B.Tech.

in

ELECTRONICS AND COMMUNICATION ENGINEERING (ECE)

Scheme of Instruction, Examination and Syllabi

of

III and IV Semesters

Academic Year: 2022-23

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

Affiliated to JNTUH; Accredited by NAAC with 'A' Grade; 6 U.G. Programs

Accredited by NBA

Kokapet (Village), Gandipet (Mandal), Hyderabad-500075, Telangana

email: principal@mgit.ac.in Website: www.mgit.ac.in Ph: 040-24193057 / 067

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Electronics and Communication Engineering
Scheme of Instruction and Examination

III Semester

S.No.	Course Code	Course Title	Instruction Hours Per Week			Examination Max. Marks		Examination Duration of SEE in Hours	Credits
			L	T	P/D	CIE	SEE		
1	EC301PC	Electronic Devices and Circuits	3	1	0	30	70	3	4
2	EC302PC	Network Analysis and Transmission Lines	3	0	0	30	70	3	3
3	EC303PC	Digital System Design	3	1	0	30	70	3	4
4	EC304PC	Signals and Systems	3	0	0	30	70	3	3
5	EC305PC	Probability Theory and Stochastic Processes	3	0	0	30	70	3	3
6	MC301HS	Constitution of India	3	0	0	30	70	3	0
7	EC351PC	Electronic Devices and Circuits Lab	0	0	2	30	70	3	1
8	EC352PC	Digital System Design Lab	0	0	2	30	70	3	1
9	EC353PC	Basic Simulation Lab	0	0	2	30	70	3	1
10	EN351HS	Finishing School -I	0	0	2	30	70	3	1
Total Hours/Marks/Credits			**18**	**2**	**8**	**300**	**700**	**-**	**21**

L: Lecture **T**: Tutorial **D**: Drawing **P**: Practical
CIE - Continuous Internal Evaluation **SEE** - Semester End Examination

L	T	P	C
3	1	0	4

III Semester Syllabus
EC301PC: Electronic Devices and Circuits
(Common to ECE & MCT)

Course Objectives

- To introduce components such as diodes, BJTs and FETs.
- To know the applications of components.
- To know the switching characteristics of components
- To give understanding of various types of amplifier circuits.

Course Outcomes

Upon successful completion of the course, students will be able to

- Know the characteristics of various components.
- Understand the utilization of components.
- Understand the biasing techniques
- Design and analyze small signal amplifier circuits.

Unit-I: Diode and Applications

Diode equation, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Derivation of Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times.

Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, comparison of rectifiers, Rectifiers with filter, Derivation for ripple factor with capacitor filter and Inductive Filters, Problems related to capacitor and inductor filter, **Clippers & Clampers-**Clipping at two independent levels, Transfer function, Clamper-Clamping Operation, Types of Clampers, Clamping Circuit Theorem, problems on clippers and clampers.

Unit-II: Bipolar Junction Transistor (BJT)

BJT:Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector Configurations, Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Collector to Base Bias, Self Bias, Stability factor, Bias Stability, Problems related to Biasing, Bias Compensation using Diodes, Transistor as a switch, switching times.

Unit-III: Junction Field Effect Transistor (FET), Special Purpose Devices

Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Comparison of BJT and FET, Biasing of FET-Fixed Bias, Self Bias and Voltage divider Bias, FET as Voltage Variable Resistor.

Special Purpose Devices: Zener Diode - **V-I** Characteristics, Zener diode as Voltage Regulator, SCR-Principle of Operation, V-I Characteristics, Applications, Tunnel diode-Principle of Operation, V-I Characteristics, UJT- Principle of Operation, V-I Characteristics and applications, Varactor Diode.

Unit-IV: Analysis and Design of Small Signal Low Frequency BJT Amplifiers

BJT modelling, Hybrid model, Determination of h-parameters from transistor characteristics, Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors, Comparison of CE, CB and CC configurations.

Unit-V: FET Amplifiers

Small Signal Model**,** Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers. MOSFET- Depletion and Enhancement type MOSFET, Volt- Ampere Characteristic of Enhancement and Depletion mode, Basic Concepts of MOSFET Amplifiers.

Suggested Readings:

1. Millman, Jacob, Electronic Devices and Circuits, McGraw Hill Education
2. Robert, L. Boylestead, Louis Nashelsky, Electronic Devices and Circuits theory, Pearson**,** 11th Edition, 2009.

Reference Books:

1. Horowitz, The Art of Electronics, Cambridge University Press, 3rd Edition.
2. Bell, David A., Electronic Devices and Circuits, Oxford, 5th Edition.
3. Millman, J., Taub, H., and Mothiki S. Rao, Prakash, Pulse, Digital and Switching Waveforms , Mc Graw Hill, 2nd Ed., 2008.

L	T	P	C
3	0	0	3

III Semester Syllabus
EC302PC: Network Analysis and Transmission Lines

Course Objectives

- ∉ To understand the basic concepts on RLC circuits.
- ∉ To know the behaviour of the steady states and transients states in RLC circuits.
- ∉ To understand the two port network parameters.
- ∉ To study the propagation, reflection and transmission of plane waves in bounded and unbounded media.

Course Outcomes

Upon successful completion of the course, students will be able to

- Gain the knowledge on basic RLC circuit's behavior.
- Analyze the Steady state and transient analysis of RLC Circuits.
- Know the characteristics of two port network parameters.
- Analyze the transmission line parameters and configurations.

Unit-I

Network Topology, Basic cut-set and tie-set matrices for planar networks, Magnetic Circuits, Self and Mutual inductances, dot convention, coefficient of coupling, impedance, reactance concept, Impedance transformation and coupled circuits, equivalent T for Magnetically coupled circuits, Ideal Transformer.

Unit-II

Transient and Steady state analysis of RC and RL Circuits, Sinusoidal, Step and Square responses. RC Circuits as integrator and differentiators. 2^{nd} order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

Unit-III

Two port network parameters, Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions– using transformed (S) variables, Poles and Zeros, Standard T, π , L Sections, Design of Attenuators, impedance matching network.

Unit-IV

Transmission Lines - I: Types, Parameters, Transmission Line Equations, equivalent circuit, Primary & Secondary Constants, Equivalent Circuit, Characteristic Impedance,

Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Types of Distortion, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading.

Unit-V

Transmission Lines – II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. λ/4, λ/2, λ/8 Lines – Impedance Transformations, Smith Chart – Configuration and Applications, Single Stub Matching.

Suggested Readings:

1. Valkenburg, Van, Network Analysis –3rd Ed., Pearson, 2016.
2. Ryder, J. D., Networks, Lines and Fields - PHI, 2nd Edition, 1999.

Reference Books:

1. Edminister, J., and Nahvi, M., Electric Circuits – Schaum's Outlines, Mc Graw Hills Education, 1999.
2. Hayt, William, and Kemmerly, Jack E., Engineering Circuit Analysis, MGH, 8th Edition, 1993.
3. Kraus, J. D., Electromagnetics with Applications TMH, 5th Ed.
4. Sinha Umesh, Transmission Lines and Networks, Satya Prakashan, (Tech. India Publications), New Delhi, 2001.

L	T	P	C
3	1	0	4

III Semester Syllabus
EC303PC: Digital System Design

Course Objectives

- To understand common forms of number representation in logic circuits
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand the concepts of combinational logic circuits and sequential circuits.
- To understand the Realization of Logic Gates Using Diodes & Transistors.

Course Outcomes

Upon completing this course, the student will be able to

- Understand the numerical information in different forms and Boolean Algebra theorems
- Postulates of Boolean algebra and to minimize combinational functions
- Design and analyze combinational and sequential circuits
- Known about the logic families and realization of logic gates.

Unit-I: Number Systems

Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.

Boolean Algebra: Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations.

Unit-II: Minimization of Boolean functions, Combinational Logic Circuits

Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method.

Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, De-multiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.

Unit-III: Sequential Circuits Fundamentals, Registers and Counters

Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T-Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring

Counter, Design and Operation of Asynchronous and Synchronous Up and Down Counters.

Unit-IV: Sequential Machines

Synchronous Modulo N–Counters, Moore and Melay Circuits, Finite State Machines, Synthesis of Synchronous Sequential Circuits, Serial Binary Adder, Sequence Detector, Parity-bit Generator, Finite state machine-capabilities and limitations, Mealy and Moore models.

Unit-V: Realization of Logic Gates Using Diodes & Transistors

AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL (Totempole TTL,OPEN collector TTL), CML and CMOS Logic Families and its Comparison, Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate- Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

Suggested Readings:

1. Kohavi , Zvi and Jha, Niraj K., Switching and Finite Automata Theory, 3rd Edition, Cambridge, 2010.
2. Jain, R. P. Modern Digital Electronics, Tata McGraw-Hill, 3rd Edition, 2007.

Reference Books:

1. Mano, Morris, Digital Design, PHI, 4th Edition, 2006.
2. Fredriac, J. Hill, Peterson, Gerald R., Introduction to Switching Theory and Logic Design, John Wiley & Sons Inc, 3rd Ed.
3. Charles, H. Roth, Fundamentals of Logic Design, Cengage Learning, 5th, Edition, 2004.
4. Kumar, Anand A., Switching Theory and Logic Design, PHI, 2013.

L	T	P	C
3	0	0	3

III Semester Syllabus
EC304PC: Signals and Systems

Course Objectives

- To understand the basics of Signals and Systems required for all Electrical Engineering related courses.
- To understand the behaviour of signal in time and frequency domain
- To understand the characteristics of LTI systems
- To understand the concepts of Signals and Systems and its analysis using different transform techniques.

Course Outcomes

Upon completing this course, the student will be able to

- Differentiate various signal functions.
- Represent any arbitrary signal in time and frequency domain.
- Understand the characteristics of linear time invariant systems.
- Analyze the signals with different transform technique.

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 and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit-Step function, Signum function.

Unit-II: Fourier series, Fourier Transforms

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.

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 Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

Unit-III: 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 characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley- Wiener criterion for physical realization, Relationship between

Bandwidth and rise time, Convolution and Correlation of Signals, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.

Unit-IV: Laplace Transforms, Z–Transforms

Laplace Transforms: Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Z–Transforms: 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.

Unit-V: Sampling theorem, Correlation

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.

Correlation: Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, 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.

Suggested Readings:

1. Lathi, B.P., Signals, Systems and Communications, BSP, 2013.
2. Oppenheim, A.V., Willsky, A.S., and Nawabi, S. H., Signals and Systems, 2 Ed.

Reference Books:

1. Simon Haykin, Barry Van Veen, Signals and Systems, Wiley 2 Ed.
2. Rama Krishna Rao A., Signals and Systems, TMH, 2008.
3. Michel J. Robert., Fundamentals of Signals and Systems, MGH International Edition, 2008.
4. Philips, C. L., Parr, J.M., and Eve A. Riskin, Signals, Systems and Transforms, PE, 3rd Ed. 2004.
5. Rao, K. Deergha, Birkhauser, Signals and Systems, Springer, 2018.

L	T	P	C
3	0	0	3

III Semester Syllabus
EC305PC: Probability Theory and Stochastic Processes

Course Objectives

- This gives basic understanding of random signals and processing
- Utilization of Random signals and systems in Communications and Signal Processing areas.
- To know the Spectral and temporal characteristics of Random Process.
- To Learn the Basic concepts of Noise sources.

Course Outcomes

Upon completing this course, the student will be able to

- Understand the concepts of Probability and Random Variables.
- Perform various operations on Random Variables.
- Determine the Spectral and temporal characteristics of Random Signals.
- Understand the concepts of Noise in Communication systems.

Unit-I: Probability & Random Variable

Set definitions, Probability introduced through Sets and Relative Frequency: Operations, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical model of experiments, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events: two events, multiple events, *Random Variable*- Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

Unit-II: Operations on Single & Multiple Random Variables – Expectations

Expected Value of a Random Variable, Expected value of a Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic and Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Joint density function and its properties, marginal density functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence.

Sum of Two Random Variables, Sum of Several Random Variables, Central Limit

Theorem, (Proof not expected). Unequal Distribution, Equal Distributions. Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

Unit-III: Random Processes – Temporal Characteristics

The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean- Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross- Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross- Correlation Functions of Input and Output.

Unit-IV: Random Processes – Spectral Characteristics

The Power Spectrum: Properties, Bandwidth of power density spectrum, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

Unit-V: Noise Sources & Information Theory

Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties. Information, Entropy and its properties, Information rate, Source coding: Huffman coding, Shannon Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR.

Suggested Readings:

1. Peebles, Peyton Z., Probability, Random Variables & Random Signal Principles - TMH, 4th Edition, 2001.
2. Taub and Schilling, Principles of Communication systems, TMH, 2008.

Reference Books:

1. Bruce Hajck, Random Processes for Engineers, Cambridge Uni press, 2015.
2. Papoulis, Athanasios and Pillai, Unnikrishna S., Probability, Random Variables and Stochastic Processes, PHI, 4th Edition, 2002.

3. Murugesan, K., Guruswamy, P., Probability, Statistics & Random Processes- Anuradha Agencies, 3rd Edition, 2003.
4. Lathi, B.P., Signals, Systems & Communications - B.S. Publications, 2003.
5. Xavier S.P. Eugene, Statistical Theory of Communication –, New Age Publications, 2003.

L	T	P	C
3	0	0	0

III Semester Syllabus
MC301HS: Constitution of India
(Common to CE, EEE, ME, ECE, MCT & MME)

Course Objectives

- Students will get to know about the history of Indian Constitution
- Students will get to know about President election and his Powers
- Students will get to know about Council of Ministers and their election Procedure and their Powers and Responsibilities
- Students will get know about Judicial System in India
- Students will get know about Panchayat-raj System in India

Course Outcomes

- This enables the Students to know about the Rights of Citizen.
- This enables the Students to know about Fundamental Duties of People.
- This enables the Students to Know the Directive principles of State Policy.
- This enables the Students to know about Functioning of Parliament and its Powers.
- This enables the Students to know about various Constitutional bodies in India.

Course content

1. Meaning of the constitution, law and constitutionalism
2. Historical perspective of the Constitution of India
   - Drafting Committee
3. Salient features and characteristics of the Constitution of India
   - Preamble
   - Salient Features
   - Major Sources of Indian Constitution
4. Scheme of the fundamental rights
   - Article 13 to 32
   - Scheme of the Fundamental Right to Equality
   - Scheme of the Fundamental Right to certain Freedom
   - Scope of the Right to Life and Personal Liberty
5. The scheme of the Fundamental Duties and its legal status
   - List of Fundamental Duties
   - Justifiability of Fundamental Duties

6. The Directive Principles of State Policy – Its importance and implementation
   - Categories - Gandhian, Socialist and Liberal Principles
   - Significance of Directive Principles of State Policy
   - Relation between Fundamental rights and Directive Principles of State Policy
7. Federal structure and distribution of legislative and financial powers between the Union and the States
   - Union List
   - State List
   - Concurrent List
   - Residuary Powers
8. Parliamentary Form of Government in India.
9. The constitutional powers and status of the President of India vs the constitutional powers and status of the Council of ministers headed by the Prime Minister
10. Amendment of the Constitution and its Procedure
    - Procedure of Amendment to Constitution of India
    - Important Amendments
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
    - Urban local Self Government
    - Rural local Self Government
13. Important Constitutional Bodies
    - Election Commission of India
    - Finance Commission of India
    - Union Public Service Commission
    - C-AG

Suggested Readings:

1. Subhash Kashyap, Our Constitution, National Book Trust, 5th Edition, Reprint- 2017.
2. V. N Shukla, The Constitution of India, Law literature Publication, 11th Edition, 2020.

Reference Books:

1. M P Jain, Indian Constitutional Law, Lexis Nexis, 8th Edition, 2018.
2. Samaraditya Pal, Indian Constitution-Origin & Evolution, Lexis Nexis, 1st Edition, 2019.

L	T	P	C
0	0	2	1

III Semester Syllabus
EC351PC: Electronic Devices and Circuits Lab
(Common to ECE & MCT)

Course Objectives

- To familiarize with various circuit components, Display devices.
- To understand the characteristics of Diode, Zener Diode
- To understand the applications of diode as rectifiers, clippers and clampers.
- To understand the characteristics of BJT and FET
- To understand the Common Emitter Amplifier Characteristics

Course Outcomes

Upon completing of this course, the student will be able to:

- Illustrate the utility of various semiconductor devices, passive elements, circuit behaviour and parameters to be estimated.
- Identify specifications, choice of device and equipment required.
- Measurement of various diodes and transistor circuit characteristics.
- Set up different types of rectifier and Filter circuits and estimate of their performance characteristics.
- Design, develop and test BJT and FET amplifier circuits and estimate the Amplifier parameters.

List of Experiments (Twelve experiments to be done):

Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator
3. Full Wave Rectifier with & without filters
4. Input and output characteristics of BJT in CE Configuration
5. Input and output characteristics of FE in CS Configuration
6. Common Emitter Amplifier Characteristics
7. Common Base Amplifier Characteristics
8. Common Source amplifier Characteristics
9. Measurement of h-parameters of transistor in CB, CE, CC configurations
10. Switching characteristics of a transistor
11. SCR Characteristics.
12. Types of Clippers at different reference voltages
13. Types of Clampers at different reference voltages
14. The steady state output waveform of clampers for a square wave input

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30V.
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals.
4. Multimeters.
5. Electronic Components.

L	T	P	C
0	0	2	1

III Semester Syllabus
EC352PC: Digital System Design Lab

Course Objectives

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand the concepts of combinational logic circuits and sequential circuits.
- To understand the Realization of Logic Gates Using Diodes & Transistors.

Course Outcomes

Upon completing this course, the student will be able to

- Understand the numerical information in different forms and Boolean Algebra theorems
- Postulates of Boolean algebra and to minimize combinational functions
- Design and analyze combinational and sequential circuits
- Known about the logic families and realization of logic gates.

Note: Implement using digital ICs, all experiments to be carried out. List of Experiments

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Generation of clock using NAND / NOR gates
4. Design a 4-bit Adder / Subtractor
5. Design and realization of a 4-bit gray to Binary and Binary to Gray Converter
6. Design and realization of an 8 bit parallel load and serial out shift register using flip-flops.
7. Design and realization of a Synchronous counter using flip-flops
8. Design and realization of 3-bit Asynchronous counters using flip-flops
9. Design and realization of 8x1 MUX using 2x1 MUX
10. Design and realization of 4-bit comparator
11. Design and realization of UP/DOWN counter.
12. Design and Realization of a sequence detector-a finite state machine.

Major Equipments required for Laboratories:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply.
2. 20 MHz Oscilloscope with Dual Channel.
3. Bread board and components/ Trainer Kit.
4. Multimeter.

L	T	P	C
0	0	2	1

III Semester Syllabus
EC353PC: Basic Simulation Lab

Course Objectives

- This gives the basics of Signals and Systems required for all Electrical Engineering related courses.
- To understand the behaviour of signal in time and frequency domain
- To understand the characteristics of LTI systems
- This gives concepts of Signals and Systems and its analysis using different transform techniques.

Course Outcomes

Upon completing this course, the student will be able to

- Differentiate various signal functions.
- Represent any arbitrary signal in time and frequency domain.
- Understand the characteristics of linear time invariant systems.
- Analyze the signals with different transform technique.

Note:

- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 15 experiment are to be completed

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit-Impulse, Unit-Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of Unit-sample, Unit-step and Sinusoidal responses of the given LTI system and verifying its physical realiazability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.

12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
13. Verification of Sampling Theorem.
14. Removal of noise by Autocorrelation / Cross correlation.
15. Extraction of Periodic Signal masked by noise using Correlation.
16. Verification of Weiner-Khinchine Relations.

Major Equipments required for Laboratories:

1. Computer System with latest specifications connected.
2. Window XP or equivalent.
3. Simulation software-MATLAB or any equivalent simulation software.

L	T	P	C
0	0	2	1

III Semester Syllabus
EN351HS: Finishing School-I
(Common to all Branches)

Course Overview

In view of the growing importance of English as a tool for global Communication and the consequent emphasis on training students to acquire language skills, this syllabus has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

Course Objectives

The main objective of this finishing school curriculum is to provide content for developing the LSRW skills of language learning and to facilitate proficiency in both receptive and productive skills, among students.

Methodology:

- Every Session will have activities on all the four skills-Listening, Speaking, Reading and Writing.
- To personalize the learning a variety of case studies and structured problem solving activities will be given to small groups and the teachers will facilitate peer reviews.
- Continuous grading, peer review and positive reinforcement will be emphasized
- Vocabulary exercises will also be a part of every session
- All sessions are designed to be student-centric and interactive.

Unit-I: Fundamentals of Communication

Unit Overview:

This is an introductory module that covers the fundamentals of communication. This module is intended to enable the students to communicate using greetings and small sentences/queries.

Learning Outcomes:

The students should be able to:

- Respond to questions
- Engage in informal conversations.
- Speak appropriately in formal situations
- Write formal and informal emails/letters

Competencies:

- Greeting appropriately
- Introducing themselves, a friend
- Situational Dialogue writing
- Responding to simple statements and questions both verbally and in writing
- Writing an email with appropriate salutation, subject lines, introduction and purpose of mail.
- Using appropriate vocabulary for both formal and informal situations.
- JAM sessions.

Sessions:

1. Introduction to Formal and Informal Conversations (Listening Activity)
2. Informal Conversations
3. Informal Conversations - Writing
4. Formal Conversations
5. Formal Conversations – Writing
6. Grammar-Prepositions
7. Adjectives and Degrees of Comparison
8. Word formation: Prefixes and Suffixes

Unit–II: Rational Recap

Unit Overview:

The module enables the participants to organize their communication, structure their speaking and writing, explain their thoughts/ideas, and summarize the given information.

Learning Outcomes:

The students should be able to:

- Classify content and describe in a coherent form
- Recognize and list the key points in a topic/message/article.
- Compare and contrast using appropriate structure
- Explain cause and effect
- Use appropriate transitions in their presentations and written assignments

Competencies:

- Organizing the communication based on the context and audience
- Structuring the content based on the type of information.
- Explaining a technical/general topic in detail.
- Writing a detailed explanation/process
- Recapitulating

Sessions:

1. Introduction to Mind maps
2. Classification
3. Sequencing
4. Description and Enumeration

Unit-III: Narrations and Dialogues

Unit Overview:

The Module is intended to develop the desired level of language competence that enables them to narrate and participate in casual dialogues.

Learning Outcomes:

The students should be able to

- Narrate a message/story/incident, both verbally and in writing.
- Describe an event/a session/ a movie/ an object / image
- Understand Vocabulary in context

Competencies:

- Framing proper phrases and sentences to describe in context
- Reading Stories and articles and summarizing.
- Speaking fluently with clarity
- Listening for main ideas and reformulating information in his/her own words
- Drawing and write appropriate conclusions, post reading a passage.
- Speaking Reading and Writing descriptive sentences and paragraphs
- Using appropriate tenses, adjectives and adverbs in conversations and written tasks

Sessions:

Grammar: Verb, Tenses

1. Recalling and Paraphrasing
2. Describing Events
3. Describing Objects/ Places
4. Story Telling
5. Describing Hypothetical events

Unit-IV: Technical Expositions and Discussions

Unit Overview:

The module enables the students to build strategies for effective interaction and help them in developing decisive awareness and personality, maintaining emotional balance.

Learning Outcomes:

The students should be able to:

- Participate in Professional discussions by providing factual information, possible solutions, and examples.

Competencies:

- Comprehending key points of a topic and identifying main points including supporting details.
- Construct a logical chain of arguments and decisive points.
- Writing a review about a product by providing reasons, causes and effects

Sessions:

Based on Case Studies

1. Compare and Contrast
2. Cause and Effect
3. Problem and Solution

Unit-V: Drawing Conclusions

Unit Overview:

This module is intended to provide necessary inputs that enable the students to draw conclusions out of a discussion and provide reports.

Learning Outcomes:

Students should be able to:

- Provide logical conclusions to the topics under discussion.
- Prepare, present, and analyze reports.

Competencies:

- Reasoning skills - Coherent and logical thinking
- Reporting and Analyzing skills.
- Analyzing the points discussed.
- Connecting all points without gaps.
- Connectives
- Communicating the decisions

Sessions:

1. Report Writing
2. Reasoning
3. Analyzing
4. Generalization and Prediction
5. Précis writing

Reference Books:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan, Pearson 2007.
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning Pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. Mc Murrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.
10. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition.

IV Semester

S.No.	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1	MA406BS	Probability Distributions and Transform Calculus	3	1	0	30	70	3	4
2	EC401PC	Electromagnetic Fields and Waves	3	0	0	30	70	3	3
3	EC402PC	Analog and Digital Communications	3	1	0	30	70	3	4
4	EC403PC	Linear IC Applications	3	0	0	30	70	3	3
5	EC404PC	Electronic Circuit Analysis	3	0	0	30	70	3	3
6	EC451PC	Analog and Digital Communications Lab	0	0	2	30	70	3	1
7	EC452PC	IC Applications Lab	0	0	2	30	70	3	1
8	EC453PC	Electronic Circuit Analysis Lab	0	0	2	30	70	3	1
9	EN452HS	Finishing School-II	0	0	2	30	70	3	1
10	MC451HS	Gender Sensitization Lab	0	0	2	30	70	3	0
Total Hours/Marks/Credits			**15**	**2**	**10**	**300**	**700**	**--**	**21**

L: Lecture **T**: Tutorial **D**: Drawing **P**: Practical
CIE - Continuous Internal Evaluation **SEE** - Semester End Examination

L	T	P	C
3	1	0	4

IV Semester Syllabus
MA406BS: Probability Distributions and Transform Calculus
(Common to EEE & ECE)

Course Objectives

To learn
- The ideas of probability, random variables and various probability distributions and their properties. The concept of theoretical distributions.
- The sampling theory and testing of hypothesis and making inferences.
- Understand and Evaluate Laplace Transforms.
- Understand and Evaluate Fourier series.
- The concept of Fourier transforms and Z- Transforms.

Course Outcomes

After learning the contents of this course the student will be able
- Formulate and solve problems involving random variables.
- Understand the theoretical distributions.
- Apply statistical methods for analyzing experimental data.
- Application of Laplace Transforms.
- Application of Fourier series and Z-Transforms.

Unit - I: Probability Distributions

Random variables: Discrete and continuous random variables and their distributions functions, Expectation of Random Variables, Variance of random variables.

Binomial and Poisson distributions and its properties, Poisson approximation to the binomial distribution, Normal and exponential distributions and its properties. Normal approximation to Binomial distribution.

Unit - II: Testing of Hypothesis

Theory of Estimation: Test of significance- Basics of testing of Hypothesis, Null and Alternate Hypothesis, types of errors, level of significance, critical region; Large sample test -single mean, difference of means, single proportion, difference of proportions; Small sample test- single mean, difference of means.

Unit - III: Laplace Transforms

Laplace Transforms; Laplace Transform of standard functions, first shifting theorem, Laplace transforms of functions when they are multiplied and divided by ‘t’, Laplace

transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transforms of special functions, Laplace transform of periodic functions, Inverse Laplace transform and its properties, convolution theorem (without Proof), solving ODEs by Laplace Transform method.

Unit- IV: Fourier series

Introduction, Periodic functions, Fourier series of periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half range sine and cosine series.

Unit- V: Fourier& Z-Transforms

Fourier integral theorem (without proof), Fourier sine and cosine integrals, sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.
Z-transform, Inverse Z-transform, properties, initial, and final value theorems.

Suggested Readings:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and Statistics for engineers and scientists, 9th Edition, Pearson Publications,
3. Integral Transforms- by Vasishtha A.K (Author), Gupta R K (Author).
4. The Use of Integral Transforms Hardcover – January 1, 1972 by Ian N. Sneddon.

Reference Books:

1. Fundamentals of Mathematical Statistics, Khanna Publications, S. C. Gupta and V. K. Kapoor.
2. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations.
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Integral Transforms and Their Applications by Lokenath Debnath, Dambaru Bhatta.

L	T	P	C
3	0	0	3

IV Semester Syllabus
EC401PC: Electromagnetic Fields and Waves

Course Objectives

- To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields, and apply them to solve physics and engineering problems.
- To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
- To analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative media.
- To conceptually understand the waveguides and to determine the characteristics of rectangular waveguides, microstrip lines.

Course Outcomes

Upon completing this course, the student will be able to

- Get the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields.
- Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions.
- Analyze the Wave Equations for good conductors, good dielectrics and evaluate the UPW Characteristics for several practical media of interest.
- To analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical problems.

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. 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's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.

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 Forms, Conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces.

Unit-IV: EM Wave Characteristics

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definitions, Relation between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization.

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.

Unit-V: Waveguides

Electromagnetic Spectrum and Bands. Rectangular Waveguides – Solution of Wave Equations in Rectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Phase and Group Velocities, Wavelengths and Impedance Relations, Equation of Power Transmission, Impossibility of TEM Mode. Microstrip Lines – Z_O Relations, Effective Dielectric Constant.

Suggested Readings:

1. William H. Hayt Jr. and John A. Buck, Engineering Electromagnetic, 8th Ed., Mc Graw Hill, 2014.
2. Matthew N.O. Sadiku and Kulkarni, S.V., Principles of Electromagnetic, 6th Ed., Oxford University Press, Asian Edition, 2015.

Reference Books:

1. Jordan E.C., and Balmain, K.G., Electromagnetic Waves and Radiating Systems, PHI, 2nd Ed., 2000.
2. Nathan Ida, Engineering Electromagnetics Springer (India) Pvt. Ltd., New Delhi, 2nd Ed., 2005.

L	T	P	C
3	1	0	4

IV Semester Syllabus
EC402PC: Analog and Digital Communications

Course Objectives

- To develop ability to analyze system requirements of analog and digital communication systems.
- To understand the generation, detection of various analog and digital modulation techniques.
- To acquire theoretical knowledge of each block in AM, FM transmitters and receivers.
- To understand the concepts of baseband transmissions.

Course Outcomes

Upon completing this course, the student will be able to:

- Analyze and design of various continuous wave and angle modulation and demodulation techniques
- Attain the knowledge about AM , FM Transmitters and Receivers
- Analyze and design the various Pulse Modulation Techniques.
- Understand the concepts of Digital Modulation Techniques and Baseband transmission.

Unit-I: Amplitude Modulation

Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB- SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Coherent detection of SSB Wave, principle of Vestigial side band modulation.

Unit-II: Angle Modulation

Basic concepts of Angle Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Signal- Armstrong Method, Detection of FM Signal: Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis.

Unit-III: Transmitters, Receivers

Transmitters: Classification of Transmitters, AM Transmitters, FM Transmitters
Receivers: Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superheterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, FM Receiver, Comparison of AM and FM Receivers.

Unit-IV: Pulse Modulation, Pulse Code Modulation

Pulse Modulation: Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM. **Pulse Code Modulation:** PCM Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Companding, DPCM, DM and Adaptive DM, Noise in PCM and DM.

Unit-V: Digital Modulation Techniques, Baseband Transmission and Optimal Reception of Digital Signal

Digital Modulation Techniques: ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non- Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK and QAM.
Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception, ISI, Eye Diagrams.

Suggested Readings:

1. Simon Haykin, Analog and Digital Communications, John Wiley, 2005.
2. Tomasi Wayne, Electronics Communication Systems-Fundamentals through Advanced, PHI, 5th Edition, 2009.

Reference Books:

1. Taub Herbert, Schilling Donald L, Saha Goutam, Principles of Communication Systems, 3rd Edition, McGraw-Hill, 2008.
2. Roddy Dennis and Coolean John, Electronic Communications, 4th Edition , PEA, 2004.
3. Kennedy George and Davis Bernard, Electronics & Communication System, TMH, 2004.
4. Shanmugam, Sam K., Analog and Digital Communication, Willey, 2005.

L	T	P	C
3	0	0	3

IV Semester Syllabus
EC403PC: Linear IC Applications

Course Objectives

- To introduce the basic building blocks of linear integrated circuits.
- To introduce the theory and applications of analog multipliers, IC-555 and PLL.
- To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes

Upon completing this course, the student will be able to:

- A thorough understanding of operational amplifiers with linear integrated circuits.
- Attain the knowledge of functional diagrams and applications of IC 555 and IC 565
- Acquire the knowledge about the Data converters.

Unit-I: Integrated Circuits

Classification, chip size and circuit complexity, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC Characteristics, 741 op- amp and its features, modes of operation-inverting, non-inverting, differential configurations.

Unit-II: Op-amp and Applications

Basic information of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, Sample & hold circuits, multipliers and dividers, differentiators and integrators, comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723 IC.

Unit-III: Active Filters & Oscillators

Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation - RC, Wien and quadrature type, waveform generators - triangular, sawtooth, square wave and VCO.

Unit-IV: Timers & Phase Locked Loops

Introduction to IC-555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

Unit-V: D-A and A-D Converters

D-A 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 dual slope integration type ADC, DAC and ADC specifications.

Suggested Readings:

1. Chowdhury, Roy D., Linear Integrated Circuits, New Age International (P) Ltd.
2. Gayakwad Ramakanth A., Op-Amps & Linear ICs, PHI.

Reference Books:

1. Coughlin, R.F., & Fredrick F. Driscol, Operational Amplifiers & Linear Integrated Circuits-1, PHI.
2. Denton J. Daibey, Operational Amplifiers & Linear Integrated Circuits: Theory & Applications, TMH.
3. Franco, Sergio, Design with Operational Amplifiers & Analog Integrated Circuits, McGraw Hill.
4. Floyd and Jain, Digital Fundamentals - Pearson Education.

L	T	P	C
3	0	0	3

IV Semester Syllabus
EC404PC: Electronic Circuit Analysis

Course Objectives

- To understand the concepts of high frequency analysis of transistors.
- To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
- To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback
- To construct various multi vibrators using transistors and sweep circuits.

Course Outcomes

Upon completing this course, the student will be able to:

- Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
- Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations
- Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
- Design Multi vibrators and sweep circuits for various applications.

Unit-I: Multistage Amplifiers & Transistor at High Frequency

Multistage Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair.

Transistor at High Frequency: Hybrid-π-model of Common Emitter transistor model, f_α, f_β and unity gain bandwidth, Gain-bandwidth product.

Unit-II: Feedback Amplifiers

Concepts of feedback, Classification of feedback amplifiers, General characteristics of Negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations, Simple problems.

Unit-III: Oscillators

Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators, Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.

Unit-IV: Large Signal Amplifiers

Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class –C Amplifiers.

Tuned Amplifiers: Introduction, single Tuned Amplifiers – Q-factor, frequency response of tuned amplifiers, Concept of stagger tuning and synchronous tuning.

Unit-V: Multivibrators & Time Base Generators

Multivibrators: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearity improvement.

Suggested Readings:

1. Millman Jacob, Halkias, Christos C., Integrated Electronics, McGraw Hill Education.
2. Thomas L. Floyd, Electronic Devices Conventional and current version, 2015, Pearson.

Reference Books:

1. David A. Bell, Electronic Devices and Circuits, Oxford, 5th Edition.
2. Robert L. Boylestead, Louis Nashelsky, Electronic Devices and Circuits theory, Pearson, 11th Edition, 2009.

L	T	P	C
0	0	2	1

IV Semester Syllabus
EC451PC: Analog and Digital Communications Lab

Course Objectives

- To measure signal-to-noise ratio with various equipment.
- To design and measure AM, FM, QPSK, and spread spectrum communication systems.
- To routinely use communications test equipment
- To identify and measure factors which hamper communication systems.

Course Outcomes

Upon completing of this course, the student will be able to understand:

- The ability of visualization and practical implementation of baseband modulation techniques
- The skill to analyze and implement analogue to digital converters like PCM, DM.
- The ability to design pass band digital modulation systems and techniques with desired specifications
- The ability to design pass band digital demodulation techniques

Note:

- Minimum 12 experiments should be conducted:
- Minimum of six experiments are to be simulated either using MATLAB, COMSIM or any other simulation package and then to be realized in hardware

List of Experiments:

1. (i) Amplitude modulation and demodulation (ii) Spectrum analysis of AM
2. (i) Frequency modulation and demodulation (ii) Spectrum analysis of FM
3. DSB-SC Modulator & Detector
4. SSB-SC Modulator & Detector (Phase Shift Method)
5. Frequency Division Multiplexing & De multiplexing
6. Pulse Amplitude Modulation & Demodulation
7. Pulse Width Modulation & Demodulation
8. Pulse Position Modulation & Demodulation
9. PCM Generation and Detection
10. Delta Modulation
11. Frequency Shift Keying: Generation and Detection
12. Binary Phase Shift Keying: Generation and Detection
13. Generation and Detection (i) DPSK (ii) QPSK

Major Equipments required for Laboratories:

1. CROs: 20MHz
2. Function Generators: 2MHz
3. Spectrum Analyzer
4. Regulated Power Supplies: 0-30V
5. MAT Lab/Equivalent Simulation Package with Communication tool box
6. Analog and Digital Modulation and Demodulation Trainer Kits.

L	T	P	C
0	0	2	1

IV Semester Syllabus
EC452PC: IC Applications Lab

Course Objectives

- The main aim of this lab is to teach the linear and non-linear applications of operational amplifiers (741).
- Students are made familiar with theory and applications of 555 timers and voltage regulators.

Course Outcomes

Upon completing of this course, the student will be able to:

- Have a thorough understanding of operational amplifiers.
- Design circuits using operational amplifiers for various applications.
- Implement various applications of 555 Timer and PLL.
- Implement different Voltage Regulators.

Note: Verify the functionality of the IC in the given application

Design and Implementation of:

1. Inverting and Non-Inverting Amplifiers using Op Amps
2. Adder and Subtractor using Op Amp.
3. Comparators using Op Amp.
4. Integrator Circuit using IC 741.
5. Differentiator Circuit using Op Amp.
6. Active filter Applications-LPF, HPF (First Order)
7. IC 741 waveform Generators-Sine, Square wave and Triangular Waves.
8. Mono-Stable Multivibrator using IC 555.
9. Astable multivibrator using IC 555.
10. Schmitt Trigger Circuits using IC 741.
11. IC 565-PLL Applications.
12. Voltage Regulator using IC 723
13. Three terminal voltage regulators-7805, 7809, 7912

Major Equipments required for Laboratories:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply.
2. 20 MHz Oscilloscope with Dual Channel.
3. Bread board and components/ Trainer Kit.
4. Multimeter.

L	T	P	C
0	0	2	1

IV Semester Syllabus
EC453PC: Electronic Circuit Analysis Lab

Course Objectives

- Analyze amplifiers for frequency response
- Analyze feedback circuits, amplifier circuits and oscillator circuits.
- To provide an overview of amplifiers, feedback amplifiers and oscillators.
- Design and construct Monostable Multivibrator and Miller sweep generator.

Course Outcomes

Upon completion of the course the student will be able to:

- Acquire a basic knowledge in solid state electronics including voltage transistor, power transistors.
- Design and analyze various types of amplifier circuits using discrete components.
- Design and analyze multivibrator and sweep circuits

Note:

- Experiments marked with ***** has to be designed, simulated and verified in hardware.
- Minimum of 9 experiments to be done in hardware.

Hardware Testing in Laboratory:

1. Common Emitter Amplifier **(*)**
2. Two Stage RC Coupled Amplifier
3. Cascode amplifier Circuit **(*)**
4. Darlington Pair Circuit
5. Current Shunt Feedback amplifier Circuit
6. Voltage Series Feedback amplifier Circuit **(*)**
7. RC Phase shift Oscillator Circuit **(*)**
8. Hartley and Colpitt's Oscillators Circuit
9. Class A power amplifier
10. Class B Complementary symmetry amplifier **(*)**
11. Design a Monostable Multivibrator
12. The output voltage waveform of Miller Sweep Circuit

Major Equipments required for Laboratories:

1. Computer System with latest specifications connected
2. Window XP or equivalent
3. Simulation software-Multisim or any equivalent simulation software
4. Regulated Power Suppliers, 0-30V
5. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
6. Functions Generators-Sine and Square wave signals
7. Multimeters
8. Electronic Components

L	T	P	C
0	0	2	1

IV Semester Syllabus
EN452HS: Finishing School- II
(Common to all Branches)

Course Overview

In view of the growing importance of English as a tool for global Communication and the consequent emphasis on training students to acquire language skills, this syllabus has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

Course Objectives

The main objective of this finishing school curriculum is to provide content for developing the LSRW skills of language learning and to facilitate proficiency in both receptive and productive skills, among students.

Methodology:

- Students will be given Reading/Listening exercises that they would have to do as a prerequisite for the class room intervention
- Every Session will have activities on all the four skills. Listening, Speaking, Reading and Writing.
- Vocabulary exercises will also be part of every session
- Students will be asked to summarize their takeaways in every class in three sentences.
- The students will be given a self study plan for language enhancement and will be given extra reading and writing exercises as and when necessary.
- To personalize learning, a variety of case studies and structured problem solving activities will be given in small groups and the trainers will facilitate peer reviews.

Unit-I: Discussions and Debates

Module Overview:

The module enables the students to build strategies for effective group interaction. It focuses on developing decisive awareness and positive personality while maintaining emotional balance.

Learning Outcomes:

The students should be able to:

- Participate in group discussions by providing factual information, real time solutions, and examples.

- Debate on a topic by picking up the key points from the arguments offered.

Competencies:

- Analytical and Probing Skills
- Interpersonal Skills
- Identifying key points of the debate.
- Problem solving ability
- Constructing a logical chain of arguments and presenting winning view points.

Sessions:

1. Six Thinking Hats
2. Initiation Techniques
3. Generating points
4. Summarization Techniques

Unit-II: Powerful Presentations

Unit Overview:

Presentations need to be clear and logical. This Module is designed to introduce students to an ideal structure for a presentation

Learning Outcomes:

Students should be able to:

- Prepare, present, and analyze reports
- Analyze the points discussed
- Connect all points logically with coherence
- Connectives
- Communicate the decisions
- Provide logical conclusions

Sessions:

1. Persuasion skills
2. Cultivate appropriate body language and group dynamics
3. Debating Structure and Content
4. Case Study based Group Discussions

Unit-III: Effective Technical Writing

Unit Overview:

Organizing the writing in a logical order, using headings, linkers and sequence markers. This module is designed to give the students inputs on how to organize using Information Mapping. The students are also given inputs to correct spelling, language and Punctuation errors, as part of editing.

Learning Outcomes:

The Students should be able to choose appropriate words and tone to present accurate, specific, and factual written documents

Competencies:

- Reporting an incident
- Writing/Presenting an essay
- Language and Vocabulary

Sessions:

1. Information Mapping
2. Report writing
3. Memos
4. SoP (Statement of Purpose)
5. MoM (Minutes of the Meeting)

Unit-IV: Reading for Content and Context

Unit Overview:

This course is designed to develop and improve reading and study skills needed for employability. Topics include identifying main idea and supporting details, determining author's purpose and tone, distinguishing between fact and opinion, identifying patterns of organization in a paragraph or passage and the transition words associated with each pattern. Also recognizing the relationship between sentences, puzzling out meanings in context, identifying logical inferences and conclusions.

Learning Outcomes:

Upon completion of the course, students should be able to:

1. Compose a summary of a given text.
2. Apply reading skills appropriate to different genres

Competencies

- Distinguish facts from opinions.
- Make inferences
- Identify author's purpose, point of view, tone, and perspective.
- Comprehend the use of figurative language.
- Synthesize information gathered from reading in order to give informed opinion.

Sessions:

1. Skimming and Scanning Techniques
2. Recognition of author's purpose
3. Awareness of stylistic differences
4. Evaluation and Discernment of fact and opinion

Unit-V: Critical Reading Skills

Unit Overview:

Research shows that good reading skills can lead to well written assignments. In this unit, students will learn reading strategies to understand and retain information, organization of reading passages, and strategies for learning and retaining vocabulary. Building on these basic strategies, students will develop skills to critically analyze texts. In addition, students will practice and develop paraphrasing and summarizing skills. Students' feedback is integral to the learning process.

Learning Outcomes:

- Recognition of propaganda techniques
- Present vocabulary building methods
- Use comprehension and vocabulary strategies to improve reading skills.

Competencies:

The students will develop enhanced ability to apply the following critical thinking skills when reading:

a. Understand the meaning of new vocabulary through:
1. Context clues, e.g., synonyms, antonyms, examples, definitions, and restatements, etc.
2. Roots and affixes

b. Analyze text (simple outlining and note taking) summarize, draw conclusions, and apply information to personal experiences.

Sessions:

1. Contextual Vocabulary-One-word substitutes
2. Homophones, Homonyms and Homographs
3. Idioms and Phrases
4. Synonyms, Antonyms and Phrasal verbs
5. Note making and Inference
6. Main idea identification

Reference Books:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan, Pearson 2007.
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning Pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.

6. Handbook for Technical Communication by David A. Mc Murrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.
10. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition.

L	T	P	C
0	0	2	0

IV Semester Syllabus

MC451HS: Gender Sensitization Lab

(An Activity-based Course)

[Common to CE, EEE, ECE, ME, MCT & MME]

Course Objectives

This course aims:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Course Description

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and

media studies – to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Unit-I: Understanding Gender

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male.

Unit-II: Gender Roles and Relations

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary.

Unit-III: Gender and Labour

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming.

Unit–IV: Gender - Based Violence

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".

Domestic Violence: Speaking Out -Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life….".

Unit – V: Gender and Culture

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive

Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of **English Literature** or Sociology or Political Science or **any other qualified faculty who has expertise in this field from engineering departments.**

- Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".

Suggested Readings:

- The Textbook, "Towards a World of Equals: A Bilingual Text Book on Gender" written by A. Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

Assessment and Grading:

- Discussion & Classroom Participation: 20%.
- Project/Assignment: 30%.
- End Term Exam: 50%.