MATHEMATICS – III

Course Code: ABM1104	**L**	**T**	**P**	**C**
	4	**1**	**0**	**4**

Aim: To acquire basic knowledge in the theory of functions of complex variables and special functions.

Objective: The primary objective of this course is to introduce the special functions and to develop the theory that is prominent in applications of the subject. A special emphasis has been given to the application of residues and conformal mappings.

UNIT-I:
BETA AND GAMMA FUNCTIONS
Beta-function and Gamma function, relation between Beta and Gamma functions, results and problems.
(7.14 - 7.16)

UNIT-II :
BESSEL'S AND LEGENDRE'S FUNCTIONS
Bessel's function, Recurrence formulae, Expansions for $J_0(x)$, $J_1(x)$; Generating function, Orthogonality of Bessel functions

Legendre's function**,** Rodrigue's formula, Recurrence formulae, Orthogonality of Legendre polynomials.
(16.6 – 16.9, 16.11, 16.13 – 16.17)

UNIT – III:
FUNCTIONS OF A COMPLEX VARIABLE
Complex function, Limit, Continuity and Derivative of a Complex function, Cauchy-Riemann equations in Cartesian and polar form, Analytic functions, Harmonic functions, Milne –Thomson method.
(20.2 – 20.5)

UNIT- IV:
ELEMENTARY FUNCTIONS OF A COMPLEX VARIABLE
Exponential and Circular functions of a Complex variable, Hyperbolic and Inverse Hyperbolic functions, Real and Imaginary parts of Circular and Hyperbolic functions, Logarithmic function of a complex variable.
(19.8 - 19.13)

UNIT- V:
COMPLEX INTEGRATION
Complex Integration**,** Cauchy's theorem, Cauchy's Integral Formula, Morera's theorem, Cauchy's inequality, Liouville's theorem, Poisson's integral formulae.
(20.12 - 20.15)

UNIT-VI:
COMPLEX POWER SERIES
Series of complex terms, Taylor' series, Laurent's series,Zeros of an analytic function
(20.16 - 20.17)

UNIT-VII :
RESIDUES
Residues, Residue theorem, Calculation of residues, Evaluation of real definite integrals.
(20.18 - 20.20)

UNIT-VIII:
CONFORMAL MAPPINGS
Geometrical representation of $w = f(z)$, Standard transformations; bilinear transformation, Conformal transformations: $w = z^2$, $w = z + \frac{1}{z}$, $w = e^z$, $w = \sin z$, $w = \cos z$, $w = \sinh z$, $w = \cosh z$.
(20.7, 20.8, 20.10)

Text Book:

Dr.B.S.Grewal "Higher Engineering Mathematics", 40th Edition, Khanna Publishers

Reference Books:

1. James Ward Brown & Ruel V. Churchill. Complex Variables and Applications (Seventh Edition). McGraw-Hill College. 2004

2. Functions Of A Complex Variable by Goyal JK , Gupta KP, Publisher: Pragati Prakashan

ELECTRONIC CIRCUITS

Course Code: AEC1103	**L**	**T**	**P**	**C**
	4	**1**	**0**	**4**

Aim & Objectives:

To introduce the basic design concepts of low frequency, high frequency amplifiers an oscillators circuits using various transistors for different applications.

UNIT-I

BIASING AND STABILIZATION: BJT biasing, DC equivalent model, criteria for fixing operating point, methods of Bias stabilization, Thermal runaway, Thermal stability, Compensation Techniques, Biasing of JFET and MOSFET.

UNIT-II

SMALL SIGNAL AMPLIFIERS: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: A_V, A_I, R_i, R_o (CB, CE & CC), Small signal model of FET and MOSFET (CG, CD & CS configurations).

