B. P. Poddar Institute of Management & Technology
Department of Electrical Engineering

LESSON PLAN
2025-26

Program : B.Tech Electrical Engineering **Credit: 3**
Contact: 3 hours/Week.
Course Name : Digital Signal Processing
Course Code : OE EE601A

Lectures Number	Topics Covered	Text Books / Reference	Teaching Aids/Methodologies
L1	Discrete time signals and systems: Sequences; representation of signals on orthogonal basis;	T2,R7 W3 W4,	Lecturing Green Glass board, Chalk
L2	Explain the concept of Signal, continuous time signal,the basic idea of sampling, concept of ideal sampler ,the process of synthesis of Discrete time Signal, formation of Digital Signal from Discrete time signal	T2,R7,W3 W4,	Lecturing Green Glass board, Chalk
L3	Sampling and reconstruction of signals - Sampling theorem and Nyquist rate. Aliasing	T2,R7 W3,W4	Lecturing Green Glass board, Chalk
L4	Sequences,-periodic, energy, power, unit-sample, unit step, unit ramp & complex exponentials	T2,R7 W4	PPT ,Green Glass board, Chalk
L5	Classification of discrete time signals	T2,R7 W3 W4	PPTGreen Glass board, Chalk
L6	Classification of Discrete time systems, Stability and causality conditions, recursive and non recursive systems., linear nonlinear, Time invariant Time varying	T2,R7 W4	Lecturing Green Glass board, Chalk
L7	Representation of discrete systems using difference equations, Explain the concept of Impulse response,Derivation of output sequence,	T2,R7 W4	Lecturing Green Glass board, Chalk

L8	Conceptualize the Convolution Process Properties of convolution, interconnection of LTI systems with physical interpretations,	T2,R7 W4	
L9	Z-Transform, Region of convergence, Z-Transforms: Definition, mapping between s-plane & z-plane, unit circle, convergence and ROC	T1, T2,R2,R3, W1	PPT,Green Glass board, Chalk
L10	Analysis of Linear Shift Invariant systems using z-transform,	T1, T2,R2,R3, W1	Lecturing Green Glass board, Chalk
L11	Properties of z-transform for causal signals,	T1, T2,R2,R3, W1	Lecturing Green Glass board, Chal
L12	Interpretation of stability in z-domain,Initial value theorem, Perseval's relation,	T1, T2,R2,R3, W1	Lecturing Green Glass board, Chal
L13	Inverse z- transforms by Power series & partial-fraction expansions with examples and exercises..	T1, T2,R2,R3, W1	Lecturing Green Glass board, Chalk
L14	Inverse z- transforms.	T1, T2,R2,R3, W1	Lecturing Green Glass board, Chalk
L15	Discrete Time Fourier Transform(DTFT): Concept of frequency in discrete and continuous domain and their relationship (radian and radian/sec),	T1, T2,R2,R3, W1	PPT, Lecturing Green Glass board, Chalk
L16	Freq. response in the discrete domain. Discrete system's response to sinusoidal/complex inputs (DTFT),	T1, T2,R2,R3, W1	Lecturing Green Glass board, Chalk
L17	Discrete Fourier Transform (DFT), Properties of DFT,	T1, T2,R2,R3, W1	Lecturing Green Glass board, Chalk
L18	Discrete Fourier Transform: Concept and relations for DFT/IDFT	T1, T2,R2,R3, W1	Lecturing Green Glass board, Chalk
L19	Relation between DTFT & DFT. Twiddle factors and their properties,	T1, T2,R2,R3, W1	Lecturing Green Glass board, Chalk
L20	Computational burden on direct DFT, DFT/DFT as linear transformation, DFT/IDFT matrices, Fast Fourier Transform Algorithm,	T1, T2,R2,R3, W1	PPT, Green Glass board, Chalk

L21	Different FFT techniques	T1, T2,R2,R3, W1	PPT
L22	Computation of circular convolution by graphical, DFT/IDFT and matrix methods,	T1, T2,R2,R3, W1	PPT
L23	Parseval's Identity, Implementation of DiscreteTimeSystems.	T1, T2,R2,R3, W1	Green Glass board, Chalk
L24	Sectionalized Convolution, Overlap Add & Save method	T1,T2,R2, R3	PPT, Green Glass board, Chalk
L25	Design of Digital filters: Design of IIR Digital Filters: Butterworth, Approximations;	T1,T2,R2, R3	Lecturing, Green Glass board, Chalk
L26	Chebyshev and Elliptic Approximations;	T1,T2,R2, R3	Lecturing, Green Glass board, Chalk
L27	Low-pass, Band-pass, Bandstop and Highpass filters.	T1,T2,R2, R3	Lecturing,PPT Green Glass board, Chalk
L28	Different analog to digital filter transformation techniques Impulse invariant	T1,T2,R2, R3	Lecturing,PPT Green Glass board, Chalk
L29	Backward diffrence, Matched Ztransform, Bilinear transformation	T1,T2,R2, R3	Lecturing, PPTGreen Glass board, Chalk
L30	Numerical Problem on Design of Filters	T1,T2,R2, R3	Green Glass board, Chalk
L31	Design of FIR Digital filters: Window method, Rectangular, Hamming and Blackman windows.	T1,T2,R2, R3	Green Glass board, Chalk
L32	Numerical problems , FIR filters design of linear phase FIR filters no. of taps,	T1,T2,R2, R3	Green Glass board, Chalk
L33	Design of FIR Digital filters: Park-McClellan's method.	T1,T2,R2, R3	Lecturing,PPT Green Glass board, Chalk
L34	Effect of finite register length in FIR filter design.	T1,T2,R2, R3	Lecturing,PPT Green Glass board, Chalk
L35	Parametric and non-parametric spectral estimation. Introduction to multi-rate signal processing	T1,T2,R2, R3	Lecturing,PPT Green Glass board, Chalk

L36	Applications of Digital Signal Processing: Correlation,	T1,T2,R2, R3	Lecturing,PPT Green Glass board, Chalk
L37	Functions and Power Spectra, Stationary Processes,	T1,T2,R2, R3	Lecturing,PPT Green Glass board, Chalk
L38	Optimal filtering using ARMA Model,	T2, R1,	Lecturing,PPT Green Glass board, Chalk
L39	Linear Mean-Square Estimation,	T2, R1,	Lecturing,PPT Green Glass board, Chalk
L40	Wiener Filter.	T2, R1,	Lecturing,PPT Green Glass board, Chalk

Text Books:

T1. Digital Signal Processing-A computer based approach, S. Mitra, TMH 06

T2. Digital Signal Processing: Principles, Algorithms & Application, J.C. Proakis & M.G. Manslakis, PHI

T3. Fundamental of Digital Signal Processing using MATLAB , Robert J. Schilling, S.L. Harris, Cengage Learning.

Reference books

R1. Digital Signal Processing, Chen, OUP

R2. Digital Signal Processing, Johnson, PHI

R3. Digital Signal Processing using MATLAB, Ingle, Vikas.

R4. Digital Signal Processing, Ifeachor, Pearson Education.

R5. Digital Signal Processing, A.V. Oppenhein & R.W. Shaffer, PHI

R6. Theory and application of Digital Signal Processing, L.R. Rabiner & B. Gold, PHI

R7. Digital Signal Processing, Ashok Ambarder, Cengage Learning.

Web References:

W1. https://www.youtube.com/watch?v=rkvEM5Y3N60
W2. https://www.youtube.com/watch?v=6dFnpz_AEyA
W3. https://www.youtube.com/watch?v=p8cina5Ke_c
W4. https://www.youtube.com/watch?v=8zbBJkw5KsM