MTL 1026			Engineering Mathematics II							
Version R-01							Co-requisites			
L	T	P	C	Minor Duration	Major Duration	Internal Marks (Assignment)	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	0	0	0	1.5 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES

After successful completion of this course, students shall be able to;

(1) Understand the concepts of vector calculus like directional derivative, gradient, divergence and curl, and their applications.

(2) learn and apply the concepts of vector integral calculus for the computation of work done, circulation, and flux.

(3) formulate the differential equations concerning physical phenomena like electric circuits, wave motion, heat equation etc.

(4) learn various methods of solution of ordinary and partial differential equations.

(5) solve various partial differential equations arising in heat conduction problems and wave propagation problems.

Unit -I 18 Contact Periods)

Vector Calculus: Beta & Gamma functions. Differentiation of vector functions of scalar variables. Gradient of a scalar field, Divergence & Curl of a vector field and their properties. Line & surface integrals. Green's theorem, Stokes' theorem & Gauss' theorem both in vector & Cartesian forms (statement only) with simple applications.

Unit-II (15 Contact Periods)

Ordinary Differential Equation(ODE): Formation of ODE, definition of order and degree of ODE and solution, ODE's of first order, method of separation of variables, homogenous and non-homogenous differential equations and their solution, exactness and integrating factor, Bernoulli's equation, linear ODE's of n^{th} order, operator method, method of undetermined coefficients, method variation of parameters, solution of simple simultaneous ODE's.

Unit-III (18 Contact Periods)

Partial Differential Equation(PDE): Formation of (PDE), Solution of PDE by direct integration, Lagrange's linear equation, Non-linear PDE of first order, Method of separation of variables, Heat, Wave & Laplace's equations (Two dimensional Polar & Cartesian Co-ordinates).

SUGGESTED BOOKS

1. E. Kreysig, Advanced Engineering Mathematics, Wiley 10th edition 2011.
2. Frank Ayres , Vector Analysis, Mc Graw Hills, 6th edition 2011.
3. T. Marsden and W.H. Freeman,VectorCalclus, Freeman, 6 edition 2011.
4. G. Simons, Differential Equations with Applications, TMH**,** McGraw-Hill Higher Education; 2 edition 1991.
5. S.L. Ross, Differential Equations, Wiley 3rd edition 1984.
6. R. Zalman, A Course in Ordinary and PDEs, Academic Press, 1st edition 2014.

Engineering Mathematics-II (1026)

MTL1012	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Engineering Mathematics -II (1026)	**CO1**	2	2	1	2	2	2	2	1	2	2	1	2	3	3
	CO2	2	2	2	2	2	2	2	1	2	2	1	2	2	3
	CO3	2	2	2	2	2	2	2	1	2	2	1	2	3	2
	CO4	2	2	2	2	1	2	2	2	2	2	1	2	3	2
	CO5	2	2	2	2	1	2	2	2	2	2	1	2	3	3

ECL 1030				**Electronic Circuits and Simulation**						
Version R-01							Co-requisites			
L	T	P	C	Minor Duration	Major Duration	Assignment	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	1	2	5	2 Hours	3 Hours	10	20	20	50	100

Course Outcomes

1. To learn basic concepts of Semiconductor Devices
2. Able to understand and use BJT and MOS Devices.
3. Learn and able to apply small signal BJT and FET analysis.
4. To analyze and design rectifiers and amplifiers using SPICE.
5. Able to understand advanced semiconductor devices and oscillators.

COURSE CONTENTS

Unit I :Bias stability (3 contact hours)

Operating point, Q point variation due to changes in β & temperature, Stability factor, stability factor analysis (variation of I_{co},V_{be})

Unit II: Small signal Analysis (4 contact hours)

BJT small signal analysis, h parameters, FET small signal analysis, small signal high frequency model (π model), Millers theorem.

Unit III: Large Signal Amplifiers (4 contact hours)

Classification of power amplifiers (Class A,B, C& D), push pull amplifier,

Unit IV: Multistage Amplifier (5 contact hours)

General cascade system, configuration of RC coupled, transformer coupled, direct couple multistage amplifier, General frequency consideration, Effect of cascading on the bandwidth of an amplifier.

