RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Electronics & Communication Engineering IV-Semester

EC402 Signals & Systems

Unit-1 Introduction of Signals and Systems: Definition of signal, Classification of Signal and representation: Continuous time and discrete time, even/odd, periodic/aperiodic, random/deterministic, energy/power, one/multidimensional, some standard signals, , Basic Operations on Signals for CT/DT signal, transformation of independent & dependent variables,

Definition of system and their classification: CT/DT, linear/non-linear, variant/non-variant, causal and non-causal system state/dynamic system, interconnection of systems. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability.

Unit-2 Linear Time- Invariant Systems: Introduction, Impulse Response Representation for LTI Systems, Convolution, Properties of the Impulse Response Representation for LTI Systems, Difference Equation for LTI Systems, Block Diagram Representations(direct form-I, direct form-II, Transpose, cascade and parallel). Impulse response of DT-LTI system and its properties.

Unit-3 z-Transform: Introduction, ROC of finite duration sequence, ROC of infinite duration sequence, Relation between Discrete time Fourier Transform and z-transform, properties of the ROC, Properties of z-transform, Inverse z-Transform, Analysis of discrete time LTI system using zTransform, Unilateral z-Transform.

Unit-4 Fourier analysis of discrete time signals: Introduction, Properties and application of discrete time Fourier series, Representation of Aperiodic signals, Fourier transform and its properties, Convergence of discrete time Fourier transform, Fourier Transform for periodic signals, Applications of DTFT.

Unit-5 State-space analysis and multi-input, multi-output representation. The state-transition matrix and its role. The Sampling Theorem and its implications- Spectra of sampled signals. Reconstruction:

Reference Books:

1. Simon Haykin, "Signals and Systems", John Wiley.
2. Simon Haykin, "Analog and Digital Communications", John Willey.
3. Bruce Carlson, "Signals and Systems", TMH.

4. Oppenheim & Wilsky, "Signals & Systems", PHI.

5. Taub and Schilling "Principles of communication signals", 2nd ed. New York: Mcgraw-Hill, 1986.

LIST OF EXPERIMENTS

1. Introduction to MATLAB Tool.

2. To implement delta function, unit step function, ramp function and parabolic function for continuous-time.

3. To implement delta function, unit step function, ramp function and parabolic function for discrete-time.

4. To implement rectangular function, triangular function, sinc function and signum function for continuous-time.

5. To implement rectangular function, triangular function, sinc function and signum function for discrete-time.

6. To explore the communication of even and odd symmetries in a signal with algebraic operations.

7. To explore the effect of transformation of signal parameters (amplitude-scaling, time-scaling & shifting).

8. To explore the time variance and time invariance property of a given system.

9. To explore causality and non-causality property of a system.

10. To demonstrate the convolution of two continuous-time signals.

11. To demonstrate the correlation of two continuous-time signals.

12. To demonstrate the convolution of two discrete-time signals.

13. To demonstrate the correlation of two discrete-time signals.

14. To determine Magnitude and Phase response of Fourier Transform of given signals.