UNIT -III

MULTI STAGE AMPLIFIERS: Concept of Multi Stage Amplifiers, Methods of Inter Stage Coupling, Two Stage RC Coupled amplifier (CE configuration), n –Stage Cascaded Amplifiers, Equivalent Circuits, Miller's Theorem, Frequency Effects, High Input Resistance Transistor Circuits: Cascode Transistor Configuration, CE-CC Amplifiers, Frequency response of RC Coupled Amplifiers using BJT, Gain Band Width Product.

UNIT -IV

HIGH FREQUENCY TRANSISTOR CIRCUTS: Transistor at High Frequencies, Hybrid-π Common Emitter Tranconductance Model, Determination of Hybrid- π Conductances, Variation of Hybrid Parameters with $|I_C|$, $|V_{CE}|$ and Temperature, The Parameters f_τ, expression for f_α, f_β, Current Gain with Resistance Load, CE Short Circuit Current Gain.

UNIT- V

FEEDBACK AMPLIFIERS: Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Analysis of negative feedback amplifiers.

UNIT-VI

OSCILLATORS: Condition for oscillations, RC and LC type Oscillators: Hartley, and Colpitts Oscillators, RC-phase shift and Wien-bridge oscillators using BJT and JFET, Frequency and amplitude stability of oscillators, Crystal oscillators.

UNIT -VII

POWER AMPLIFIERS : Class- A Power Amplifier, Maximum Value of Efficiency of Class- A Amplifier, Transformer Coupled Amplifier, Transformer Coupled Audio Amplifier, Push Pull Amplifier, Complimentary Symmetry Circuits (Transformer Less Class B Power Amplifier), Class C Power Amplifier, Phase Inverters, Class D Operation, Class S Operation, Heat Sinks.

UNIT -VIII

TUNED AMPLIFIERS: Single Tuned Capacitive Coupled Amplifier, Tapped Single Tuned Capacitance Coupled Amplifier, Single Tuned Transformer Coupled or Inductively Coupled Amplifier, CE Double Tuned Amplifier, Stagger Tuning, Stability Considerations, Tuned Class B and Class C Amplifiers, Wideband Amplifiers, Applications of Tuned Amplifiers.

Text Books:

1. Electronic Devices and Circuits – J.Millman and C.C.Halkias, Tata McGraw Hill, 1998.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006.
3. Electronic Devices and Circuits – B.Visweswara Rao, K.Bhaskarram Murthy, K.Raja Rajeswari, P.Chalam Raju Pantulu, Pearson Publications, 2nd Edition.
4. Electronic Devices and Circuits – Raju GSN, IK International.

References:

1.Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2.Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.,1998.
3. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.
4. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, A.Vallavaraj, TMH.
5. Electronic Devices and Circuits – K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.

SIGNALS AND SYSTEMS

Course Code: AEC1104	**L**	**T**	**P**	**C**
	4	**1**	**0**	**4**

Aim & Objectives:

1. To introduce various signals & transforms that are involved in audio & video communications.
2. To make students familiar with signal operations & system analysis which are used in communications & signal processing.

UNIT-I

SIGNAL ANALYSIS : Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Classification of signals, Singularity functions, Concept of Impulse function, Unit step function, Signum function.

UNIT-II

FOURIER SERIES : Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum.

UNIT-III

FOURIER TRANSFORMS : Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, Properties of Fourier transforms, Fourier transforms involving impulse function and Signum function, Introduction to Hilbert Transform.

UNIT-IV

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS: Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT-V

CONVOLUTION AND CORRELATION OF SIGNALS: Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density

spectrum, Relation between auto correlation function and energy/power spectral density function, Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT-VI

SAMPLING: Sampling theorem – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT-VII

LAPLACE TRANSFORMS: Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC), constraints on ROC for various classes of signals, Properties of L.T's. Relation between L.T's, and F.T. of a signal, Laplace transform of certain signals using waveform synthesis.

UNIT-VIII

Z–TRANSFORMS: Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms, Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

Text Books:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
3. Signals & Systems – K.Raja Rajeswari, B.Visvesvara Rao, PHI -2009.
4. Signals & Systems – P.Rama Krishna Rao, TMH.

