**17EC2101-SIGNALS & SYSTEMS**

**(Common to EEE & ECE)**

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| **Course category:** | Program core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 2 - 2 - 0 |
| **Pre-requisite:** | Knowledge of vectors Trigonometry, Differentiation & Integration | **Sessional Evaluation :**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  10 |

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| **Course Objectives** | Students undergoing this course are expected to understand: | |
| 1. The different types of Continuous Time Signals. 2. The Fourier series for periodic signals. 3. The Fourier Transform of various signals. 4. Analysis and Design of different types of Continuous Time Systems. 5. To provide mathematical background of Discrete Time Signals and Systems. 6. The Fourier Transform of discrete time signals and systems. | |
| **Course Outcomes** | Upon successful completion of the course , the students will be able to: | |
| CO1 | Define the signals and systems with examples. |
| CO2 | Find the Fourier series of various Periodic signals. |
| CO3 | Define the Fourier Transform and its properties. |
| CO4 | Explain the inter connections of LTI systems. |
| CO5 | Explain the operations on discrete time signals and its transformations. |
| CO6 | Know the difference between FT and HT and applications of those two. |
| **Course Content** | **UNIT-I**  **CONTINUOUS TIME SIGNALS:** Signal classification, Types of Signals-Dirac delta, unit step, ramp, Signum and Exponential functions, Operations on signals, Analogy between vectors and signals, Orthogonality, Mean square error  **UNIT-II**  **FOURIER SERIES**: Definition-Dirichlet’s conditions, classification of Fourier Series, properties of Fourier Series. | |

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|  | **UNIT III**  **FOURIER TRANSFORM:** Existence of Fourier Transform- Properties of Fourier Transform-Inverse Fourier Transforms, Parseval’s Theorem of Energy and Power signals, Energy, Power, Periodicity of signals, Power and Energy Spectral Densities, Auto and Cross correlation of signals.  **UNIT-IV**  **CONTINUOUS TIME SYSTEMS:** Classification of systems – Linearity and time invariance – Transmission of signals through LTI systems – Convolution – Impulse response – Frequency response of LTI Systems.  **UNIT-V**  **DISCRETE TIME SIGNALS AND SYSTEMS:** Unit impulse, step, ramp, and exponential signals – Periodicity of signals – Operations on signals – Linear Shift Invariant(LSI) system – Stability – Causality – Convolution and Correlation –Linear constant coefficient difference equation – Impulse response.  **UNIT-VI**  **DISCRETE TIME FOURIER TRANSFORM**: Definition of Discrete Time Fourier Transform – Properties – Transfer function – System analysis using DTFT. Ideal filters – Distortion less transmission – Bandwidth – Rise time – Hilbert transform – Pre and complex envelopes – Bandpass signals through band pass systems. |
| **Text Books and Reference Books** | **TEXT BOOKS:**   1. Signals & Systems : A Anand Kumar – PHI 2. Linear Systems and Signals : B.P.Lathi – Oxford University Press 3. Signals & Systems: P.Ramesh Babu-SP   **REFERENCE BOOKS:**   1. Signals &Systems :J.S.Chitode – Technical Publications. 2. Signals &Systems :A.V.Oppenhiem & A.S.Willsky with S.Hamid Nawab - PHI |
| **E- Resources** | https://nptel.ac.in/courses  https://iete-elan.ac.in  https://freevideolectures.com/university/iitm |