Unit V: Frequency response of Amplifier (5 contact hours)

Frequency response characteristics, the high frequency response of CE stage, the gain bandwidth product, common source stage at high frequency, Emitter and source followers at high frequency, the time constant method of obtaining the response.

Unit VI: Feedback Amplifiers (9 contact hours)

Feedback concepts, the transfer gain with feedback, general characteristics of feedback amplifier. Input resistance, output resistance, voltage series feedback pair, current series feedback, current shunt feedback, voltage shunt feedback.

Unit VIII: Regulated power supplies 10 contact hours)

ordinary DC power supply, voltage regulators, Zener as voltage regulator, series voltage regulators, principle of switching voltage regulator, IC voltage regulator, its specification and performance characteristics

Unit VIII: Circuit Simulation using PSPICE

SPICE and its types, limitations; Circuit Descriptions: Input files, Element values, Nodes, Circuit elements, Sources, Types of Analysis, Output Variables and commands; Format of circuit and output files, simulation of simple DC circuits.

NOTE:	End Term Evaluation (Major Exam) shall be carried out in three stages. Minor I (20 marks), Minor II (20 marks), and Major (50 marks) exams.
	Assignment Marks shall be awarded on students' work in the form of Case Study / Design problem / Presentation / Quiz, which shall be evaluated by the concerned faculty.

Recommended Books:

1.Integrated Electronics, Millman & Halkias,Tata Mc Graw Hill
2.Microelectronics, Millman & Grabel, Tata Mc Graw Hill
3.Electronics Circuits, Schilling &Belove, McGraw Hill
4.Introduction to PSpice using OrCad for Circuits & Electronics, Rashid, Pearson Education

Electronic Circuits and Simulation (ECL1030)

Subject Name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Electronic Circuits and Simulation (ECL1030)	**CO1**	3	2	1	2	2	2	2	1	2	2	1	3	3	3
	CO2	3	2	3	2	2	2	2	1	2	2	1	3	2	3
	CO3	3	2	3	3	2	2	2	1	2	2	1	3	3	2
	CO4	3	2	3	3	1	3	3	2	3	2	1	3	3	2
	CO5	3	2	3	3	1	2	2	2	3	2	1	3	3	3

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ECL 1022				**Network Analysis and Synthesis**			Pre Requisites			
Version R-01							Co-requisites			
L	T	P	C	Minor Duration	Major Duration	Assignment	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	1	0	4	2 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES

COURSE CONTENTS

Unit I: Foundations of Network Analysis (3 contact hours)

Passive elements and their circuit properties, Voltage & Current Sources, Source Transformations, Network Theorems (Tellegen's, Reciprocity, Compensation Theorem), Duality, Concept of Complex Impedance.

Unit II: Network Graph Theory (4 contact hours)

Concept of a network graph terminology used in network graph, relation between twigs and links, Properties of a tree in a graph, Formation of incidence matrix, No. of trees in a graph, Cut set matrix and tie set matrix

Unit-III Laplace Transform (4contact hours)

Definition, Inverse L.T, Properties of L.T, Solution of Linear Differential equations, Transformed Circuit Components Representation, Independent Sources, Resistance Inductance and Capacitance Parameters, Transfer Functions

Unit IV: Transient Response (5 contact hours)

Initial Conditions, Transient and Steady State Responses, Transient responses of RL, RC and RLC Networks

Unit V: Two-port Networks

Two-port parameters (z, y, h, ABCD), Transfer functions using two-port parameters. Interconnection of two-ports, Analysis of Ladder Networks

Unit VI: Network Synthesis (5 contact hours)

Causality and Stability, Hurwitz polynomials. Positive real functions, Frequency Response of Reactive One – ports, Synthesis of Reactive One-ports by Foster's method, Synthesis of Reactive One-ports by Cauer's Method.

Unit VII Filters (9 contact hours)

Determination of pass and attenuation bands constant K-type, Low pass, High pass, Band pass, Band stop, M-derived filters, Lattice filter

NOTE:	End Term Evaluation (Major Exam) shall be carried out in three stages. Minor I (20 marks), Minor II (20 marks), and Major (50 marks) exams.
	Assignment Marks shall be awarded on students' work in the form of Case Study / Design problem / Presentation / Quiz, which shall be evaluated by the concerned faculty.

