

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Automation & Robotics) (Sem.-4)

LINEAR CONTROL SYSTEMS

Subject Code : BTEE-402

M.Code : 57108

Date of Examination : 12-07-22

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.

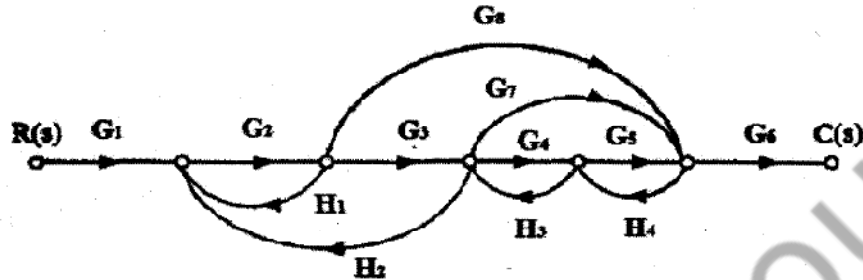
SECTION-A

1. Answer briefly :

- a) Differentiate between continuous and sampled data control systems.
- b) Discuss the advantages of block diagram representation.
- c) What do you mean by servomechanism? Discuss.
- d) Discuss the effect of feedback on the system stability.
- e) List the use of Laplace transform.
- f) What is gain margin? Explain.
- g) Why compensation is required? Explain.
- h) List the various advantages of frequency domain analysis.
- i) What do you mean by breakaway points? Explain their significance.
- j) Compare AC and DC servo motors.

SECTION-B

2. Differentiate between open loop and closed loop control systems by citing at least two examples of each type of system. Also discuss time variant and time invariant systems.
3. Calculate the transfer function $C(s)/R(s)$ of the following :



4. Discuss Routh-Hurwitz Criterion. Find the stability of the system having the characteristic equation

$$s^4 + 20s^3 + 15s^2 + 2s + 3 = 0$$

5. How a compensator is selected for a particular system? Write the procedure for the design of a Lag compensator.
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. Sketch the Bode plot for the transfer function given below :

$$G(s)H(s) = \frac{8(s+2)}{s^2(s+3)(s+5)}$$

8. For the open loop transfer function given below sketch the root locus plot for the system when

$$G(s)H(s) = \frac{K(s+1)}{(s^2 + 0.4s + 0.4)}$$

Also determine the value of K at $s = -2$ and comment upon the stability.

9. Discuss the following :

- a) Stepper motor
- b) Controllability and Observability .

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.