References:

1.Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition.
2.Network Analysis - M.E. Van Valkenburg, PHI Publications, 3rd Edn., 2000.
3.Signals & Systems Analysis Using Transformation Methods & MAT Lab – Robert, TMH, 2003.
4.Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, Pearson education. 3rd Edition, 2004.

ELECTRICAL TECHNOLOGY

CODE: AEE1137	**L**	**T**	**P**	**C**
	4	**1**	**0**	**4**

Aim: To familiarize the student with the principles of Electro-Mechanical Energy Conversion with D.C, A.C Machines that find wide application in industry. The course covers construction, Principle of D.C, A.C Machines and Instruments.

Objective: In this course the different types of Instruments, DC generators, DC motors, Induction Motors, Alternators and Single Phase Motors which are widely used in industry are covered and their performance aspects will be studied.

UNIT-I:
DC GENERATORS
Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators

UNIT-II:
DC. MOTORS
DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT-III:
TRANSFORMERS
Principle of operation of single phase transformer – types – Constructional features – Phasor diagram on No Load and Load – Equivalent circuit

UNIT-IV:
PERFORMANCE OF TRANSFORMERS
Losses and Efficiency of transformer and Regulation–OC and SC tests – Predetermination of efficiency and regulation (Simple Problems).

UNIT –V:
THREE PHASE INDUCTION MOTOR
Principle of operation of three-phase induction motors –Slip ring and Squirrel cage motors – Torque equation-Slip-Torque characteristics – Efficiency calculation – Starting methods.

UNIT –VI:
SYNCHRONOUS MACHINES
Constructional features – Principle of operation – Types - EMF Equation – Distribution and Coil span factors – Armature parameters-armature resistance-synchronous reactance-phasor diagram-unity power factor-lagging power factor –leading power factor-Predetermination of

regulation by Synchronous Impedance Method – OC and SC tests-principle of operation of synchronous motors.

UNIT- VII:
SINGLE PHASE INDUCTION MOTORS
Principle of operation - Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics.

UNIT-VIII:
ELECTRICAL INSTRUMENTS
Types of instruments (Indicating, integrating, Recording) - Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters and Voltmeters) wattmeters and energy meters.
Text Books:

1.“M.S Naidu and S.Kamakshaiah” Introduction to Electrical Engineering –, TMH Publ.
2. **“**Vincent Del Toro”, Electrical Engineering Fundamentals, PHI Publishers second Edition.

References:

1. “V.K Mehta” Principles of Electrical Engineering, Scand Publications.
2. “I.J. Nagrath and D.P Kothari”, Theory and Problems of Basic Electrical Engineering, PHI Publications.
3. “David V. Kerns, JR. J. David Irwin”, Essentials of Electrical and Computer Engineering.

PULSE AND DIGITAL CIRCUITS

Course Code: AEC1105	**L**	**T**	**P**	**C**
	4	**1**	**0**	**4**

Aim & Objectives:

1. To design Linear & Non Linear waveshaping Circuits.
2. To design Logic circuits using semiconductor devices.
3. Generation of various waveforms.

UNIT -I
LINEAR WAVESHAPING
Low pass &High pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs, RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT -II
NON-LINEAR WAVE SHAPING
Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT -III
SWITCHING CHARACTERISTICS OF DEVICES
Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

UNIT -IV
MULTIVIBRATORS
Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using transistors.

UNIT -V
TIME BASE GENERATORS
General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators.

UNIT-VI
SYNCHRONIZATION AND FREQUENCY DIVISION
Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals, Sine wave frequency division with a sweep circuit.

UNIT-VII
SAMPLING GATES
Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates.

UNIT -VIII
REALIZATION OF LOGIC GATES USING DIODES & TRANSISTORS
AND, OR gates using Diodes, Resistor, Transistor Logic, Diode Transistor Logic.

Text Books:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill, 1991.
2. Pulse and Digital Circuits – A. Anand Kumar, PHI

References:

1. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002
2. Wave Generation and Shaping - L. Strauss.
3. Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman.