Recommended Books:

Basic Electronics (ECL1022)

Subject Name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Network Analysis and Synthesis (ECL1022)	**CO1**	3	2	1	2	2	2	2	1	2	2	1	3	3	3
	CO2	3	2	3	2	2	2	2	1	2	2	1	3	2	3
	CO3	3	2	3	3	2	2	2	1	2	2	1	3	3	2
	CO4	3	2	3	3	1	3	3	2	3	2	1	3	3	2
	CO5	3	2	3	3	1	2	2	2	3	2	1	3	3	3

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ECL 2030				Linear Integrated Circuits and Applications			Pre Requisites			
Version R-01							Co-requisites			
L	T	P	C	Minor Duration	Major Duration	Assignment	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	0	1	4	2 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES:

1.To understand the concept of differential amplifiers

2.To understand the basics of Operational amplifiers and its applications

3.To be able to perform the Frequency response analysis of Op-amp

4.To be able to design active filters and oscillators using Op-amp

5.To be introduced about some specialized IC applications of OP-amp

Course Contents

Unit I: Introduction: Differential Amplifiers (3 contact hours)

Basics of Differential Amplifier, Transistorized Differential Amplifier, Configurations of Differential Amplifier, Analysis of Dual Input Balanced Output Differential Amplifier, Constant Current Bias, Current Mirror Circuit, Cascading of Differential Amplifiers.

Unit II: Introduction to Operational Amplifiers (4 contact hours)

The Ideal Op-Amp, Block diagram Representation of Op-Amp, Voltage Transfer Curve of Op-Amp, Integrated Circuit: Package Types, Pin Identification and Temperature- Ranges, Interpretation of Data sheets and Characteristics of an Op-Amp, Inverting and Non-Inverting Configuration, Ideal Open-Loop and Closed-Loop Operation of Op-Amp, Block diagram Representation of Feedback Configurations, Voltage-Series Feedback Amplifier, Voltage-Shunt Feedback Amplifier, Differential Amplifiers with One & Two Op-Amps.

Unit III: Frequency Response of an Op-Amp (4 contact hours)

Introduction, Frequency Response, Compensating Networks, Frequency Response of Internally Compensated Op-Amp, Frequency response of Non-compensated Op-Amp, Closed-Loop Frequency Response, Circuit Stability, Slew Rate.

Unit-IV: General Linear Applications (5 contact hours)

DC & AC Amplifiers, Peaking Amplifier, Summing, Scaling and Averaging amplifier, Instrumentation Amplifier, Voltage-to-Current Converter, Current-to-Voltage Converter, The Integrator, The Differentiator, Log and Antilog Amplifier, Peak Detector, Precision Rectifiers, Comparator, Zero Crossing Detector, Schmitt Trigger, Sample and Hold Circuit, Clippers and Clampers, A/D and D/A Converters.

Unit V: Active Filters and Oscillators (5 contact hours)

Active Filters:- Butterworth Filters, Band-Pass Filters, Band Reject Filters, All-Pass Filters. Oscillators and Wave Generators:- Phase Shift Oscillator, Wien Bridge Oscillator, Voltage-Controlled Oscillator(VCO), Square Wave Generator, Triangular Wave Generator, Saw-tooth Wave Generator.

Unit VI: Specialized IC Applications (9 contact hours)

Introduction, Universal Active Filter, The 555 Timer, Monostable and Astable Multivibrator using IC 555, Phase-Locked Loop(PLL), Voltage Regulators.

Recommended Books:

1.OP-AMP and Linear IC's By Ramakant A. Gayakwad, Prentice Hall
2.Digital Integrated Electronics, By Taub and Schilling, McGraw Hill
3.Integrated Electronics, By Millman J. and Halkias C.C., McGraw Hill.
4.Op-Amp and Linear IC's, By Caughlier and Driscoll, PHI

Linear Integrated Circuits and Applications (ECL2030)

Subject Name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Linear Integrated Circuits and Applications (ECL2030)	**CO1**	3	2	1	2	2	2	2	1	2	2	1	3	3	3
	CO2	3	2	3	2	2	2	2	1	2	2	1	3	2	3
	CO3	3	2	3	3	2	2	2	1	2	2	1	3	3	2
	CO4	3	2	3	3	1	3	3	2	3	2	1	3	3	2
	CO5	3	2	3	3	1	2	2	2	3	2	1	3	3	3

ECL 2152				Digital Communication Engineering			Pre Requisites			
Version R-01							Co-requisites			
L	T	P	C	Minor Duration	Major Duration	Assignment	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	0	1	4	2 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES:

1.Understand the theoretical aspects of digital communication system, useful for today's multidisciplinary applications.

