Department of Physics
Osmania University
Hyderabad

Scheme of instructions and syllabus
(Choice Based Credit System)
of

M.Sc. Electronics

(Offered at affiliated colleges)

With effect from: 2016-2017

Department of Physics, Osmania University, Hyderabad
M.Sc. Electronics
(Offered at affiliated colleges)
Scheme of instructions and syllabus under Choice Based Credit System
(With effect from : 2016-2017)

Semester - I

S.No.	Subject code	Subject	Teaching Hours	Credits	Marks
1	Core- E-101	Mathematical Physics and Circuit Analysis	4	4	100
2	Core- E-102	EM Theory and Transmission Lines	4	4	100
3	Core- E-103	Digital System Design	4	4	100
4	Core- E-104	C-Programming & Mat lab	4	4	100
5	Practical-P-101	Circuit Analysis Lab	4	2	100
6	Practical-P-102	Communication Lab	4	2	100
7	Practical-P-103	Digital Lab	4	2	100
8	Practical-P-104	Computer Lab	4	2	100
	TOTAL		32	24	800

Semester - II

S.No.	Subject code	Subject	Teaching Hours	Credits	Marks
1	Core- E-201	Microwave Systems and Antennas	4	4	100
2	Core- E-202	Feedback Control Systems	4	4	100
3	Core- E-203	Microprocessors and Interfacing	4	4	100
4	Core- E-204	Digital Signal Processing and Processors	4	4	100
5	Practical-P-201	Microwave Lab	4	2	100
6	Practical-P-202	Control System Lab	4	2	100
7	Practical-P-203	Microprocessor Lab	4	2	100
8	Practical-P-204	DSP-Lab	4	2	100
	TOTAL		32	24	800

Note : 20% of marks in each theory paper are allotted for internal assessment

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Semester - III

S.No.	Subject code	Subject	Teaching Hours	Credits	Marks
1	Core/Common- E-301	Digital System Design using VHDL	4	4	100
2	Core/Common- E-302	Embedded Systems and Applications	4	4	100
3	E-303	Data Communications	4	4	100
4	E-304	i. Microwave integrated circuits ii. Embedded 'C' and RTOS	4	4	100
5	Practical-P-301E	Lab- 1: VHDL Lab	4	2	100
6	Practical-P-302E	Lab-2: Embedded System Lab	4	2	100
7	Practical-P-303E	Lab-3 : Microwave integrated circuits	4	2	100
8	Practical-P-304E	Lab-4 : Embedded 'C' and RTOS	4	2	100
	TOTAL		32	24	800

Semester - IV

S.No.	Subject code	Subject	Teaching Hours	Credits	Marks
1	Core/Common- E-401	VLSI Design	4	4	100
2	Core/Common- E-402	Electronic Instrumentation	4	4	100
3	Elective -I , E-403	i. Fiber Optic Communications ii. ARM Programming and Embedded Communication Protocols	4	4	100
4	Practical-P-401E	Lab-1: VLSI -Lab	4	2	100
5	Practical-P-402E	Lab-2: Instrumentation-Lab	4	2	100
6	Practical-P-403E	Lab-3: Fiber optics Lab	4	2	100
7	Practical -P404E	Lab-4: ARM Programming Lab	4	2	100
8	Project work			4	100
	TOTAL			24	800

Note : 20% of marks in each theory paper are allotted for internal assessment

Total Credits: 96

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Semester – I

Paper –I (Core- E-101) : Mathematical Physics and Circuit Analysis

Unit – I: Differential equations & Spectral analysis: Power series solution for a differential equation – Legendary's differential equation and its solution – Legendry Polynomials — Generating function – Recurrence relations – Beta and Gamma functions and their properties - Bessel differential equation and its solutions – Bessel functions of first and second kind- generating functions

Spectral Analysis : Introduction to the concept of signals in time and frequency domains - Fourier series, The sampling function, response of a linear system, normalized power, normalized power in a Fourier expansion, power spectral density, effect of transfer function on power spectral density.