SWITCHING THEORY AND LOGIC DESIGN

	L	T	P	C
Course Code : AEC1106	**4**	**1**	**0**	**4**

Aim & Objectives:

1. To design combinational & sequential digital circuits used in digital systems.
2. To introduce programmable logic devices.

UNIT -I
NUMBER SYSTEMS & CODES:
Philosophy of number systems – complement, representation of negative numbers,binary arithmetic,binary codes,error detecting & error correcting codes,hamming codes.

UNIT -II
BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS:
Fundamental postulates of Boolean Algebra, Basic theorems and properties, switching functions,Canonical and Standard forms,Algebraic simplification digital logic gates, properties of XOR gates,universal gates,Multilevel NAND/NOR realizations.

UNIT -III
MINIMIZATION OF SWITCHING FUNCTIONS:
Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime –Implicants chart, simplification rules.

UNIT -IV
COMBINATIONAL LOGIC DESIGN:
Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX Realization of switching functions, Parity bit generator, Code-converters, Hazards and hazard free realizations.

UNIT -V
PROGRAMMABLE LOGIC DEVICES, THRESHOLD LOGIC:
Basic PLD's-ROM, PROM, PLA, PAL Realization of Switching functions, Capabilities and limitations of Threshold gate, Synthesis of Threshold functions, Multigate Synthesis.

UNIT -VI
SEQUENTIAL CIRCUITS - I:
Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples), Basic flip-flops-Triggering and excitation tables, registers, shift registers, Steps in synchronous sequential circuit design, synchronous counters, ripple counters.

UNIT -VII

SEQUENTIAL CIRCUITS - II:

Design of modulo-N Ring & Shift counters, Serial binary adder, sequence detector, Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified sequential machines, Partition techniques, incompletely specified sequential machines using merger table.

UNIT -VIII

ALGORITHMIC STATE MACHINES:

Salient features of the ASM chart, Simple examples, System design using data path and control subsystems, control implementations, examples of weighing machine and binary multiplier.

Text Books:

1. Digital Design – Morris Mano, PHI, 3rd Edition, 2006.
2. Switching & Finite Automata theory – Zvi Kohavi, TMH, 2nd Edition.
3. Digital Electronics – R.P.Jain.

References:

1.An Engineering Approach to Digital Design – Fletcher, PHI. Digital Logic – Application and Design – John M. Yarbrough, Thomson.

2.Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.

3.Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006.

ELECTRONIC CIRCUITS LAB

Course Code: AEC1107

L	T	P	C
0	0	3	2

Aim & Objective:

To design & implement various electronic circuits such as amplifiers and oscillators.Design and Simulation in Simulation Laboratory using Multisim OR Pspice OR Equivalent Simulation Software and Testing in the Hardware Laboratory.

1. CE Amplifier
2. CC Amplifier (Emitter Follower).
3. Two stage R-C coupled Amplifier.
4. Feed back amplifier (Current Series).
5. Feedback amplifier (Voltage Series).
6. Feedback amplifier (Current Shunt).
7. Feedback amplifier (Voltage Shunt)
8. FET amplifier (Common Source)
9. Wien Bridge Oscillator
10. RC Phase Shift Oscillator
11. Colpitts Oscillator.
12. Crystal Oscillator
13. Class A Power Amplifier (Transformer less)
14. Class B Complementary Symmetry Amplifier
15. Series Voltage Regulator
16. Shunt Voltage Regulator
17. Tuned Amplifier

Note: Any **TEN** of the above experiments are to be conducted.

ELECTRICAL TECHNOLOGY LAB

Course Code: AEE1138

L	T	P	C
0	0	3	2

Aim: To introduce the Network theorems and AC & DC Machines basic concepts.

Objective: The Lab is intended for the students to get hands on experience in dealing with Network theory, AC & DC Machines and their performance.