2.Learn the elements of digital communications systems, fundamental concepts of sampling theorem, quantization and coding.

3Understand the different types of digital pulse and band pass modulation techniques.

4Able to calculate probability of error for method filter Receiver and various Digital

Modulation techniques to analyze the performance of Digital Communications Systems in the pressure of noise.

5.Able to do the source coding problems and understand the compact description of sources.

6.Able to solve the various channel coding problems and analyze the performance of vicarious coding techniques.

Course Contents

Unit I: Introduction: (3 contact hours)

: A historical perspective in the development of Digital Communication, elements of a digital communication system, analog versus digital communication system.

Introduction, sampling process, pulse amplitude modulation, TDM, PPM, PDM, bandwidth-noise trade-off, quantization process, PCM, DPCM, DM, Adaptive DPCM, sub-band coding, linear predictive coding,.

Unit ll: Pulse modulation (4 contact hours)

Introduction, sampling process, pulse amplitude modulation, TDM, PPM, PDM, bandwidth-noise trade-off, quantization process, PCM, DPCM, DM, Adaptive DPCM, sub-band coding, linear predictive coding,.

Unit lll: Base band pulse transmission (4 contact hours)

Introduction, matched filter, error rate due to noise, inter symbol interference, Nyquist's criterion for distortion less base band binary transmission, correlative level coding.

Unit-IV: Digital pass-band transmission (5 contact hours)

Introduction, pass band transmission model, Gram Schmidt orthogonalization procedure, geometric representation of signals, response of bank of correlators, to noisy input, coherent detection of signals in noise, probability of error, correlation receiver, detection of signals with unknown phase, hierarchy of digital modulation techniques, coherent binary PSK, coherent binary FSK, coherent QPSK, coherent minimum shift keying, differential phase shift keying, comparison of binary & quaternary modulation schemes, M-ary modulation techniques, power spectra, bandwidth efficiency, synchronization.

Unit V: Source coding (5 contact hours)

Mathematical models of information sources, a logarithmic measure of information, source coding theorem, source coding algorithms- the Huffman source coding algorithm & the LEMEPel-Ziv source coding.

Unit VI: Channel capacity & coding (9contact hours)

Modeling of communication channels, channel capacity, bounds on communication, coding for reliable communication, linear block codes, cyclic codes, convolutional codes.

Recommended Books:

1.Digital communication, Simon Hykins,ohn Willey & Sons
2.Digital communication , John G Proakis, McGraw Hill
3.Fundamental of Telecommunications, R G Freeman , John Wiley
4.Telecommunications Systems Engineering , R G Freeman, John Wiley
5.Telecommunication Transmissions Systems, R G Winch, McGraw-Hill
6.Electronic Communication Systems, W Tomasi, PHI

Digital Communication Engineering(ECL2152)

Subject Name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Digital Communication Engineering(ECL2152)	**CO1**	3	2	1	2	2	2	2	1	2	2	1	3	3	3
	CO2	3	2	3	2	2	2	2	1	2	2	1	3	2	3
	CO3	3	2	3	3	2	2	2	1	2	2	1	3	3	2
	CO4	3	2	3	3	1	3	3	2	3	2	1	3	3	2
	CO5	3	2	3	3	1	2	2	2	3	2	1	3	3	3

ECL 2041			Antenna and Wave Propagation				Pre Requisites			
Version R-01							Co-requisites			
L	T	P	C	Minor Duration	Major Duration	Assignment	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	0	1	4	2 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES:

1.Students would be able to understand the basic operation of e.m. wave based application.

2Students should be able to design and analyze various types of antenna.

