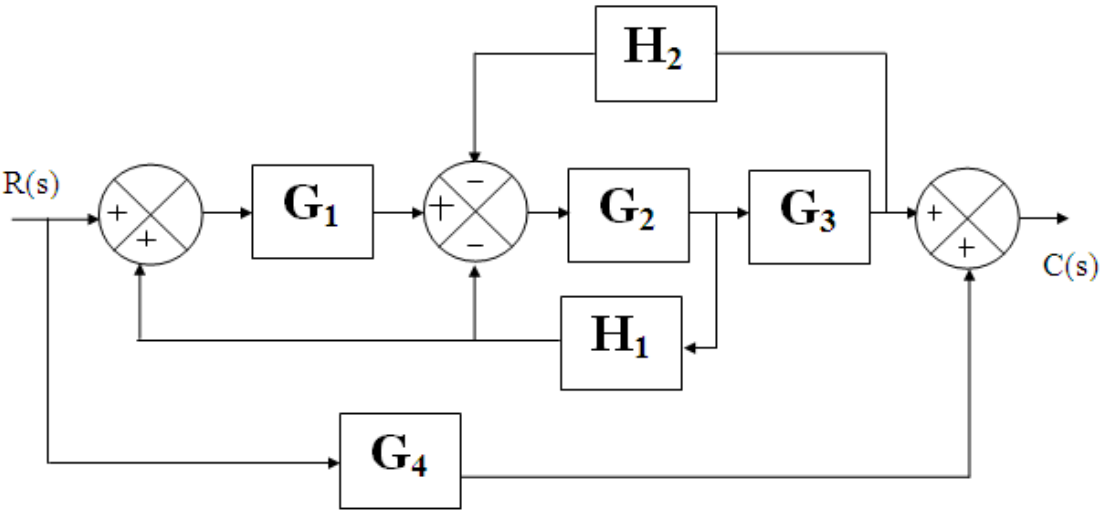
PART - B (5 x 16 = 80 Marks)

11. (a) Write the differential equations governing the mechanical system shown in figure and determine the transfer function. (16)



Or

(b) Obtain the closed loop transfer function *C(S)/R(S)* of the system whose block diagram is shown in figure. (16)



12. (a) Derive the expression for the response of first order system for unit step input. (16)

Or

(b) For servomechanism with open loop transfer function given below explain what type of input signal give rise to a constant steady error and calculate their value. Given $G(s) = \frac{10}{(s+2)(s+3)}$. (16)

13. (a) A unity feedback control system has $G(s) = \frac{K}{s(s+4)(s+10)}$. Draw the Bode plot. Find *K* when phase margin 30°. (16)

Or

(b) Sketch the polar plot of the given transfer function and find phase margin and gain margin $G(s) = \frac{1}{s(s+4)(s+8)}$ (16)

14. (a) Determine the range of values of K for the system to be stable.
$s^3 + 3Ks^2 + (K+2)s + 4 = 0$. (16)

Or

(b) The open loop transfer function of a system is $G(s) = \frac{K}{s(1+0.1s)(1+s)}$ (16)

(i) Determine the value of *K* so that gain margin is 6 *db*.
(ii) Determine the value of *K* so that phase margin is 40°.

15. (a) A discrete time system is described by the difference equation *y(k+2)+5y(k+1)+6y(k)=u(k); y(0)=y(1)=0; T=1Sec*. (16)
(i) Determine a state model in canonical form.
(ii) Find the state transition matrix.
(iii) For input *u(k)=1;k ≥ 1*, find the output *y(k)*.
(16)

Or

(b) Determine the State transition matrix for the state model whose A matrix is given by

(i) $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ (ii) $A = \begin{bmatrix} 0 & 1 \\ 1 & -2 \end{bmatrix}$. (16)