PART – A

1. Verification of Kirchhoff's laws.
2. Series Resonance – Resonant frequency, Bandwidth and Q-factor determination for RLC network.
3. Time response of first order R-L and R-C network for periodic Non-sinusoidal inputs – time constant and steady state error determination.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of Maximum power transfer theorem.
6. Experimental determination of Thevenin's equivalent circuits and verification by direct test.

PART – B

1. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance and critical speed.
2. Swinburne's Test on DC shunt machine.
3. Brake test on DC shunt motor.
4. OC & SC tests on Single-phase transformer.
5. Brake test on 3-phase Induction motor.
6. Regulation of alternator by synchronous impedance method.

Note: Any **FIVE** experiments from Part-A and **FIVE** experiments from Part-B are to be conducted.

MATHEMATICS – IV
(Common to **ECE, EEE**)

Course Code: ABM1107	**L**	**T**	**P**	**C**
	4	**0**	**0**	**4**

UNIT-1

Probability

Probability Introduced through Sets and Relative Frequency, Joint and Conditional Probability, Independent Events, Combined Experiments.
(1.3 – 1.6 of [1])

UNIT-II

Random Variable-Expectation

The Random Variable Concept, Distribution Function, Density Function, The Gaussian Random Variable, Conditional Distribution and Density Function, Expectation, Transformations of a Random Variable.
(2.1 –2.4, 2.6, 3.1, 3.2, 3.4 of [1])

UNIT-III

Multiple Random Variables

Vector Random Variables, Joint Distribution and Its Properties, Joint Density and Its Properties, Conditional Distribution and Density, Statistical Independence, Distribution and Density of a sum of Random Variables, Central Limit Theorem (without proof).
(4.1 – 4.7 of [1])

UNIT-1V

Operations on Multiple Random Variables

Expected Value of a Function of Random Variables, Jointly Gaussian Random Variables, Transformations of Multiple Random Variables.
(5.1, 5.3, 5.4 of [1])

UNIT- V
Random Process – Temporal Characteristics

The Random Process Concept, Stationarity and Independence**,** Correlation Functions, Measurement of Correlation Functions, Gaussian Random Processes, Poisson Random Process.
(6.1 – 6.6 of [1])

UNIT- VI

Solution of Algebraic and Transcendental equations

Introduction to Numerical Methods, Solution of algebraic and transcendental equations- Bisection method, method of false position, Newton's method, Iteration method, Finite differences, Differences of a polynomial, Difference operators.
(28.1, 28.2, 29.1, 29.2 & 29.4 of [2])

UNIT-VII

Interpolation

Newton's interpolation formulae, Central difference interpolation formulae, Interpolation with unequal intervals – Lagrange's formula, Newton's divided difference formula, Inverse interpolation.
(29.5, 29.6, 29.8& 29.9 of [2])

UNIT-VIII

Numerical Differentiation and Integration

Numerical differentiation, Numerical Integration – Newton-cote's formula, Trapezoidal rule, Simpson's $1/3^{rd}$ rule, Simpson's $3/8^{th}$ rule, Weddle's rule.
(29.10, 29.12 of [2])

Text Books:

[1] Peyton Z. Peebles, Jr., Ph.D. "Probability, Random Variables and Random Signal Principles", 4^{th} Edition, Tata McGraw-Hill Publishing Company Limited.

[2] Dr.B.S.Grewal "Higher Engineering Mathematics", 40^{th} Edition, Khanna Publishers.

Reference Books:

1.Probability, Random variables and Stochastic processes- Athanasios Papoulis and S.Unnikrishna Pillai, PHI, 4^{th} Edition 2002.
2.Numerical Methods form scientific and Engineering Computation, M.K.Jain, S.R.K.Iyengar and R.K.Jain, New age International Publishers.
3.Introductory Methods of Numerical Analysis by S. S. Sastry, Prentice Hall India Pvt., Limited.