Unit – II: The Fourier transform - Properties of Fourier Transforms, examples of Fourier transforms, convolution and circuit response in time domain - Parseval's theorem power energy transfer through a network, band limiting of waveforms, power and cross correlation, auto correlation, auto correlation of a periodic waveform, auto correlation of a non-periodic waveform of finite energy, auto correlation of other waveforms - expansion in orthogonal functions, completeness of an orthogonal set.

The Fourier series - The Gram-Schmitt Procedure, correspondence between signals and vectors, distinguish ability of signals.

Unit – III: LF Circuit analysis - I

Introduction – **Laplace Transformation** – basic theorems – examples of solution by Laplace transformation method – partial fraction expansion - examples - Analysis of LC, RC, RL and RLC circuits using Laplace transforms. Unit step, shifted unit step, Ramp and Impulse functions –Waveform synthesis – convolution integral.

Concept of complex frequency - Transform impedance and transform circuits – network functions for the one port and two port networks – poles and zeros of network functions – restrictions on pole-zero locations for driving point functions and transfer functions – time domain behavior from pole zero plot – examples.

Unit –IV: RF & MW Circuit analysis – I

Single and Multi port Networks : Introduction – Basic definitions – Matrix representation of Pi-network – Low-frequency hybrid network description of a BJT – Internal resistance and current gain of BJT based on h-parameters – Interconnecting networks – parallel connection of networks – cascading networks – ABCD representation – ABCD network representation of an impedance element – ABCD matrix computation of a T-network – ABCD-matrix

coefficient computation of a transmission line section. Network properties and applications – Inter relations between Parameter Sets – Analysis of Microwave amplifier.

Scattering Parameters– definition – meaning of S-Parameters – Determination of a T-network elements – Chain Scattering matrix – conversion between Z- and S-parameters.

Signal flow chart modeling– flow chart analysis of a dual port network – Generalization of S- parameters – Input impedance computation of a Transmission line using signal flow chart – Practical measurement of S-parameters.

Recommended Books

1. Applied Mathematics for Engineers and Physicists – Louis Pipes and RA.Rarvill, (Mc Graw Hill)
2. Mathematical Physics –Satya Prakash (Kedarnath&Ramnath& Co) '95
3. Network Analysis – (7^{th} , 8^{th} 9^{th} and 10^{th} chapters) Van Valkenberg)
4. Electronic communication systems – Kennedy and Davis Tata Mc Graw Hill
5. Principles of communication systems – H. Taub and D.L. Shilling (Tata Mc Graw Hill), ,1991.
6. An Introduction to analog and digital communications – Simon Haykin (PHI)
7. Communications Systems – B.P. Lathi. (Wiley Eastern Ltd.)
8. Electronic communication systems – Roody and coolean
9. RF circuit Design – Theory and Application by Reinhold Ludwig & Pavel Bretchko – (Pearson Education Asia.)

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Semester – I

Paper – II (Core- E-102) : EM Theory and Transmission Lines

Unit – I : Electromagnetic waves

Techniques for calculating potentials- Poisson and Laplace equations – multi-pole expansion of the energy of a system of charges in an electrostatic field- vector potential – Magnetic scalar potential. Introduction to **Maxwell's equations** – displacement current – derivation of Maxwell's equations- Maxwell's equations

Propagation of EM waves in bounded media – Reflection and Refraction of EM waves at the interface of non-conducting media – Fresnel's relations, total internal reflection.

Radiation of EM waves: Inhomogeneous wave equation for potentials, retarded potentials, long wavelength approximation electric dipole radiation – magnetic dipole and electric quadru-pole radiation.

Unit – II

Introduction – Frequency spectrum – RF behavior of passive components – HF resistors, capacitors and inductors – chip components – surface mounted inductors.

