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B.Tech.(EIE) (2011 & 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.



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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 $G(s) = \frac{50}{(s+2)(s+1)}$
- 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. $\ge 40^{\circ}$

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- 8. a) Represent the following set of equations by a signal flow graph and determine the overall gain relating x_5 and x_1 .
 - $x_2 = a x_1 + f x_2$ $x_3 = b x_2 + e x_4$ $x_4 = c x_3 + h x_5$
 - $x_5 = \mathrm{d} x_4 + \mathrm{g} x_2$
 - 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 :
 - a) Root Locus
 - www.FirstRanker.com b) 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.