

Year & Sem: E1S2	Course Code: EC1202	Course Name: Signals and Systems	No. of Credits: 4	L 2	T&PS 2	P 0
Unit-I: Introduction to signals: Mathematical representations of a signal, Common signals in Engineering: Exponential and Sinusoidal signals, Useful signal models: singularity functions-unit impulse function, unit step function, signum function, Transformations of the independent & dependent variables, size of a signal, absolutely integrable & square integrable functions, Characterization & Classification of Signals. Introduction to systems: Modeling of systems: input-output description, typical examples of systems, Characterization, Classification and properties of systems, Interconnections of systems Unit-II: Continuous-time (CT) Linear Time-invariant (LTI) systems: System Response to Internal Conditions, The representation of CT signals in terms of impulses, the CT unit impulse response, system response to external input: convolution for CT LTI systems, Properties of Convolution, Properties of CT LTI systems: memoryless systems, stability, invertibility, causality; unit step response, Differential equation models & Solution of differential equations: Natural & Forced responses, ZIR & ZSR, stability in terms of natural response, System response to complex exponential inputs Unit-III: Signal representation by Fourier series: Signals and Vectors, Signal comparison: correlation, Signal representation by orthogonal signal set, Trigonometric Fourier series, Wave Symmetry, exponential Fourier series, Convergence of the Fourier series and Gibbs Phenomenon, frequency spectra, Properties of Fourier series, Power representation using Fourier series, LTI system response to periodic inputs. Unit-IV: The Continuous-time Fourier Transform (CTFT): Development of CTFT of an aperiodic signal, Convergence of CTFT, CTFT of some useful functions, Magnitude and Phase representation of CTFT, The CTFT of periodic signals, Properties of CTFT, Frequency spectra of signals, Signal bandwidth, System bandwidth, Frequency response of LTI systems, Energy and Power Density Spectra. Unit-V: CT system analysis using the Laplace Transform: The Laplace Transform, Region of Convergence, Laplace transform of elementary functions, Properties of Laplace Transform, The Inverse Laplace Transform, Response of LTI systems, System Functions, Relationship between Laplace Transform and Fourier Transform, The Unilateral Laplace Transform Unit-VI: Analog Filters: Time -domain and frequency -domain aspects of ideal and non-ideal frequency selective filters, causality and Paley wiener criterion for physical realization, Design of Filters: System design using placement of poles and zeros, Approximating functions: Butterworth and Chebyshev Filters, Frequency transformations, Conditions and requirements for Distortion less transmission. References/Text Books: 1. Alan V Oppenheim, Alan V Willsky, S. Hamid Nawab, "Signals and Systems", 2nd edition, Pearson/PHI, 2015 2. B P Lathi, "Principles of Signal Processing and Linear Systems", 1st edition, Oxford						

University press, 2009

3. C L Philips, J M Parr and Eve A Riskin, "Signals, Systems and Transforms", 4th Edition, Pearson Education, 2008.
4. Simon Haykin, Van Veen, "Signals & Systems", 2nd Edition, Wiley Publications, 2007.
5. Mahamood Nahvi, "Signals and Systems", McGraw Hill Publishers, 1st edition, 2015.
6. Michael Roberts, Govind Sharma "Fundamentals of Signals and Systems", MGH Publishers (SIE), 2nd Edition, 2008.
7. A Anand Kumar, "Signals and Systems", 3rd edition, Pearson/PHI, 2013

Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations.

Video Lectures (Web Links):

1. <https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/video-lectures/>
2. <http://nptel.ac.in/courses/117104074/>
3. <http://nptel.ac.in/courses/108106075/>
4. <http://nptel.ac.in/courses/117101055/>

Study Materials (Web Links):

- 1.
- 2.

Problems & Solutions (Web Links):

- 1.
- 2.

Assignments (Web Links):

- 1.
- 2.