Transmission Lines: Examples of transmission lines – two wire lines-Coaxial lines – Microstrip lines. Equivalent circuit representation – **General transmission line equation** – Traveling voltage and current waves – Characteristic Impedance –loss less transmission.

microstrip transmission lines – terminated lossless transmission line – voltage reflection coefficient – propagation constant and phase velocity – standing waves – Special termination conditions – Input impedance of a lossless line- short circuit transmission line.

quarter wave transmission line – sourced and loaded transmission line- power considerations for a transmission line – input impedance matching – return loss and insertion loss.

Unit III

Strip lines : basic parameters, phase constant, characteristic impedance, effective dielectric constant, quality factor.

Some varieties of strip lines, parallel strip lines, coplanar strip lines, shielded strip lines. Variation of the characteristic impedance with frequency.

Losses in micro strip lines - die electric loss, ohmic losses and radiation losses. Example calculations.

Microwave Integrated Circuit Design: Introduction, Microwave Integrated Circuits, MIC Materials, Types of MICs, Hybrid Versus Monolithic MICs, and Chip Mathematics.

Unit - IV

Smith Chart and Applications : From reflection coefficient to load impedance – normalized impedance equation – parametric reflection coefficient equation – graphical representation –

impedance transformation – special transformation conditions – short circuit transformations – admittance transformations.

Parallel and series connections – Parallel connection of R and L elements – parallel connections of R and C elements – Series connection of R and L elements – Series connection of R and C elements – example of a T- network .

Recommended Books

1. Electromagnetic – Kraus - 4th edition McGraw Hill
2. Introduction to electrodynamics – D.J. Griffiths, (PHI)
3. Electronic communications – D. Roddy & J. Coolen 4th edition (PHI)
4. Electronic communication systems – Kennedy & Davis – 11th Chapter for Unit IV
5. Electromagnetic_ Jordan and Balman
6. Electromagnetic by J.A.Edminister (MGH)
7. Electromagnetic waves by R.K.Shev Gaonkar.1st edition (MGH)
8. R.F. Circuit Design - Theory and Applications - Reinhold Ludwig & Pavel Bretchko - Pearson Education Asia
9. Networks lines and fields – Ryder
10. Secrets of RF circuit design by Carr 3rd edition 2002 (MGH)
11. Fundamentals of microwave engineering by R.E.Collin

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Semester – I

Paper – III (Core- E– 103) : Digital System Design

Unit –I

Binary System and Boolean Algebra & Functions: Number System, Signed Number Representation, Binary Codes. Boolean algebra - Basic theorems and functions, Digital Logic Gates and Integrated Circuits (Detailed Explanation of Logic Families & Technologies).

Gate Level Minimization: Canonical Equations (SOP & POS), Simplifications of **2 to 6** Variable Boolean functions - using Boolean Identities, Karnaugh Map, Tabulation Method's (Including Concept of Implicants), NAND and NOR implementation, Multi-Level Implementations, Ex-OR Functions.

Unit – II

Combinational and Sequential Logic Design: Combinational Logic Circuits – Adders, Subtractor, Code conversion, Decimal & Binary Adders, Subtractors, Magnitude Comparators, Decoders, Encoders, MUXs and De-MUXs.

Synchronous Sequential Circuits: Latches, Flip – Flop Analysis (Character Equation, Table & Excitation Tables). Analysis & Designing of Synchronous Sequential Circuits (State Reduction and Assignments)

Asynchronous Sequential Circuits: Analysis & Designing of Asynchronous Sequential Circuits (State Reduction and Assignments), Circuit with Latches, Race – Free Assignments and Hazards.

Unit – III

Memory and PLD Devices: Introduction, PLD Notation, Gate Array (AND & OR).
Combinational PLDs – ROM, PLA, PAL, GAL, CPLD (XC9500) and FPGA (XC4000).
Introduction to Hardware Description Languages– ABEL, VHDL, Verilog, CUPL .

