**20EC2103– SIGNALS AND SYSTEMS**

(**EEE**)

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| **Course category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 2 - 1 - 0 |
| **Pre-requisite:** | Knowledge of vectors, Trigonometry, Differentiation & Integration | **Sessional Evaluation :**  **External Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course**  **Objectives:** | Students undergoing this course are expected to learn: | |
| 1. The different types of Continuous Time Signals. 2. The Fourier series for periodic signals. 3. The Fourier Transform of various signals. 4. The analysis of different types of Continuous Time Systems. 5. The 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** | Analyze the signal in frequency domain by applying FT and its properties. |
| **CO4** | Establish the inter connections of LTI systems. |
| **CO5** | Know the operations on discrete time signals and its transformations. |
| **CO6** | Solve the difference equation and attain the solution using DTFT. |
| **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.  **UNIT III**  **FOURIER TRANSFORM:** Existence of Fourier Transform, Properties of Fourier Transform, Inverse Fourier Transforms, Parseval’s Theorem of Energy and Power signals, Auto and Cross correlation of signals, Power and Energy Spectral Densities,  **UNIT-IV**  **CONTINUOUS TIME SYSTEMS:** Classification of systems, LTI System, Transmission of signals through LTI systems, Convolution, Impulse response, Frequency response of LTI Systems, Distortion less transmission, Ideal filters, Band Width, Rise time, Hilbert transform, Pre and complex envelopes, Band pass signals through band pass 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, 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. | |
| **Text Books**  **&**  **Reference Books** | **Text Books:**   1. Signals &Systems :A.V.Oppenhiem & A.S.Willsky with S.HamidNawab – PHI 2. Linear Systems and Signals : B.P.Lathi – Oxford University Press 3. Signals & Systems : A Anand Kumar – PHI   **Reference Books:**   1. Signals &Systems :J.S.Chitode – Technical Publications 2. Signals & Systems: P.Ramesh Babu-SP | |
| **e-Resourses** | 1. https://nptel.ac.in/courses 2. https://iete-elan.ac.in 3. https://freevideolectures.com/university/iit | |