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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(EIE) (2011 &amp; Onwards) (Sem.-4)

**LINEAR CONTROL SYSTEMS**

Subject Code : IC-204

M.Code : 57021

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

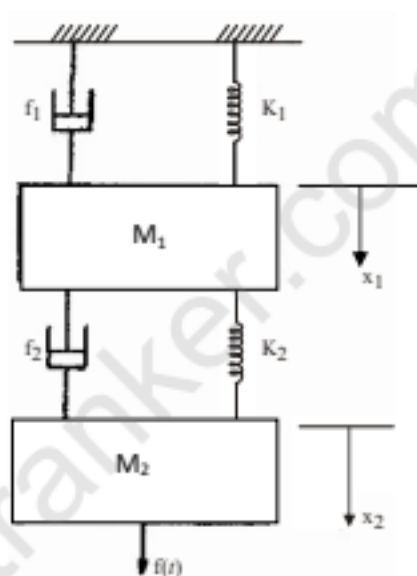
**SECTION-A****1. Answer briefly :**

- a. What do you mean by servomechanism? Explain.
- b. What do you mean by steady state error? Explain.
- c. Define settling time and maximum overshoot.
- d. Discuss the significance of time constant in first order system.
- e. List the advantages and disadvantages of Routh-Hurwitz criterion.
- f. Discuss the importance of Asymptotes in root locus.
- g. Discuss the various test input signals used for time domain analysis.
- h. Why compensation is required? Explain.
- i. Discuss the importance of synchro in control system.
- j. Discuss the importance of Laplace transform in control system.



### SECTION-B

2. Differentiate :
  - a) Linear and non-linear systems
  - b) Open and closed loop systems
  - c) Time variant and time invariant systems
3. Using Mathematical Modelling, find the  $x_2(s)/f(t)$  of the system shown below :



4. What do you mean by order of a system? Determine the transient and steady state response of first order system when unit step input is applied.
5. Sketch the bode plot for the system when open loop transfer function is given by  $G(s) = \frac{50}{(s+2)(s+4)}$ .
6. Explain in detail A.C. and D.C. tachometers used in control systems.

### SECTION-C

7. Design a phase lag compensating network for  $G(s) = \frac{50}{s(1+0.1s)(1+0.2s)}$ .

to meet the following specifications :  $K_v = 30 \text{ sec}^{-1}$ , P.M.  $\geq 40^\circ$

8. a) Represent the following set of equations by a signal flow graph and determine the overall gain relating  $x_5$  and  $x_1$ .

$$x_2 = a x_1 + f x_2$$

$$x_3 = b x_2 + e x_4$$

$$x_4 = c x_3 + h x_5$$

$$x_5 = d x_4 + g x_2$$

- b) Find whether the system shown below is stable or not?

$$\frac{4}{s(s+1)(s+3)(s^2+4s+8)}$$

9. Discuss the following :

- Root Locus
- Servo motors

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**