BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLGY & SCIENCE
(AUTONOMOUS)
(Approved by AICTE, Permanently Affiliated to JNTUK, Kakinada, Accredited by NAAC with 'A' Grade)
DEPARTMENTOFELECTRONICS AND COMMUNICATIONENGINEERING

BR23 B.TECH II YEAR SYLLABUS

II Year-I Semester					
		L	T	P	C
23ES3T03	SIGNALS AND SYSTEMS	3	0	0	3

Course Objectives:

- To study about signals and systems.
- To analyze the spectral characteristics of signal using Fourier series and Fourier transforms.
- To understand the characteristics of systems.
- To introduce the concept of sampling process
- To know various transform techniques to analyze the signals and systems.

UNIT- I: INTRODUCTION

Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time- scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions. Related problems.

UNIT–II: FOURIER SERIES AND FOURIER TRANSFORM

Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform, Related problems.

UNIT-III: ANALYSIS OF LINEAR SYSTEMS

Introduction, Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant(LTV)system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system, Related problems. Filter characteristics of linear systems. Distortion less transmission through a system, Signal band width, system band width, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT–IV: CORRELATION

Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between Convolution and correlation,

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Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

SAMPLING THEOREM: Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to B and Pass sampling, Related problems.

UNIT–V: LAPLACE TRANSFORMS:

Introduction, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Inverse Laplace transform, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

Z–TRANSFORMS: Concept of Z-Transform of a discrete sequence .Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z- transform, properties of Z-transforms. Distinction between Laplace, Fourier and Z- transforms.

TEXTBOOKS:

1. Signals, Systems & Communications-B.P.Lathi, BSPublications,2003.
2. Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn,1997
3. Signals & Systems-SimonHaykinandVanVeen,Wiley,2ndEdition,2007

REFERENCEBOOKS:

1. Principles of Linear Systems and Signals–BP Lathi, Oxford University Press,2015
2. Signals and Systems–TK Rawat, Oxford University press,2011
3. Signals and Systems-Anand Kumar, PHI 3rd edition 2015.

Online Learning Resources:

- http://nptel.ac.in/courses/117106114/
- https://www.tutorialspoint.com/signals_and_systems

Course Outcomes:

COs	Statements	BL
CO1	Differentiate the various classifications of signals and systems	BL2
CO2	AnalyzethefrequencydomainrepresentationofsignalsusingFourierconcepts	BL4
CO3	Classify the systems based on their properties and determine the response of LTI Systems.	BL2
CO4	Define the sampling process and various types of sampling techniques.	BL1
CO5	Apply Laplace and z-transforms to analyze signals and Systems (continuous & discrete).	BL3

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