

Department of Electronics
Government Degree College, Baramulla (Autonomous)

Semester 4th

Course Minor

Subject: Electronics

Course Title: SIGNALS AND SYSTEMS

Course Code: ELTC1422M

Credits: THEORY: 4, PRACTICAL: 2

Contact Hours: (64 Th + 64 Pr)

Course Objectives:

1. *To understand the fundamental characteristics of signals and systems.*
2. *To understand signals and systems in terms of both the time and transform domains.*
3. *To develop the mathematical skills to solve problems involving convolution, filtering and sampling.*

Expected Learning Outcomes:

At the end of this course students will demonstrate the ability to:

1. *Analyse different types of signals.*
2. *Analyse linear shift-invariant (LSI) systems.*
3. *Represent continuous and discrete systems in time and frequency domain using Fourier series and transform.*
4. *Analyse discrete time signals in z-domain.*
5. *Study sampling and reconstruction of a signal.*

THEORY (4 Credits):

Unit-I: Representation and classification of signals and systems

(16 Contact hours)

Representation and Classifications of Continuous and Discrete Time Signals and Systems; Linear and Nonlinear systems, Causal and non-causal Systems, Time varying and Time Invariant systems, Singularity Functions; Convolution Operation of Continuous and Discrete Time Signals; Impulse Response and Its Properties.

UNIT-II: Fourier Transform and its Properties

(16 Contact hours)

Fourier Transform and its Properties: Linearity, Time shifting, frequency shifting, Time integration, frequency differentiation, convolution. Fourier transform of important electric signals. Examples based on Fourier transform of various signals and systems. System Analysis Using Fourier Transform, Representation and Analysis of Bandpass Signals and Systems.

Unit III: Laplace Transform and its properties**(16 Contact hours)**

Definition of Laplace Transform; Properties of Laplace transform: Linearity, scaling, Time shifting, Frequency shifting, Time differentiation, Time integration, Frequency differentiation, Initial and final value theorem, Inverse Laplace transform, Transfer Function; Poles and zeros of a transfer function, Frequency Response of I and II Order Systems.

Unit-IV: Discrete Time Systems**(16 Contact hours)**

Sampling: Representation of a Continuous-Time Signal by its Samples, Sampling Theorem. Reconstruction of a Signal from its Samples, Aliasing, Discrete-Time Processing of Continuous-Time Signals: Arithmetic operations on discrete time signals. Solutions of Discrete time systems using Z-transform. Introduction to Random Variables; Probability Distribution and Probability Density Functions; Uniform, Gaussian, Exponential and Poisson Random Variables; Statistical Averages; Random Processes; Correlation; Power Spectral Density.

RECOMMENDED BOOKS:

1. Alan V, Oppenheim and A.S Wilsky, Signals and Systems, prentice Hall India
2. Simon Hykin, Signals and systems, John Wiley.
3. B. P Lathi, Signals and systems
4. Simon Hykin, Communication systems, John Wiley
5. D. M. Etter, D.C, Kuncicky, H. Moore, Introduction to MATLAB 7, Pearson.

PRACTICAL (2 CREDIT)

(Note: The student is required to attempt at least 10 experiments based on the following contents)

1. Familiarization with MATLAB software.
2. Introduction to Signal Processing toolbox.
3. Matrix Operations & Plotting using MATLAB.
4. Generation of Signals & Signal Operations.
5. Convolution on Continuous Time Signals.
6. Study of Laplace Transforms using MATLAB.
7. To Study sampling of continuous signals using MATLAB.