Unit – IV

Counters and Algorithms: Designing of Synchronous & Asynchronous Counters. **Registers** – with parallel load and Sequential logic implementation.**Shift Registers** – Serial Transfer, Serial addition and Bidirectional transfer with parallel load. Timing sequences. **Algorithmic State Machines** – ASM charts, Timing and control implementation, Design with MUXs, PLA Control.

Recommended Books

1. Digital Design – By M. Morris Mano, 2nd Ed., PHI, 2000
2. Switching theory & Logic design - By R.P.Jain, TMH, 2003

3. Digital Design – By John F Wakerly, 4th Ed., PHI, 2006
4. Digital Principles & Design - By Donald D. Givone., TMH, 2002
5. Modern Digital Electronics – By R.P.Jain., 3rd Ed., TMH,2003
6. Digital Design – By M. Morris Mano, 3rd Ed., PHI, 2003
7. Digital system principles & Applications – By Ronald J. Tocci, Neal Widmer , 6th Ed., PHI., 1994
8. Digital Principles & Applications – By Donald P. Leach & Albert Paul Malvino, 5th Ed., 2002
9. Digital Fundamentals – By Floyd., 7th Ed., PHI, 2002

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Semester – I

Paper – IV (Core- E-104) :C- PROGRAMMING AND MATLAB

UNIT I: Introduction to programming in C:

Then input and output operator, comments, Data types, Variables, objects and their

declarations, keywords and identifiers chained assignments Integer types, simple arithmetic operators, operator precedence and associativity, the increment and decrement operators, compound assignment expressions,, simple programs.

The if statement, the if……. else statement, Relational operators, Compound Statements, The while statement, the do……...while statement, for statement break statement, continue statement, the go to statement., the Switch Statement, Enumeration types.

UNIT II: Function, Arrays and pointers:

Function declaration & definitions, local variables & functions, void functions, passing by

reference and passing by value, passing by constant reference, Array declaration and initializing, processing Arrays, passing an Array to a function, the Linear search and Bubble sort algorithm, binary search algorithm, using arrays with enumeration types, Multidimensional Arrays.

Pointers declaration, pointer operator, address operator, pointer arithmetic's References, Derived types, Arrays & pointers, the new operator, the delete operator, dynamic arrays, Arrays of pointers and pointers to Arrays, Pointers to Pointers. Pointers to functions call by value, call by References.

UNIT III :

MATLAB Environment: MATLAB as a calculator – variables – Functions – Display formats – Complex numbers – Matrices and Vectors – Strings – Input and Output statements – Simple plotting in MATLB – MATLAB package environments.

MATLAB operators and Control flow: Relation operations – Logical operations – Elementary math functions – Matrix functions - Characters and strings – IF-END, IF-ELSE-END, ELSE-IF, SWTCHCASE, FOR Loops, WHILE Loops

Interactive Computations: Matrices and Vectors, Matrices and Array operations, Vectorization, Command line functions, Using Built – in functions.

Scripts and Functions: Scripts Files, Function files, General Structure of files, Scope of Varialbles, Passing parameters, Global Variables, Recursive functions.

UNIT IV:

File Input and Output: Opening and Closing files, Writing formatted output files, Reading formatted Data from files, Writing and Reading binary files.

Plotting in MATLAB: Line styles, Markers and colors, Important plotting commands, Obtaining Numerical values from graphs, Different plot types, Three dimension plots, Handle Graphics, Saving plotting graphs.

MATLAB Numerical methods: Linear algebra, Curve fitting, Data analysis and Statistics, Numerical Integration, Numerical Differentiation, Ordinary differential equations, Nonlinear algebraic equations, Eigen vectors and Eigen values.

MATLAB Electronic applications: Fourier analysis, Fourier transforms and applications.

Recommended Books

1. Programming with C by Balaguruswamy
2. Programming in C by Kerningham and Ritchie
3. C programming by Raja Raman
4. Programming in MATLAB by Marc E. Hermitter, Thomson Brooks
5. MATLAB programming byRudrapratap.

