

Reg. No.

Question Paper Code

11556

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

Sixth Semester

Electronics and Instrumentation Engineering

EI8691 - COMPUTER CONTROL OF PROCESSES

(Regulations 2017)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,</i>
<i>K-Level, CO</i> |
|---|-------------------------------------|
| 1. What is sample data control system? | 2,K1,CO1 |
| 2. State the concept of controllability and observability test. | 2,K2,CO1 |
| 3. What is mathematical model? | 2,K1,CO2 |
| 4. Differentiate parametric and non-parametric method. | 2,K2,CO2 |
| 5. Define Z-transform. | 2,K2,CO3 |
| 6. State what is meant by region of convergence. | 2,K1,CO3 |
| 7. Recall the problems arising from interactions. | 2,K1,CO4 |
| 8. List the advantages of relative gain array. | 2,K1,CO4 |
| 9. Illustrate Multivariable control system. | 2,K2,CO5 |
| 10. Mention the effect of PID controller. | 2,K2,CO5 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Express and derive the transfer function of first order hold device. 13,K2,CO1
- OR**
- b) Give the state model of the discrete data system represented by the difference equation $y(k+1)+5y(k+2)+3y(k)=u(k)$ in Jordan canonical form and phase variable form. 13,K3,CO1
12. a) Explain in detail about the system identification process. Give example. 13,K2,CO2
- OR**
- b) Explain in detail about the frequency analysis method. 13,K2,CO2
13. a) Discuss briefly Smith predictor algorithm with example. 13,K2,CO3

OR

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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b) Find $D(Z)$ for the system $G(s) = 1/((S+1)(S+4))$ using Dead beat ^{13,K3,CO3} algorithm.

14. a) Explain about the process interaction. For any 2X2 process, explain in ^{13,K2,CO4} detail.

OR

b) Consider a process with the following input-output relationship ^{13,K3,CO4}

$$y_1(s) = \frac{1}{s+1} u_1(s) + \frac{1}{0.1s+1} u_1(s)$$

$$y_2(s) = \frac{-0.2}{0.5s+1} u_1(s) + \frac{0.8}{s+1} u_2(s)$$

Draw the block diagram input-output pairing the process.

15. a) How Internal Model Control is developed for the process? Explain ^{13,K2,CO5} with example.

OR

b) Examine the effect of tuning parameters for MIMO process. ^{13,K2,CO5}

PART - C (1 × 15 = 15 Marks)

16. a) Assess various methods involved in non-parametric methods of system ^{15,K2,CO2} identification and explain any two non-parametric methods.

OR

b) Consider a following 2 x 2 process ^{15,K3,CO4}

$$\begin{bmatrix} X_D \\ X_B \end{bmatrix} = \begin{bmatrix} \frac{-18.9e^{-3s}}{21s+1} & \frac{-12.8e^{-5s}}{16.7s+1} \\ \frac{-19.4e^{-5s}}{14.4s+1} & \frac{6.6e^{-7s}}{10.9s+1} \end{bmatrix} \begin{bmatrix} S(s) \\ R(s) \end{bmatrix}$$

Design a decoupler for the process.