

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Question Paper Code: 34522

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Fourth Semester

Electronics and Communication Engineering

01UEI422 – LINEAR CONTROL ENGINEERING

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

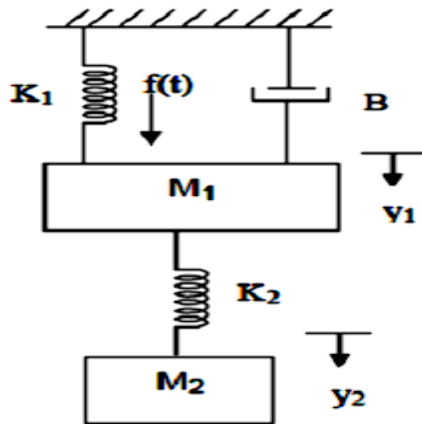
Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. What is feedback? What are the components of feedback control system?
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. In Routh array what conclusion you can make when there is a row of all zeros?
9. What are the advantages of State Space analysis?
10. State the reason for using state space analysis rather than using transfer function method.

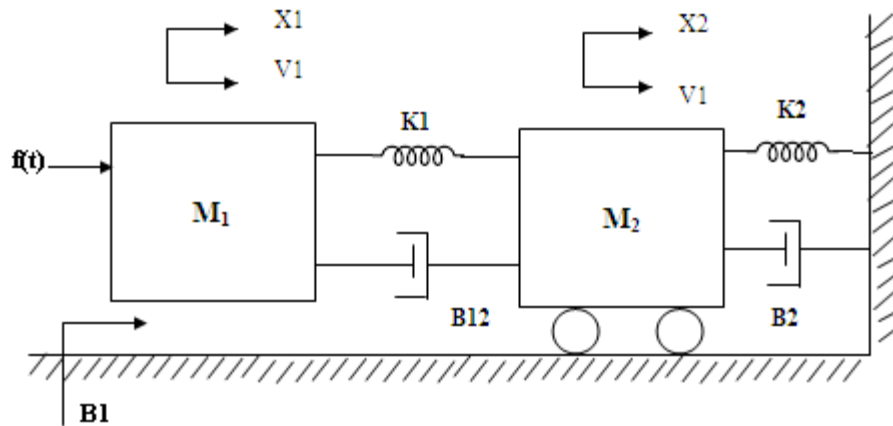
PART - B (5 x 16 = 80 Marks)

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



Or

- (b) Write the differential equations governing the mechanical system shown in Fig. 3. Draw the force-voltage and force-current electrical analogous circuits and verify by writing mesh and node equations. (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) A unity feedback control system has an open loop transfer function $G(s) = \frac{K}{s(s^2 + 4s + 13)}$. Sketch the root locus. (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 $y(k+2)+5y(k+1)+6y(k)=u(k)$; $y(0)=y(1)=0$; $T=1\text{Sec}$. (16)
(i) Determine a state model in canonical form.
(ii) Find the state transition matrix.
(iii) For input $u(k)=1$; $k \geq 1$, find the output $y(k)$.

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)