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Semester – II

Paper – I (Core- E-201): Microwaves and Antenna Systems

UNIT - I :**Wave guides**

Introduction – reflections of waves from a conducting plane – parallel plane wave guide – cutoff wave length – cutoff frequency – group and phase velocity in wave guides – rectangular wave guides – circular wave guides - different modes – field patterns.

Wave guide coupling – methods of exiting wave guides – slop coupling – direct coupling to coaxial lines – choke coupling, tuning.Directional couplers, circulators, cavity resonators, Hybrid junctions.**Microwave propagation** in magnetic materials, Faraday rotation in Ferrites – Gyrators, isolators and phase shifters.

Unit II : Microwave Sources

Klystron – Introduction – two cavity klystrons – velocity modulation – Bunching – output power – Beam heading - efficiency of klystron – power required to bunch the electron Reflex klystron – velocity modulation – power output – efficiency.

Magnetron – cylindrical magnetron - magnetic equations and cutoff voltage equations – cyclotron angular frequency – power output – efficiency.

Traveling Wave Tube – Slow wave structure – amplification process.Other Microwave tubes- Cross field amplifier – Backward wave Oscillator –Miscellaneous tubes., TRAPATT, BARRITT, Gun diode, PIN diode.

Unit - III : Antennas

Introduction – antenna equivalent circuits – coordinate system – radiation fields-polarization – isotropic radiator – power gain of an antenna – effective area of an antenna – effective length of an antenna. **Hertzian dipole** – Half wave dipole vertical antennas – Ground reflections – grounded vertical antennas – folded elements loop and ferrite rod receiving antennas – non-resonant antennas – long wire antenna – rhombic antenna.

Unit - IV :

Driven arrays– Broad side array – end-fire array – turnstile antenna Parasitic arrays. **Parasitic reflectors** – Parasitic directors – Yagi-Uda array – Plane reflector arrays.**UHF antennas** – Discone Omni- Helical antenna – Log periodic antenna.

Microwave antennas – Horns – Parabolic reflector antenna – variations on the parabolic reflector – Dielectric lens antennas – slot antennas

Recommended Books :

1. R.F. Circuit Design - Theory and Applications - Reinhold Ludwig & Pavel Bretchko - Pearson Education Asia
2. Networks lines and fields – Ryder
3. Microwave engineering with wireless applications - Pennok& Shepherd

4. Microwave devices and circuits – Samuel Y. Liao
5. Microwave integrated circuits by K.C.Gupta.
6. Fundamentals of microwave engineering by R.E.Collin
7. Antenna theory – K.D.Prasad.
8. Classical electrodynamics – J.D. Jackson , 2edition, Ed. Wiley
9. Classical electrodynamics – S.P. Puri, Tata McGraw Hill
10. Electronic communications – D. Roddy & J. Coolen 4th edition (PHI)
11. Electronic communication systems – Kennedy & Davis – 11th Chapter for Unit IV

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Semester – II

Paper –II (Core- E-202): Feedback Control Systems

Unit – I

General concepts and Mathematical techniques:

Introduction, Open loop control system, Closed loop control systems, Modern control system applications .Transfer function concept, transfer function of common networks (RC, RL & RLC), Transfer function of physical systems, Block Diagram Representation of Control System, Block Diagram reductions, Signal Flow Graph and Masons Gain formula, Reduction of signal flow Graphs, Applications of signal flow Graph - .

Unit – II

State equations and Transfer Function representation of Physical control system elements:

State Space Concepts, the State Variable Diagram. State Equations Of Electrical Networks, Transfer Function And State Space Representation Of Typical Mechanical, Electrical, Hydraulic, Thermal Systems.

