

1128

M.E. Electrical Engineering (Power System)

First Semester

EE-8104: Digital Control Systems

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt any five questions.

x-x-x

- I. a) Enumerate basic elements of a digital control system and show the block diagram representation of such a system.
- b) Illustrate the discrete data and digital control system with microprocessor - controlled system. (5,5)
- II. a) Find the inverse Z- transform using partial fraction expansion for the following function

$$F(z) = \frac{z(z+2)}{(z-3)(z^2-z+1)}$$

- b) Discuss principle of discretization. How is ideal sampler different from its actual sampler counterpart. (5,5)
- III. Why is z-transform useful in analysis of digital control systems? Define Pulse transfer function. Also mention limitations of z-transform. (10)
- IV. Investigate controllability of the following state model of a digital control system:

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 1 \\ -6 \end{bmatrix} u(k) \quad (10)$$

- V. Define stability of digital control systems. Enumerate various methods used for stability investigation of such systems. (10)
- VI. Explain necessary and sufficient conditions for arbitrary pole-placement in state-feedback control method. (10)
- VII. Discuss appropriate quadratic performance indices for optimal solution of state regulator and output regulator problems. (10)

(2)

VIII. Discuss the following:-

- a) Stability in the z-domain.
- b) Configuration of a basic digital control scheme.

(5,5)

x-x-x