DIGITAL IC APPLICATIONS

	L	T	P	C
Course Code: AEC1108	**4**	**1**	**0**	**4**

Aim & Objectives:

1. Familiarization of various Digital Logic families
2. Design of digital circuits using VHDL Programming.

UNIT -I
LOGIC FAMILIES:
Introduction to logic families, RTL, DCTL, DTL, HTL, IIL, TTL, Schottky TTL and Emitter coupled logic, NMOS, PMOS, CMOS logic, Comparison of logic families.

UNIT -II
CMOS INTERFACING:
CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Familiarity with standard 74xx and CMOS 40xx series ICs—specifications.

UNIT -III
VHDL HARDWARE DESCRIPTION LANGUAGE:
Design flow, program structure, types and constants, functions and procedures, libraries and packages.

UNIT -IV
VHDL DESIGN ELEMENTS:
Structural design elements, data flow design elements, behavioral design elements, time dimension and simulation synthesis.

UNIT -V
COMBINATIONAL LOGIC DESIGN:
Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, Basic Concepts of ALUs, Combinational multipliers, VHDL models for the above ICs.

UNIT -VI
DESIGN EXAMPLES:
Design examples (using VHDL) - Barrel shifter, comparators, floating-point encoder,

dual parity encoder.

UNIT -VII
SEQUENTIAL LOGIC DESIGN:
Latches and flip-flops, PLDs, counters, shift register, and their VHDL models, synchronous design methodology, impediments to synchronous design.

UNIT -VIII
MEMORIES:
ROM - Internal structure, 2D-decoding commercial types, timing and applications.
Static RAM - Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS.
Dynamic RAM **-** Internal structure, timing, synchronous DRAMs.

Text Books:

1.Digital Design Principles & Practices – John F.Wakerly, PHI/Pearson Education Asia, 3rd Ed., 2005.
2.VHDL Primer –J.Bhasker, Pearson Education / PHI, 3rd Edition.

References:

1. Digital System Design Using VHDL – Charles H. Roth Jr., PWS Publications, 1998.
2. Introduction to Logic Design – Alan B. Marcovitz, TMH, 2nd Edition,2005.
3. Fundamentals of Digital Logic with VHDL Design—Stephen Brown and Zvonko Vramesic., McGraw Hill, 2nd Edition. 2005.
4. Modern Digital Electronics – R.P.Jain, Mc Graw Hill, 3rd Edition, 2006.

ANALOG COMMUNICATIONS

	L	T	P	C
Course Code : AEC1109	**4**	**1**	**0**	**4**

Aim & Objective:

To impart the knowledge about different modulation & demodulation techniques which are
used in analog communication systems.

UNIT -I
INTRODUCTION :
Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

UNIT -II
DSB MODULATION AND DEMODULATION:
Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop.

UNIT -III
SSB MODULATION AND DEMODULATION:
Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT -IV
ANGLE MODULATION:
Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave.

UNIT -V

GENERATION AND DETECTION OF FM:

Generation of FM Waves: Direct (Parameter Variation) and Indirect (Armstrong) methods, Detection of FM Waves: Single slope detector, Stagger tuned detector, Foster-Seeley discriminator, Ratio detector, Zero crossing detector, Phase locked loop, Comparison of PM, FM & AM.

UNIT -VI

MODELING OF NOISE SOURCES:

Resistive (Thermal) Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Effective Noise Temperature of cascaded networks**,** Antenna as a Noise Source, Modeling of Practical Noisy Networks: Average Noise Figures, Relationship between Average Noise Figure and Effective Noise Temperature, Average Noise Figure of cascaded networks.

UNIT -VII

NOISE IN MODULATION SYSTEM:

Noise in Analog communication System, System Noise in AM System, Noise in DSB System & Noise in SSB System, Introduction to Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.

UNIT -VIII

PULSE MODULATION:

Time Division Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity), PWM: Generation & demodulation of PWM (Direct and Indirect methods), PPM, Generation and demodulation of PPM.

