EE304: SIGNALS AND SYSTEMS
CREDITS = 5 (L=3, T=0, P=2)

Course Objectives:

The course aims to provide the student with:

1. The fundamental knowledge and representation of various types of signals and systems
2. The application of the signals to fundamental systems and obtain the mathematical equations Relating input and output signals.
3. Applications of the knowledge gained through the objectives 1 and 2 to investigate different Systems available and have a detailed knowledge about them from the angle of signals and systems.

Teaching and Assessment Scheme:

Teaching Scheme			Credit	Marks Distribution				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
3	0	2	5	ESE	CE	ESE	CE	150
				70	30	30	20	

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Introduction:** Basic definitions, Classification of signals and systems. Signal operations and properties. Basic continuous time signals, Some useful models of signals, Even and odd functions of signals, Discretization of continuous time signals, Basic properties of systems, System models, Frequency spectrum in signal and system analysis, Sampling and quantization of signals, Basic instruments associated with signals and systems study.	08
2	**Time Domain Analysis of Continuous Time Systems:** Impulse response characterization and convolution integral for CT- LTI, step and other causal signal responses of CT LTI system, Properties of convolution, LTI system response properties from impulse response, System analysis with linear differential equation model, and System representation in block diagram for simulation and analysis.	08

Unit No.	Topics	Teaching Hours
3	**Time Domain Analysis of Discrete Time Systems:** Classification of DT systems, Examples of DT systems, Impulse response characterization and convolution sum, Step and casual signal response to DT-LTI systems, Properties of convolution sum, DT-LTI system properties from impulse response, Analysis with linear differential equation model.	08
4	**System Analysis Using Fourier and Laplace Transform:** Representation of periodic functions, Fourier series, Frequency spectrum of aperiodic signals, Fourier Transform, Relation between Laplace Transform and Fourier Transform and its properties. Fundamentals of DFT and DTFT.	08
5	**Analysis of Discrete Time Systems Using Z Transform:** The z-Transform, Convergence of z-Transform, Basic z-Transform, Properties of z-Transform, Inverse z-Transform and Solving difference equation using z-Transform, DT LTI system characterization, Frequency response analysis of DT systems.	08
6	**State Variable Analysis of Continuous and Discrete Time Systems:** State variable fundamentals and basic definitions, State variable analysis of CT systems, Examples of state variables.	04
	TOTAL	**44**

Reference Books:

1. K. Gopalan, "Signals and Systems", 3rd Edition2011, Cengage Learning (India Edition),
2. B.P.Lathi, "Linear Systems and Signals", 2nd Edition , 2009, Oxford University Press
3. Anand Kumar,"Signal and Systems", 3rd Edition, Prentice Hall
4. Alan V. Oppenheim, Alan S. Wilsky and Nawab, "Signals and Systems" Prentice Hall
5. Michal J. Roberts and Govind Sharma, "Signals and Systems", Tata Mc-Graw Hill Publications
6. Charles L. Philips, J. M. Parr and E. A. Riskin, "Signal, Systems and Transforms", Pearson Education
7. Li Tan, Elsevier Digital Signal Processing Fundamentals and Applications, Academic Press
8. Simon Haykin and Bary Van Veen, "Signals and Systems", Wiley- India Publications

Course Outcomes (Cos):

After learning this course the students will be able to:
CO1. Identify various signals and represent them using mathematical tools.
CO2. Identify various systems and represent them using mathematical tools.
CO3. Establish relationship between signal input and output of a system.
CO4. Learn the mathematical tools associated with signal and system analysis.
CO5. Get introduced with the discrete time systems.
CO6. Find and relate the practical applications of various CT and DT signals and systems.