3Students should be able to understand the different propagation modes of EM wave.

4.Students would be able to find suitability of antennas for different applications.

5.To understand the different types of antennas and their applications

Course Contents

Unit I: Introduction: **Antenna Fundamentals** (3contact hours)

Radiation pattern, Antenna gain, Effective joint of an antenna, Antenna aperture, relation between antenna gain and antenna aperture, elementary idea of self and mutual impedances in antenna, Antenna terminal impedance, reciprocity theorem of an antenna.

Unit II: Antenna arrays (4 contact hours)

Arrays of two point source, linear arrays of n-point sources, broad side and End fire arrays, Pattern multiplication Binomial arrays.

Unit III: Special purpose antennas (4 contact hours)

Loop antenna traveling wave antenna, Rhombic antenna, Yagi antenna, Horn and reflector type antennas, Helix antenna, and Lens antenna, Log Periodic antenna, Microstrip patch antenna

Unit-IV: Ground wave propagation (5 contact hours)

Introduction to different region of the atmosphere. Various propagation paths, Basic ideas of ground wave propagation, space wave and surface wave, True Tropospharic refraction, radius of curvature of a ray in the troposphere. Concept of modified earth, Duct propagation.

Unit V: Sky wave propagation (5 contact hours)

Structure of the ionosphere, effective permittivity & conductivity of an ionized region. Effect of earth magnetic field. Critical frequency. MUF and OPWF. Virtual height, skip distance fading.

Recommended Books:

- Fields & Wave Electromagnetics , DK Cheng
- Fields & Wave in Communication Electronics, Ramo Whinnery & Duzer
- Electromagnetic Waves and Radiating Systems, Jordan & Balmin
- Antenna Theory:Analysis & Design, A. Balanis
- Elements of Electromagnetics, Sadiku
- Antenna & Wave Propagation, K.D. Prasad

Antenna and Wave Propagation (ECL2041)

Subject Name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Antenna and Wave Propagation (ECL2041)	**CO1**	3	2	1	2	2	2	2	1	2	2	1	3	3	3
	CO2	3	2	3	2	2	2	2	1	2	2	1	3	2	3
	CO3	3	2	3	3	2	2	2	1	2	2	1	3	3	2
	CO4	3	2	3	3	1	3	3	2	3	2	1	3	3	2
	CO5	3	2	3	3	1	2	2	2	3	2	1	3	3	3

ECL 2060			Microprocessor Systems				Pre Requisites			
Version R-01							Co-requisites			
L	T	P	C	Minor Duration	Major Duration	Assignment	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	0	1	4	2 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES:

After Successful Completion of this Course, students shall be able to;

1.The student will be able to analyze, specify, design, write and test assembly language programs of moderate complexity.

2.The student will be able to select an appropriate 'architecture' or program design to apply to a particular situation; e.g. an interrupt-driven I/O handler for a responsive real-time machine.

3.The student will be able to calculate the worst-case execution time of programs or parts of programs, and to design and build, or to modify, software to maximize its run time memory or execution-time behavior.

4.Write programs to run on 8086 microprocessor based systems.

5.Design system using memory chips and peripheral chips for 16 bit 8086 microprocessor.

Course Contents

Unit I: Introduction: **Introduction to 8085 Microprocessor** (3contact hours)

Functional block diagram – Registers, ALU, Bus systems, Memory & Instruction cycles Timing diagrams, Address Decoding techniques, Addressing modes, Instruction Set, Assembly Language Programming, Interrupts-Types & handling, ISR, Stack architecture

Unit II: Memory and Peripheral interfacing (4contact hours)

Basic interfacing concepts - Memory space partitioning - Buffering of buses – Timing constraints - Memory control signals - Read and write cycles, Interfacing RAM, ROM, 8255PPI, Interfacing applications using 8255. Need for direct memory access - DMA transfer types.

Unit III: Intel 16 bit Microprocessor (4 contact hours)

Register organization of 8086 – Architecture - Physical Memory organization - I/O addressing capability, Addressing modes of 8086 - Instruction set of 8086 - Assembler directives and operators, Assembly language programming, Interrupt Architecture

Unit-IV: Freescale 32 bit ColdFire Processor (5contact hours)

Introduction to ColdFire Core, Comparison with 8085 & 8086 Architecture, Introduction to MCF5223X Microprocessor Architecture & Functional Blocks.