Text Books:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed.
2. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 2007 3rdEdition.
3. Communication Systems – B.P. Lathi, BS Publication, 2006.
4. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.

References:

1. Communication Systems Second Edition – R.P. Singh, SP Sapre, TMH, 2007.
2. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.

LINEAR IC APPLICATIONS

	L	T	P	C
Course Code : AEC1110	**4**	**1**	**0**	**4**

Aim & Objective:

1.Study of linear ICs for various applications.
2.To design the analog electronic circuits such as amplifiers, oscillators, filters using linear ICs.

UNIT -I
DIFFERENTIAL AMPLIFIERS:
Differential Amplifier- DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

UNIT - II
INTEGRATED CIRCUITS:
Integrated circuits-Types, Classification, Package Types and temperature ranges, Power supply requirements, Op-amp Block Diagram, Characteristics of OP-Amps, ideal and practical Op-amp specifications, DC and AC characteristics: 741 op-amp & its features, Op-Amp parameters & their measurements, Input & Output Offset voltages & currents, slew rate, CMRR, PSRR, drift, Frequency Compensation techniques.

UNIT -III
LINEAR APPLICATIONS OF OP- AMPS:
Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, Voltage to current and current to Voltage converters, Buffers.

UNIT -IV
NON-LINEAR APPLICATIONS OF OP- AMPS:
Comparators, Schmitt Trigger, Multivibrators, Triangular and Square wave generators, Log and Anti log amplifiers, Precision rectifiers.

UNIT -V
FILTERS AND OSCILLATORS:
Introduction, Butter worth filters – 1st order, 2nd order LPF, HPF filters, Band pass, Band reject and all pass filters, Oscillators – Introduction, classification: RC and Wien bridge oscillators, VCO (566).

UNIT -VI

TIMERS & PHASE LOCKED LOOPS:

Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, 555 timer as Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators.

UNIT -VII

D to A & A to D CONVERTERS :

Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC Specifications, IC AD574 (12 bit ADC).

UNIT -VIII

VOLTAGE REGULATORS :

Voltage Regulator Types, Fixed and Variable voltage regulators, IC723 voltage regulator, Three Terminal Voltage Regulators – IC 7805, Switching Regulator IC 1723, Balanced modulator IC 1496.

Text Books:

1. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 1987.
2. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.

References:

1. Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 1988.
2. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, PHI, 6th Edition.
3. Micro Electronics – Millman, McGraw Hill,1988.
4. Operational Amplifiers – C.G. Clayton, Butterworth & Company Publ. Ltd./ Elsevier, 1971.

COMPUTER ORGANIZATION

	L	T	P	C
Course Code : ACT1104	**4**	**1**	**0**	**4**

Aim: To give detailed information about the structure of computers and internal organization of different units regarding memory I/O devices register. Student will get an idea about the internal organization of the computer system and its internal operations.

Objective: Student will get an idea about the internal organization of the computer system and its internal operations.

UNIT -I

BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional unit, Basic OPERATIONAL concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation, Fixed Point Representation. Floating – Point Representation. Error Detection codes.

UNIT -II

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro-operations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions – Instruction cycle.

Memory – Reference Instructions. Input – Output and Interrupt. STACK organization. Instruction formats. Addressing modes, DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

UNIT -III

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Microprogrammed control.

UNIT -IV

COMPUTER ARITHMETIC: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit Decimal Arithmetic operations.

UNIT -V

THE MEMORY SYSTEM: Basic concepts semiconductor RAM memories. Read-only memories Cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID.

UNIT -VI

INPUT-OUTPUT ORGANIZATION: Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input –Output Processor (IOP) Serial communication; Introduction to peripheral component, Interconnect (PCI) bus. Introduction to standard serial communication protocols like RS232, USB, IEEE1394.

UNIT -VII

PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

UNIT -VIII

MULTI PROCESSORS: Characteristics or Multiprocessors, Interconnection Structures, Interprocessor Arbitration. InterProcessor Communication and Synchronization Cache Coherance, Shared Memory Multiprocessors.

