H.T.No. | | | | | | | | | | |

Code No: EC1524 **GEC-R14**

II B. Tech II Semester Regular Examinations, May 2016

CONTROL SYSTEMS

(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 60**

Note: All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **PART-B.** All Questions carry equal Marks.

PART-A

6 × 2 = 12M

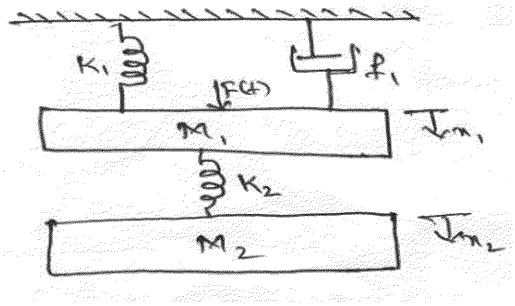
1. What are the advantages of closed loop system compared to open loop system?
2. Give the expression for the rise time of the step response for a second order system.
3. How R-H criterion is useful in plotting root locus?
4. Draw the pole zero plot for lag – lead compensator.
5. Define controllability.
6. Define sampled data control system.

PART-B

4 × 12 = 48M

1. a) Explain the differences between Open loop and Closed control systems. (4M)

   b) Derive the transfer function of relating input F(t) and x_2 for the system shown in figure below. (8M)



2. If x(t) is the input and y(t) is the output of the system described by the differential equation $\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 8y(t) = 8x(t)$. Determine the un-damped natural frequency, damping ratio, damped natural frequency, peak overshoot and settling time. (12M)

3. a) By means of the Routh Hurwitz Criterion, check whether the following system is stable or not.
$s^4+6s^3+23s^2+40s+50=0$ (4M)

b) The open loop transfer function of a unity feedback system is $G(s) = \frac{K}{(s+2)(s+4)(s^2+6s+25)}$. Draw the rough sketch of root locus and determine the value of K which will cause sustained oscillations in the closed loop system. (8M)

4. The Open Loop Transfer Function of a unity feedback system is given by $G(s) = \frac{K(s+20)}{(s+1)(s+2)(s+10)}$. Sketch the bode plot for K=10. Determine the Phase margin, Gain margin, phase crossover frequency and gain crossover frequency. (12M)

5. a) Discuss about the properties of State Transition Matrix. (4M)

b) Determine the solution of the State equation $\dot{X} = AX$ where $A = \begin{bmatrix} 2 & -1 \\ 2 & 3 \end{bmatrix}$ and $X(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ (8M)

6. Draw the block diagram of sampled data control system and explain in detail about each block. (12M)

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