**Lesson Plan**

**Name of faculty: SUNIL KUMAR DAHIYA, AP-ECE**

**Discipline: ECE**

**Semester: 6th Sem**

**Subject: Digital Signal Processing (ECE-302N & ECE-310N)**

Lesson Plan Duration: 15 weeks (from January 2020 to May 2020)

Work Load (Lecture/Practical) per week (in hours): Lectures: 03 hours, Tutorials: 02 hours; Practical: 09 hours.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Week** | **Theory (ECE-302N)** | | **Practical (ECE-310N)** | |
|  | **Lecture day** | **Topic (Including assignment/ test)** | **Practical day** | **Topic** |
| 1st |  | Z- transform and its properties | 1 | Introduction to MATLAB |
|  | Z- transform and its properties |  |  |
|  | Inversion of Z-transform |  |  |
| 2nd |  | One sided Z-transform and  solution of differential equations | 2 | Write a program to plot the Sine wave, cosine wave and Tangent wave |
|  | One sided Z-transform and  solution of differential equations |  |  |
|  | Analysis of LTI systems in Z-domain, causality, stability, schur-cohn stability  test |  |  |
| 3rd |  | Analysis of LTI systems in Z-domain, causality, stability, schur-cohn stability  test | 3 | Write a program to plot the following functions: a) impulse function b) unit step c) unit ramp d) exponential e) sinusoidal |
|  | Relationship between Z-transform and Fourier transform |  |  |
|  | All pass filters |  |  |
| 4th |  | minimum-phase, maximum-phase and mixed-phase systems | 4 | Write a program to plot the convolution and multiplication of two signals. |
|  | minimum-phase, maximum-phase and mixed-phase systems |  |  |
|  | Goertzel algorithm |  |  |
| 5th |  | Chirp Z-transform | 5 | Define a function to compute DTFT of a finite length signal. Plot the magnitude and phase plots using subplots |
|  | Properties of DFT |  |  |
|  | Linear filtering using DFT |  |  |
| 6th |  | Frequency analysis  of signals using DFT | 6 | Verify the Symmetry, time shifting and modulating properties of DTFT with a rectangular  pulse. |
|  | radix 2, radix-4, |  |  |
|  | computation of DFT of real sequences |  |  |
| 7th |  | Direct form, cascade form | 7 | Study the aliasing effect by using a Sinusoidal Signal. Show the plots of' continuous time  Signal. Sampled Signal and reconstructed signals by using subplot |
|  | frequency sampling and lattice  structures for FIR systems |  |  |
|  | Direct forms, transposed form |  |  |
| 8th |  | cascade form parallel form | 8 | Write a program to plot real, imaginary phase and magnitude of exponential function |
|  | Lattice and lattice  ladder structures for IIR systems |  |  |
|  | Lattice and lattice  ladder structures for IIR systems |  |  |
| 9th |  | Characteristics of practical frequency selective filters | 9 | Study different window functions available in signal processing |
|  | Filters design specifications  peak pass band ripple |  |  |
|  | minimum stop band attenuation |  |  |
| 10th |  | Four types of FIR filters | 10 | Verify the properties of Discrete Fourier Transform (DFT). |
|  | alternation theorem |  |  |
|  | Design of FIR filters using windows |  |  |
| 11th |  | Kaiser window method comparison of design methods for FIR  filters, | 11 | Write a program to find the convolution of two sequences using in built convolution function. |
|  | Kaiser window method comparison of design methods for FIR  filters, |  |  |
|  | Gibbs phenomenon |  |  |
| 12th |  | design of FIR filters by frequency sampling method | 12 | Write a program to study the frequency shift property of DTFT. |
|  | design of FIR filters by frequency sampling method |  |  |
|  | design of optimum equi-ripple  FIR filters |  |  |
| 13th |  | Design of IIR filters from analog filters | 13 | Write a program to study circular shift property of DTFT. |
|  | Design of IIR filters from analog filters |  |  |
|  | Design by approximation of derivatives |  |  |
| 14th |  | Impulse Invariance Method | 14 | Write a program to study scaling property of DFT. |
|  | Bilinear Transformation Method |  |  |
|  | Least Square Methods |  |  |
| 15th |  | Characteristics of Butterworth, Chebyshev and Elliptical analog filters | 15 | Write a program to study the sampling theorem of a continuous time signal. |
|  | Design of IIR filters,  Frequency transformation | 16 | Write a program to study the Z-Transform. |
|  | design of IIR filters in frequency domain. | 17 | Write a program to study the various Properties of Z-Transform. |