SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS): CHITTOOR
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

II Year B.Tech. I semester

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16ECE 212 SIGNALS AND SYSTEMS

COURSE EDUCATIONAL OBJECTIVES:

- This is a core subject, basic knowledge of which is required by all the engineers.
- To do analysis of signals & systems(continuous and discrete).
- This course focuses on: To get an in-depth knowledge about signals, systems and analysis of the same using various Transforms.

UNIT I

Signals and Systems: Continuous-Time and Discrete-Time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, the Unit Impulse and Unit Step Functions, Continuous-Time and Discrete-Time Systems, Basic System Properties, Linear Time-Invariant Systems - Discrete-Time LTI Systems, The Convolution Sum, Continuous-Time LTI Systems – The Convolution Integral, Properties of Linear Time-Invariant Systems, Causal LTI Systems Described by Differential and Difference Equations, Singularity Functions.

UNIT II

Fourier Series Representation of Periodic Signals: The Response of LTI Systems to Complex Exponentials. Fourier Series Representation of Continuous-Time Periodic Signals, Convergence of the Fourier Series, Properties of Continuous-Time Fourier Series, Fourier Series Representation of Discrete-Time Periodic Signals, Properties of Discrete-Time Fourier Series.

UNIT III

The Continuous-Time Fourier Transform: Representation of Aperiodic Signals, The Continuous- Time Fourier Transform, The Fourier Transform for Periodic Signals, Properties of the Continuous- Time Fourier Transform, The Convolution Property, Fourier Properties and Basic Fourier Transform Pairs, Systems characterized by Linear constant coefficient differential equations, The Discrete-Time Fourier Transform - Representation of Aperiodic Signals, The Discrete-Time Fourier Transform, The Convolution Property, Fourier Transform Properties and Basic Fourier Transform Pairs, Duality, Systems Characterized by Linear Constant-Coefficient Difference Equations.

UNIT IV

Time & Frequency Characterization of Signals and Systems: The Magnitude-Phase Representation of the Fourier Transform, The Magnitude-Phase Representation of the Frequency Response of LTI Systems,Signal Bandwidth, System Bandwidth.

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Sampling: Representation of a Continuous-Time Signal by Its Samples - Sampling Theorem, Reconstruction of a Signal from Its Samples Using Interpolation. Effect of under sampling: Aliasing, Discrete-Time Processing of Continuous-Time Signals.

UNIT V

Laplace and z-Transforms: The Laplace Transform. The Region of Convergence for Laplace Transforms& Properties, The Inverse Laplace Transform, Properties of the Laplace Transform, Some Laplace Transform Pairs, The Z-Transform - Region of Convergence for the z-Transform & Properties, The Inverse z-Transform, Properties of the z-Transform, Some Common z-Transform Pairs.

COURSE OUTCOMES:

Upon completing this course the student will be able to:

- ✓ For integro-differential equations, the students will have the knowledge to make use of Laplace transforms.
- ✓ For continuous time signals the students will make use of Fourier transform and Fourier series.
- ✓ For discrete time signals the students will make use of Z transforms.
- ✓ The concept of convolution is useful for analysis in the areas of linear systems and communication theory.

Text books:

1. Signals and systems, 2/e, 1997, A.V. Oppenheim, A.S. Willsky and S.H. Nawab, Pearson Education, Delhi.
2. Signals & System, 2/e, 2001, Simon Haykin and Van Veen,John Wiley & Sons, inc, Delhi.

Reference books:

1. Signals, Systems & Communications, 2/e, 2003, B.P Lathi, BS Publications, Hyderabad.
2. Luis F. Chaparro, "Signals and Systems using MATLAB," Academic Press, 2011.
3. Fundamentals of Signals and Systems, International Edition, 2008, Michel J. Robert, Tata McGraw-Hill, Delhi.