	2
Z- Tranform: Defination and properties, inverse Z-Tranform, The transfer function	5
Digital Filter Structure: Block diagram representation, FIR , IIR filter, Allpass filter, Tunable IIR Digital filter, Digital Sin-Cosine generator. Computational complexity.	7
FIR Digital Filter Design: Prelimnary considerations, FIR Design based on windowed FS, Design of minimum phase.	7
DSP Algorithm implementaion: Stucture simulation, Computation of DFT, DFT & IDFT using MATAB, Sliding DFT, Number represenation, Handling verflow, Tunable digital filters.	8
Application od Digital Signal Processing: Dual tone multifrequency tone signal Detection, Spectral analysis of sinusoidal Signal, nonstationary signal, random signal, Musical sound processing, Signal compression, Transmultiplexers.	6

Tutorials:
1. History of Fourier Transform.
2. Understanding Speech Spectral Analysis Problem.
3. Understanding FFT.
4. Study of TMS Series of processors.
5. MALAB program for generation of complex exponential sequence.

Reference books:

1. Sanjit K Mitra, Digital Signal Processing: A computer Based Approach
2. Discrete Time Signal Processing, Steven A. Tretter, Wiley(1976),
3. Digital Signal Processing, Johnny Johnson, PHI.
4. Digital Signal Processing, Prokis, PHI.
5. Boaz Porat, "A course in Digital signal Processing" First Edition, John Wiley & Sons 1996

ELD202: DIGITAL SIGNAL PROCESSING

Students have to design the following experiments in Matlab and Simulink and plot the characteristics of the signal processing system under design.

1.	Filters	8
	a. Lp norm	
	b. Ensemble averaging Filters	
	c. Exponential moving average systems	
	d. Median filter	
	e. FIR	
2.	Demonstration of aliasing effect.	5
3.	Oscillators	1
	a. Design using Van der Pol's equation	0
	b. Lorentz oscillators systems	
	c. Gaussian oscillators systems	
4.	FFT	
5.	Image processing	5
	a. Interpolations	1
	b. Pattern recognition using PCA	5
6.	Simulink	

a. Transfer function design and study for impulse and finite sequence.
b. Convolution 10

ELD301: DIGITAL SYSTEMS DESIGNS WITH HDL

Introduction: About Digital Design, Analog versus Digital, Electronic Aspects of Digital Design, PLD's, ASIC, Digital Design level. 03

Digital Concept and Number System: General Positional number system conversions, Operation, BCD, Gray Code, Character Codes, Codes for Actions, Conditions, and States n-Cubes and Distance, Codes for Detecting and Correcting Errors, Error-Detecting Codes, Error-Correcting and Multiple-Error-Detecting Codes, Hamming Codes, CRC Codes, Two-Dimensional Codes, Checksum Codes, m-out-of-n Codes, Codes for Serial Data Transmission and Storage, Parallel and Serial Data, Serial Line Codes,

COMBINATIONAL LOGIC DESIGN PRINCIPLES: Switching Algebra, Combinational-Circuit Analysis, Combinational-Circuit Synthesis, and Timing Hazards. 12

HARDWARE DESCRIPTION LANGUAGES: HDL-Based Digital Design, ABEL Hardware Description Language, The VHDL Hardware Description Language, The Verilog Hardware Description Language, 05

COMBINATIONAL LOGIC DESIGN PRACTICES: Documentation Standards, Circuit Timing, Combinational PLDs , Decoders , Encoders , Three-State Devices , Multiplexers , Exclusive-OR Gates and Parity Circuits , Comparators , Adders, Subtractors, and ALUs , Combinational Multipliers . 06

SEQUENTIAL LOGIC DESIGN PRINCIPLES & PRACTICES: Bistable Elements, Latches and Flip-Flops, Clocked Synchronous State-Machine Analysis, Clocked Synchronous State-Machine Design, Designing State Machines Using State Diagrams, State-Machine Synthesis Using Transition Lists, Another State-Machine Design Example, Decomposing State Machines, Feedback Sequential-Circuit Analysis, Feedback Sequential-Circuit Design, ABEL Sequential-Circuit Design Features ,Sequential-Circuit Design with VHDL , Sequential-Circuit Design with Verilog, Sequential-Circuit Documentation Standards , Latches and Flip-Flops ,Sequential PLDs , Counters, Shift Registers, Iterative versus Sequential Circuits , Synchronous Design Methodology , Impediments to Synchronous Design , Synchronizer Failure and Metastability 08

MEMORY, CPLDS, AND FPGAS

Read-Only Memory, Read/Write Memory, Static RAM, Dynamic RAM, Complex Programmable Logic Devices, Field-Programmable Gate Arrays

Tutorials:

1. Design flow for the simple microprocessor in HDL 1
2. Study and compares types of RAMS. 2
3. Design of GRAY code circuit.
4. Study of ALTERA PLD's
5. Study of XYLINX PLD's.
6. Studying WEB Pack Xylynx tool. 06

Reference Books: 6

1. Digital Design Principles and Practices, by John F. Wakerly, Prentice Hall's Fourth Edition.
2. Digital Logic Applications & Designs by John M. Yarbough, CWS Publishing Co. Division of Thomson Learning,
3. Giovanni De Micheli, "Synthesis and Optimization of Digital Circuits," Tata McGraw-Hill, 2003.
4. Srinivas Devadas, Abhijit Ghosh, and Kurt Keutzer, "Logic Synthesis," McGraw-Hill, USA,