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Total No. of Pages : 02

Total No. of Questions : 09

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

LINEAR CONTROL SYSTEMS

Subject Code : IC-204

Paper ID : [A0310]

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.

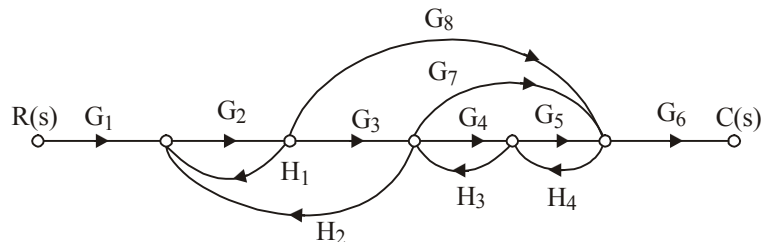
SECTION-A**1. Answer briefly :**

- a What do you mean by regulating systems? Explain.
- b Discuss the significance of transfer function.
- c Define rise time and peak time.
- d Differentiate between linear and non-linear systems.
- e Why Bode plot is drawn on the semi-log paper?
- f Discuss the importance of breakaway points in root locus.
- g How Nyquist criterion is different from Routh-Hurwitz criterion.
- h Why compensation is required? Explain.
- i Discuss the importance of error detectors in control system.
- j Define phase margin and gain margin.

SECTION-B

2. Differentiate between open loop and closed loop control systems. Mention at least TWO examples of each type of system. Also discuss continuous and sampled data control systems.

3. Calculate the transfer function $C(s)/R(s)$ of the following :



4. The open loop transfer function of a unity-feedback control system is given by

$$G(s) = \frac{25}{s(s+5)}$$

Calculate the natural frequency of oscillations, damped frequency of oscillations, damping factor, damping ratio and maximum overshoot of a unit step input.

5. Sketch the bode plot for the system when open loop transfer function is given by

$$G(s)H(s) = \frac{30}{s(0.5s+1)(0.08s+1)}$$

6. Describe the working of Synchros with diagram and mathematical equation. How Synchro receiver and transmitter can be used in control systems?

SECTION-C

7. The open loop transfer function of a unity feedback is

$$G(s) = \frac{K}{s(1+0.2s)}$$

It is required that the velocity error constant should be at least 20 and the phase margin should be 44° . Does the system meet the required specifications? If not, design the compensating network to satisfy the required specifications.

8. Sketch the root locus plot and determine the value of K if damping ratio is 0.707, for the system whose open loop transfer function is given by $G(s)H(s) = \frac{K}{s(s+4)}$.
9. Discuss the following :
- Modelling of electrical and mechanical systems
 - Magnetic amplifier or servomotors