Roll No. | | | | | | | | | | | | Total No. of Pages : 03

Total No. of Questions : 09

B.Tech. (Electronics & Communication Engg.) (Sem.–5)

CONTROL SYSTEMS

Subject Code : BTEC-504-18

M.Code : 78300

Date of Examination : 25-11-2023

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. Attempt the following :

a) Differentiate between open loop and closed loop control by giving one example of each.

b) What do you mean by a pneumatic actuator?

c) Define the sensitivity of a control system.

d) What do you mean by a multiloop control configuration?

e) How gain crossover frequency is different from phase cross over frequency?

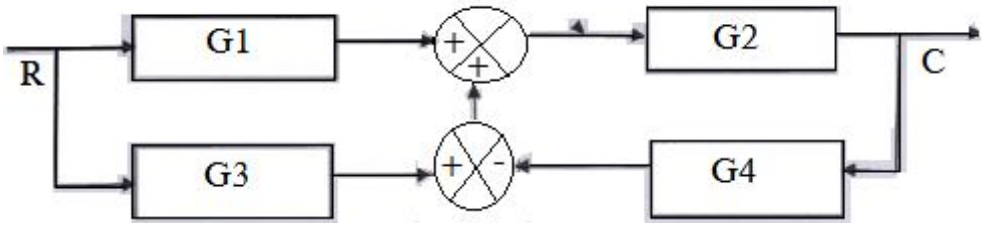
f) Define the term robustness of a system.

g) What do you mean by a Multiple Input and Multiple output (MIMO) system?

h) How a non-linear system is different from a linear system?

i) Define the stability of a control system.

j) Determine the overall transfer function of the following block diagram :



SECTION - B

2. Derive an expression for steady state error for first order control system when subjected to unit ramp input function.

3. By using the direct decomposition, draw the block diagram for the following transfer function and obtain a state model :

$$\frac{Y(s)}{U(s)} = \frac{1}{s^3 + 9s^2 + 26s + 24}$$

4. Determine the stability of the system by using Routh Hurwitz stability criterion whose characteristic equation is given below

$$s^4 + s^3 + 5s^2 + 4s + 4 = 0$$

5. What is a compensator? Explain about phase lead compensator.

6. A unity feedback control system has an open loop transfer function given below :

$$G(s) = \frac{K}{s(s+2)}$$

Draw its root locus.

SECTION - C

7. Determine the transfer matrix from the data given below and draw the block diagram

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 0 & 3 \\ -2 & -5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} u(t)$$

and $y = \begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$

8. Discuss about the detailed construction, working & applications of LVDT.

9. The overall transfer function of a control system is given by :

$$\frac{C(s)}{R(s)} = \frac{16}{s^2 + 1.6s + 16}$$

It is desired that damping ratio be 0.7. Determine the derivative rate feedback constant K_D and compare rise time, peak time, maximum overshoot and steady state error for unit ramp input without and with derivative feedback control.

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.