EOPC2003 SIGNALS AND SYSTEMS (3-0-0)

Course Objective:

- To understand the fundamental characteristics of signals and systems
- To understand signals and systems in terms of both the time and transform domains, taking advantage of the complementary insights and tools that these different perspectives provide.
- To develop the mathematical skills to solve problems involving convolution, correlation, and sampling.

Module 1 Basics of continuous-time and discrete-Time Signals, Elementary signals (Impulse, Ramp, step, exponential), Classification of Discrete-Time Signals, Simple Manipulation of Discrete time signals, Discrete-Time Systems:Block Diagram Representation, Classification and Interconnection.	**7 Hours**
Module 2 Analysis of Discrete-Time LTI Systems: Techniques, Response of LTI Systems, Properties of Convolution, Causal LTI Systems, Stability of LTI Systems; Discrete-Time Systems described by Difference Equations; Implementation of Discrete-Time Systems. Correlation of Discrete-Time Signals: Cross correlation and Autocorrelation Sequences, Properties.	**8 Hours**
Module 3 Fourier series representation: Continuous time Fourier series (CTFS), Dirichlet conditions, properties of CTFS, discrete time Fourier series (DTFS), properties of DTFS .	**4 Hours**
Module 4 Sampling: Representation of a Continuous-Time Signal by Its Samples, The Sampling Theorem. Reconstruction of a Signal from Its Samples Using Interpolation, Aliasing, Discrete-Time Processing of Continuous-Time Signals	**4 Hours**
Module 5 The continuous-Time Fourier Transform (CTFT): Basic concepts of the Fourier Transform, Fourier Transform of periodic and Aperiodic signals. Properties of the continuous-Time Fourier Transform. The discrete time Fourier transform(DTFT): Fouriertransform of periodic and Aperiodic signals, properties of DTFT.	**7 Hours**

Course Outcomes: At the end of the course, students will be able to

- CO1: understand the basic properties of signals and systems in both continuous and discrete time.
- CO2: classify systems based on their properties and determine the response of LTI system using convolution.
- CO3: analyse the spectral characteristics of continuous-time periodic and aperiodic signals using Fourier analysis.
- CO4: understand the process of sampling and the effects of under sampling.
- CO5: apply the discrete time Fourier transform for analysis of discrete-time signals.

Text Books:

1. Digital Signal Processing — Principles, Algorithms and Applications, John. G. Proakis and Dimitris. G. Manolakis, 4th Edition, Pearson.
2. Signals & Systems by Alan V Oppenheim, A.S. Willsky and S.H. Nawab 2nd Edition, Pearson.

3. Signals and Systems by Simon Haykin and Barry Van Veen, 2nd Edition, Willey.
4. Fundamentals of Signals and Systems - M J Roberts, TMH
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