Time domain analysis of control systems: Typical Test Signals for the Time Response of Control Systems – Steady State Error – Unity Feedback Systems. Steady State Error For A Unity Feedback System With Step Input, Ramp Input And Parabolic Input – Unit Step Response And Time Domain Specifications – Transient Response of a Prototype Second Order System – Effect Of Adding Poles And Zeros To Transfer Functions

Unit – III

The Concept of **Stability** – Routh Hurwitz Stability Criterion - The Stability of State Variable Systems – Root Locus method, Root Locus Concept – Properties and Construction of Root Loci – Frequency Plots – Polar and Bode plots – Frequency Domain Specifications – resonant peak , resonant angular frequency and band width of 2^{nd} Order System - Nyquist Stability Criterion – Applications.

Unit – IV

Design of Control Systems – Introduction, Cascade Compensation Techniques, Minor loop feedback compensation techniques, and example of the design of a linear feedback control system –

Design with PD controller – Time Domain interpretation of PD controller – Design with PI controller – Time domain interpretation and design of PI controller – Design with PID controller – Design with phase lead controller – Time domain interpretation and design of phase lead controller – Design with phase lag controller – Time domain interpretation and design of phase lag controller – Design with lead and lag controller – Polo zero cancellation compensation.

Recommended Books

1. Automatic Control systems – Benjamin C. Kuo, (PHI)
2. Modern Control systems – Richard C.Dorf and Robert H. Bishop, Addison Wesley Publications
3. Control systems principles and design - by M.Gopal 2nd edition 2002 (MGH)
4. Control and Systems Engineering – I J Nagarath and M Gopal, (New Age Int Pub)
5. Control systems --- A Anand Kumar – PHI
6. Modern control engineering – Katsuhiko Ogata –PHI
7. Control systems – NagoorKhani
8. Control systems – Stanley.M.Shinners
9. Principles of control systems - Xavier- S Chand
10. Control systems - by Ashok Kumar 1st edition (MGH)

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Semester – II

Paper – III (Core- E-203): Microprocessors & Interfacing

Unit – I

The 8086 Microprocessor - General Organization of a Microcomputer, Detailed Architecture of 8086, Addressing Modes, Instructions, Assembly Language Programming, Programming Examples. The 8086-Based **System Design -** Pins and Signals, System Components, Interfacing Memory, I/O Devices, Data Converters, Stepper Motor.Interrupts.

Unit – II

Peripheral Interfaces and Interfacing with 8086 : Parallel I/O Methods, Programmable Peripheral Interface (8255 A), Key Board /Display interface (8279), Priority Interrupt Controller (8259 A), DMA Controller (8237), Programmable Interval Timer (8254), UART PC16550D.

Unit – III

The IBM PC Motherboard and Drives - Motherboard Components – Mother Board for IBM PC and Pentium System, with support chips, System Resources, ROM BIOS Services.

Drives - Principles of Magnetic Storage, Floppy Disk Drive and Interface, Hard Disk Drive, IDE Interface, SCSI Interface, CD-ROM Drive, BIOS Disk Drive Services.

Unit – IV

I/O Buses, Ports and Universal Serial Bus - ISA, MCA, EISA, PCI Buses; Local Buses, VL Bus, AGP.Parallel and Serial Ports.**USB -** USB System, USB Transfer, USB Controller.

Advanced Microprocessors - Protected Mode Operation, The 80286, 80386, 80486, **Pentium**, Pentium-Pro and Pentium I - IV Microprocessors.(Block diagram approach only)

Recommended Books

1. Microprocessors, PC Hardware and Interfacing - By N. Mathivanan, PHI, 2003
2. The Intel Microprocessors 8086/8088, 80186/80188, 80286,80386,80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, Architecture, Programming, and Interfacing - By Barry B. Brey, 6th Ed., PHI / PEA, 17th Reprint, 2003

3. The 8086 Microprocessor : Programming & Interfacing the PC - By Kenneth J. Ayala
    a. Penram International Publishing, 1995
4. Advanced Microprocessors and Peripherals - Architecture, Programming and Interfacing - By A K Ray and K M Bhurchandi, TMH, 2000

