

**LECTURE PLAN (Monsoon, 2022 - 2023)**

**DIGITAL SIGNAL PROCESSING (Course Code: ECC 302)**

**(for V Sem B.TECH – ECE)**

**(LTP: 3 - 0 - 0)**

<u>Sl No.</u>	<u>Topic</u>	No. of lectures
1.	<b>Introduction to Sampling, Discrete-time Signals in time domain:</b> Typical signals, Energy/power signals, causal/non-causal signals. <b>Discrete-time-systems in time domain:</b> Time domain characteristics of LTI systems, Step/impulse response, stability of systems, FIR and IIR systems.	4
2.	<b>Discrete-time-signals in frequency domain:</b> DTFT, DFS, DFT, Basics of FFT, Linear/Circular convolution using DFT, Z transform,	6
3.	<b>Sampling of Continuous-time signals:</b> frequency-domain representation of Sampling, reconstruction of bandlimited signal from its samples, Discrete-time processing of continuous-time signals, Sampling rate changes- Upsampling and downsampling.	3
4.	<b>LTI DTS in frequency domain:</b> transfer functions, frequency response, simple digital filters, all-pass functions	5
5.	<b>Digital Filter structures:</b> Direct, parallel, cascade, ladder and lattice for IIR, possible realizations for FIR including polyphase, All pass structures	5
6.	<b>IIR Digital Filter Design:</b> Bilinear transformation method, Design of lowpass, High pass and Band-pass IIR Digital filters, Spectral transformation of IIR filters	5
7.	<b>FIR Digital Filter Design:</b> FIR design using windowing, Equiripple Linear phase FIR Filters, Design of minimum phase FIR filters.	5
8.	<b>Multirate Signal Processing Fundamentals:</b> Multi stage design of Decimator and Interpolator, The polyphase decomposition, Arbitrary-rate sampling rate converter.	3
9.	<b>Finite Word Length Effects: sampling and reconstruction:</b> analysis of quantization errors in A-to-D conversion, effects of coefficient quantization and round-off noise in digital filters.	3
	<b>Total</b>	<b>39</b>

Text Books :

1. Digital Signal Processing 4<sup>th</sup> ed.– *S K Mitra*

Reference Book:

- I. Discrete-time Signal Processing: 2<sup>nd</sup> ed. *A. V. Oppenheim, R. Schaffer and J.R. Buck*
- II. Schaum's Outlines on Digital Signal Processing – *M H Hayes* (Adapted by : *S Bhattacharya*)