Text Books :

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI.

References :

1.Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2.Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3.Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
4.Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier
5.Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

EM WAVES AND TRANSMISSION LINES

Course Code: AEC1111	**L**	**T**	**P**	**C**
	4	**1**	**0**	**4**

Aim & Objective:

To impart the fundamental knowledge about the Static & Time varying fields used in different media such as free space, transmission lines and wave guides.

UNIT -I
ELECTROSTATICS
Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Related Problems, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial, Spherical Capacitors.

UNIT -II
MAGNETOSTATICS
Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy.

UNIT -III
MAXWELL'S EQUATIONS (Time Varying Fields)
Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric-Dielectric, Dielectric-Conductor and conductor-free space Interfaces.

UNIT -IV
EM WAVE CHARACTERISTICS - I
Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations between E & H. Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media. Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization.

UNIT -V

EM WAVE CHARACTERUISTICS – II

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem – Applications.

UNIT -VI

TRANSMISSION LINES - I

Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Loss less ness /Low Loss Characterization, Distortion – Condition for Distortionless and Minimum Attenuation, Loading - Types of Loading.

UNIT -VII

TRANSMISSION LINES – II

Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR, UHF Lines as Circuit Elements; λ/4, λ/2, λ/8 Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single and Double Stub Matching.

UNIT -VIII

WAVEGUIDES

Introduction, TE, TM, TEM Modes - Concepts and Analysis, Cut-off Frequencies, Velocities, Wavelengths, Wave Impedances. Attenuation Factor – Expression for TE, TM and TEM Case. Circular waveguides (qualitative treatment).

Text Books:

1. Elements of Electro magnetics – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech. India Publications), New Delhi, 2001.
4. Electromagnetic Field Theory and Transmission Lines – G.S.N. Raju, Pearson Edn. Pte. Ltd., 2005.

References :

1. Engineering Electromagnetics – Nathan Ida, Springer (India) Pvt. Ltd., New Delhi, 2nd ed., 2005.
2. Networks, Lines and Fields – John D. Ryder, PHI, 2nd ed., 1999.
3. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.

IC and PDC LAB

CODE: AEC1112	**L**	**T**	**P**	**C**
	0	**0**	**3**	**2**

Aim & Objective:

1. To design analog circuits using linear ICs for various applications.
2. To design electronic circuits for generation of linear and non –linear wave forms using discrete components.
3. Linear wave shaping.
4. Non Linear wave shaping – Clippers and Clampers.
5. Astable Multivibrator.
6. Monostable Multivibrator.
7. Schmitt Trigger.
8. Bootstrap sweep circuit.
9. Integrator and differentiator using IC 741
10. Band Pass and Band stop filters using IC 741.
11. Function Generator using IC 741.
12. Astable and Monostable Multivibrator using 555 Timer.
13. PLL Using IC 565.
14. Voltage regulator using IC 723.
15. Study of Logic Gates using Discrete components.
16. 4-bit D/A converter.

Note: Any **TEN** of the above experiments are to be conducted.

ANALOG COMMUNICATIONS LAB

CODE: AEC1113	**L**	**T**	**P**	**C**
	0	**0**	**3**	**2**

Aim & Objectives:

To design various modulation & demodulation processes using different methods used in analog communication systems.

1. Amplitude modulation and demodulation.
2. MAT LAB Simulation of Amplitude modulation and demodulation
3. Frequency modulation and demodulation.
4. Balanced modulator.
5. MATLAB Simulation of DSB-SC Modulation and Demodulation
6. Pre-emphasis & de-emphasis.
7. Characteristics of mixer.
8. Digital Phase detector.
9. Phase locked loop.
10. Synchronous detector.
11. SSB system.
12. Spectral analysis of AM and FM signals using spectrum analyzer.
13. Squelch Circuit.
14. Frequency Synthesizer.
15. AGC Characteristics.

Note: Minimum **TEN** experiments should be conducted.