5. Advanced Microprocessors and Interfacing - By Badri Ram, TMH, 2nd Reprint 2002
6. Microprocessors and Interfacing, Programming and Hardware - By Douglas V. Hall, TMH, 2nd Ed., 18th Reprint, 2003

7. The 8088 and 8086 Microprocessors - Programming, Interfacing, Software, Hardware and Applications - By Walter A Triebel and Avtar Singh, PHI, 4th Ed., 2002

8. Microcomputer Systems : The 8086/8088 Family, Architecture , Programming, and Design
    a. By Yu-cheng Liu and Glenn A. Gibson, PHI, 2nd Ed., 1986.
9. Microprocessors – Data Hand Book, BPB.
10. IBM PB and Clones Hardware, Trouble shooting and Maintenance -By B.Govindarajalu - TMH, 2nd edition. 2002.

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Semester – II

Paper –IV (Core- E-204) : Digital Signal Processing and Processors

Unit-I

Discrete- Time signal and linear systems- Introduction-Advantages of DSP-classification of signals – Signal representation- standard signals Discrete – time signals –Operation on signals Discrete-time-system-classification of discrete time system-convolution-correlation of two sequences-Inverse systems and De convolution Frequency analysis of Discrete time signals – systems – A/D conversion.

Z transform- Introduction- ROC –Properties of ROC- Z- Transform Inverse Z-Transform Discrete Fourier Transform-Discrete Fourier series-properties-DFT-Properties-Distinguish between linear and circular convolution filtering long duration sequence.

Unit-II

Fast-Fourier Transform-Direct evaluation of DFT-Decimation-in-Time and Frequency, Differences and similarities between DIT-DIF-IDFT using FFT-IIR filters-Introduction-Design of Digital filters from analog filters-analog Low pass Filter design-Butterworth, Chebyshev filters-Design of IIR filters from analog filters- Frequency transformation on digital Domain-realization of Digital Filters.

Unit-III

FIR Filter- Introduction –Linear Phase FIR filters, Their Frequency response-Location of the Zeros of LPFIR filters-Fourier series method of designing FIR filter-Design of a FIR filter using windows – Frequency sampling method of designing FIR filters-Realization of FIR filters Effect of finite word length in **Digital filters** – Introduction –Rounding and truncation errors-Quantization in A/D signals- O/P noise from a Digital System-Co-Efficient of quantization effect in direct form, realization in IIR, FIR filters- Quantization errors in the computation of DFT.

Unit-IV

Digital Signal Processor- Architecture of **TMS320C5X -** Bus structure-Central Architecture Logic Unit (CALU)-Auxiliary Register (AR)-Index register (INDX)-ARCR-Block move address register Block Repeat register-parallel logic unit – memory mapped registers-Program controller-Some flags in status registers - on chip memory – on chip peripherals.

TMS320C5X language - Assembly Language syntax, Addressing modes-Instructions – Load/store –Addition /Subtraction- Move –Multiplication NORM- Program Control-Peripheral control.

Instruction pipelining in C5X - Pipeline structure – operation.

Recommended Books

1. Digital signal processing by Prokaies (PHI)
2. Digital Signal Processing – S Salivahanan,AVallavaraj and Gnanapriya (TMH)
3. Digital Signal Processors- B.VenkataRamaniand M.Bhaskar (TMH).
4. Digital Signal Processors – Sen M Kuo&Woon-Seng Gan, Pearson Education
5. Digital signal processing by Oppenheim &Schafer (EEE)
6. Digital signal processing by White .
7. Discrete time signal processing by Oppenheim and Schafer (EEE)
8. Digital Signal Processing-Syed Amjad Ali
9. Digital Signal Processing-SanjitK.Mitra
10. Digital Signal Processing-Nagoorkani
11. Digital Signal Processing-Ronal Scefer
12. Digital Signal Processing-Ananth and Padmanabham
13. Digital Signal processing theory and analysis and digital filter design by B.Somanadh Nair –(EEE)
14. Digital signal processing by Ramesh babu --Sci-Tech Pub