Recommended Books:

1.Gaonkar R. S, "Microprocessor Architecture: Programming and Applications with the 8085/8086A", New Age International (P) Ltd.,
2.K. Ray, K. M. Bhurchandi – Advanced Microprocessors and Peripherals – Architecture, Programming and Interface – Tata McGraw Hill
3."ColdFire Microprocessors & Microcontrollers" – Munir Bannoura, Rudan Bettelheim and Richard Soja, AMT Publishing.
4.Douglas V. Hall, "Microprocessors and Interfacing Programming and Hardware", Tata McGraw Hill,
5.Daniel Tabak, "Advanced Microprocessors", McGraw Hill,
6. David A. Patterson, John.L.Hennessey – Computer organization and design-the hardware/software Interface- Elsevier-Morgan Kaufmann Publishers-

Microprocessor Systems (ECL2060)

Subject Name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Microprocessor Systems (ECL2060)	**CO1**	3	2	1	2	2	2	2	1	2	2	1	3	3	3
	CO2	3	2	3	2	2	2	2	1	2	2	1	3	2	3
	CO3	3	2	3	3	2	2	2	1	2	2	1	3	3	2
	CO4	3	2	3	3	1	3	3	2	3	2	1	3	3	2
	CO5	3	2	3	3	1	2	2	2	3	2	1	3	3	3

ECL 2071			Digital System Design using VHDL				Pre Requisites			
Version R-01							Co-requisites			
L	T	P	C	Minor Duration	Major Duration	Assignment	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	0	1	4	2 Hours	3 Hours	10	20	20	50	100

Course Output

1.To understand and develop complex digital circuits and system functions based on algorithms.

2.To represent complex digital circuits in the form of the hierarchically organized VHDL design/simulation software tools.

3.To develop VHDL architectural representations of systems and components using models representing structure, behavior, or data flow concepts describing the internal structure or external behavior of the circuit.

4To develop final technical documentation of a complex digital system using VHDL language descriptions, and their implementations on CPLD and FPGA.

Course Contents

Unit I: Introduction: Review (3 contact hours)

Review of concepts of combinational and Sequential logic circuit design, design of digital systems with help of state machine charts and their realization through Gates, Multiplexers and other discrete digital ICs.

Unit II: Synchronous and Asynchronous Sequential circuits (4contact hours)

Sequential Circuits: Synchronous sequential circuits and finite state machines (FSM); Mealy machine; Moore machine; State table; State diagram; Synchronous Sequential circuit analysis; System design; State minimization; State assignment; ROM implementation; Asynchronous sequential circuits, Threshold functions , Hazards, Pulse Mode Circuits.

Unit III: Introduction to VHDL (4 contact hours)

Basic language elements & behavioral modeling, Data flow modeling – structural, Generics and configurations - Subprogram and overloading – Packages and Libraries – Model simulation.

Design of Hardware using VHDL as examples – code converters, multiplexer, de-multiplexer, binary adders and multipliers, counters. Design of sequential circuits using VHDL, counters, shift registers

Basics of FPGA, CPLD and programmable devices in general. FPGA programming, design and implementation of digital system, ASIC design using CAD tools. Overview of ASM's realization through PLDs and design of FSM / simple microprocessor through Algorithmic State Machine concept.

Recommended Books:

1. Daniel Gajski: Principles of Digital Design

2.Bhasker: A VHDL Primer

3.Pedroni: Circuit Design with VHDL

4.Perry: VHDL: Programming by examples

5.Palnitkar: Verilog HDL,

Digital System Design using VHDL (ECL2071)

Subject Name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Digital System Design using VHDL (ECL2071)	**CO1**	3	2	1	2	2	2	2	1	2	2	1	3	3	3
	CO2	3	2	3	2	2	2	2	1	2	2	1	3	2	3
	CO3	3	2	3	3	2	2	2	1	2	2	1	3	3	2
	CO4	3	2	3	3	1	3	3	2	3	2	1	3	3	2
	CO5	3	2	3	3	1	2	2	2	3	2	1	3	3	3