Vidyalankar

T.E. Sem. VI [ETRX]

Discrete Time Signals and Systems

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

1. **Discrete Time (DT) Signals & Systems :**
   Signal classification manipulation; Signal Periodicity in DT domain; Concept of system and System classification; System representation as a difference equation; Impulse Response; Finite Impulse Response (FIR) & Infinite Impulse; Response (IIR) systems; Convolution and its properties auto correlation and cross correlation with its properties; BIBO stability condition.

2. **Z Transform :**
   Two–sided Z Transform and Region of Convergence (ROC); Properties of Z Transform and derivations; Relationship with Laplace Transform & mapping; One–sided Z Transform; Inverse Z Transform.

3. **D.T. System Analysis using Z Transform :**
   System Transfer function & Impulse response, pole zero plot; BIBO stability and ROC; Solution of a difference equation; Zero input & zero state responses; Frequency response using Analytical & graphical techniques; Polo zero plot and filter type for first and second order systems; System classification based on phase response as Minimum phase, maximum phase, mixed phase or linear phase systems.

4. **DT Signal Analysis & Computation of Spectra :**
   DTFS definitions from orthogonal complex exponentials; CTFS & DTFS and Properties of DTFS; Power Density spectrum; DTFT and Properties of DTFT; Energy Density spectrum; Relationship between DTFT & Z transform.

5. **Discrete Fourier Transform (DFT) :**
   DFT and comparison with other transforms; DFT Properties; Circular convolution; Block convolution using DFT by Overlap–add & Overlap save methods; Fast Fourier Transform (FFT) by radix 2 and radix 3 and radix 4 techniques; Decimation in Time; Decimation in frequency with development of flow graphs; DFT analysis of Sinusoidal signals; Goertzel algorithm; Comparison of complex and real, multiplication and additions of DFT and FFT; DFT computation by Divide and conquer approach Limitations of DFT; Applications of FFT.

6. **DSP Processors and application of DSP :**
   Need for Special architecture of DSP processor; Difference between DSP processor & microprocessor; Fixed point and floating point processors; A general DSP processor (TMS320C54XX series), TMS6713 and Da–vinci. Application of DSP to speech, image, biomedical and radar processing.

Reference :

1. Digital Signal Processing (*Ashok Ambardar*) Cengeg Learning Publication.
2. Digital Signal Processing : Principles, Algorithms and applications (*J.G. Proakis, D.G. Manolakis*) Prentice Hall of India, 1995.
3. (*A.V. Oppenheim, Ronald W Schafer*) Prentice Hall, 1983.
4. Digital Signal Processing A Practical approach, (*E.C. Ifeachor and B.W. Jervis*) Pearson Publication.
5. Digital Signal Processors, Architecture, Programming (*B. Venkata Ramani and M. Bhaskar*) TMH, 2004.
6. Digital Signal Processing (*S.K. Mitra*) Tata McGraw Hill Publication, 2001.
7. Linear Systems & Signals (*B.P. Lathi*) Oxform University Press (2nd Indian Impression − 2007)
8. Digital Signal Processors, Architecture, Programming (*B. Venkata Ramani & M. Bhaskar*) TMH 2004.
9. Learning with Lab View 7 Express (*R.H. Bishop*) Pearson Education.
10. Virtual Instrumentation using Labview (*Gupta*) Tata McGraw Hill Publication.
11. Digital Signal Processing (*Chi-tsong Chen*) Oxford University Press.

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