

**B.E ELECTRONICS AND COMMUNICATION ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - VI****Signal Processing and Applications (3:0:0) 3**

(Common to ECE, ETE &amp; EEE Branches)

(Effective from the academic year 2021-22)

Course Code	<b>21EC653</b>	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	03

**Course Objectives:**

This course will enable students to:

1. Understand the fundamentals of signal processing.
2. Familiar with DSP techniques in frequency domain.
3. Use toolbox in the MATLAB software to write programs to perform various applications of signal processing.

**Module - 1**

**Introduction:** Introduction to Signal processing, significance and scope of signal processing in current scenario, industry applications, research and innovations related to signal processing, impact on course on societal problems.

**Classification of signals:** Classification of signals and operations of signals.

**System Classification and properties:** Linear-nonlinear, Time variant-invariant, causal-non causal, static-dynamic, stable- unstable, **invertible** **(9 Hours)**

**Module - 2**

**Analysis of LTI system in various domains:** Convolution sum & Integral definition with basic problems, Z transform definition with basic problems, Introduction to Fourier Transform & DTFT, Definition and basic problems. Sampling Theorem- Statement and

proof, converting the analog signal to a digital signal. Practical sampling. Applications

**(7 Hours)****Module - 3**

**Discrete Fourier Transforms (DFT):** Frequency domain sampling and Reconstruction of Discrete Time Signals, The Discrete Fourier Transform, properties (no proof) and basic problems

**Fast-Fourier-Transform (FFT) algorithms:** Radix-2 FFT algorithms for the computation of DFT decimation-in-time algorithms.

Application

**(7 Hours)****Module - 4****Digital Filter Design:**

Frequency response of ideal analog filters, Salient features of Butterworth filters, Design and implementation of Analog Butterworth filters to meet given specifications.

Design of FIR Filters using the Window technique: rectangular, hamming and the frequency sampling technique to meet given specifications. Applications

**(8 Hours)****Module - 5**

**Applications of signal processing:**

Introduction to image, bio medical signals. Case study on image, bio medical signal processing applications using MATLAB.

**Summary of the Course:** This course provides basic signal processing techniques in various domains and applications using MATLAB. **(9 Hours)**

**Course Outcomes:** The students will be able to:

**CO1: Apply** the knowledge of digital signal processing to find DFT's of various signals .

**CO2: Design** various digital filters.

**CO3: Interpret** the given case study material related to different operations and properties of signals and systems in various domains.

**CO4: Demonstrate** in team simple projects of Signal processing applications with ideas

**Textbooks/Reference:**

Title & Edition	Author	Publisher	Year of Publication	Text / Reference
Signals and System 2 <sup>nd</sup> Edition	Simon Haykins and Barry Van Veen	Wiley India	2008	Text
Proakis & Monalakis, 4th Edition	Digital signal processing Principles Algorithms & Applications	Pearson education, New Delhi	2007	Text
Digital Image Processing	Ayaraman, S.Esakkirajan, T.Veerakumar,	Tata Mc GrawHill		Reference
Biomedical Signal and Image Processing,  Second edition	Kayvan Najarian , Robert Splinter	CRC Press, Taylor & Francis Group, LLC	2012	Reference

**COs and POs Mapping**

COs	PO's											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1												
CO2		2										
CO3			3									
CO4					3					2		2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped