Course Type	Course Code	Name of Course	L	Т	Р	Credit
DC	EEC309	Modern Control	3	0	0	9

## **Course Objective**

The course will gives basic concept of discrete control system, state space analysis and nonlinear control for industrial applications. The course Will be helpful for modelling and performance analysis of modern control system practice.

## **Learning Outcomes**

Upon successful completion of this course, students will:

- Understand the basic concept of discrete control system,
- Learn the mathematical modeling of control system in Z- domain.
- Learn state space modeling of modern control system.
- Understand the basic concept of nonlinear control system.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Sampling data system: Sampling-and-hold operation, Sampling theorem, Signal reconstruction, Difference equation	4	Understand the basic concept of discrete control system.
2	Z-transform, Pulse transfer function, Inverse Z-transform and response of linear discrete-time systems, z-transform analysis of sampled-data control system, Standard transformation techniques, Modified Z-transform,	8	Understand the modelingtechnique of discrete controlsystem.
3	Stability analysis, Root locus technique, Compensationtechnique by digital computer	5	Familiarization of performance analysis of discrete control system.
4	State-space analysis: State variables, state model for linear continuous-time systems, Types of state models, Diagonalization, Eigenvalues and eigenvectors, Solution of state equation, state transition matrix, computation of state transition matrix by Laplace transformation, Controllability and observability, transfer matrix	11	Understand the state spacemodeling of modern controlsystem.
5	Control system design by pole-placement using state feedback	5	Familiarization of designtechnique of modern control system using state space analysis.
6	Introduction to nonlinear control system, Common physical nonlinearities,	3	Develop knowledge of basic nonlinear control system.
7	Describing function and phase plane method for analysis of common nonlinearities, Stability of non-linear system.	6	Modeling and performance analysis of nonlinear controlsystem.

## **Text Books**

- 1. Modern Control Engineering- K Ogata, Pearson Education
- 2. Discrete time control system- K Ogata, Pearson Education
- 3. Digital control and state variable methods -M Gopal, Tata Mc-Grawhill
- 4. Automatic Control Systems W A Wolovich, Rineheart and Winstone Inc. USA

## **Reference Books**

1. Control Systems-J J Distefano III, A R Stubberud, I J Williams