GLOBAL INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
COURSE CATALOGUE
REGULATIONS B.TECH – GR - 24
ELECTRONICS AND COMMUNICATION ENGINEERING
II YEAR II SEMESTER

Course Code	Course Name	Subject Area	Category	Periods Per Week			Credits	Scheme of Examination Max Marks		
				L	T	P		CIA	SEE	Total
THEORY										
EC401PC	Probability Theory and Stochastic Processes	PCC	CORE	3	0	0	3	40	60	100
EC402PC	Electromagnetic Fields and Transmission Lines	PCC	CORE	3	0	0	3	40	60	100
EC403PC	Analog and Digital Communications	PCC	CORE	3	0	0	3	40	60	100
EC404PC	Linear and Digital IC Applications	PCC	CORE	3	0	0	3	40	60	100
EC405PC	Electronic Circuit Analysis	PCC	CORE	3	0	0	3	40	60	100
PRACTICAL										
EC406PC	Analog and Digital Communications Laboratory	PCC	CORE	0	0	2	1	40	60	100
EC407PC	Linear and Digital IC Applications Laboratory	PCC	CORE	0	0	2	1	40	60	100
EC408PC	Electronic Circuit Analysis Laboratory	PCC	CORE	0	0	2	1	40	60	100
EC409PC	Real Time Project/ Field Based Project	PROJ	PROJECT	0	0	4	2	40	60	100
MANDATORY COURSE										
*MC410	Intellectual Property Rights	MC – IV	MC	3	0	0	0			
			Total Credits	**18**	**0**	**10**	**20**			

COURSE CONTENT

PROBABILITY THEORY AND STOCHASTIC PROCESS								
II Year - II Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC401PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

A Probability Theory and Stochastic Processes (PTSP) course provides a deep understanding of random phenomena, covering probability concepts, random variables, stochastic processes (like Markov chains), and noise.

2. COURSE OBJECTIVE

The students will try to Learn:

1) This gives basic understanding of random variables and operations that can be performed on them.
2) To known the Spectral and temporal characteristics of Random Process.
3) To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Understand the concept of Probability, sample space. Know about Random variable and Distribution & Density functions.
CO 2	Perform operations on single and multiple Random variables.
CO 3	Determine the Spectral and temporal characteristics of Random Signals.
CO 4	Determine the spectral characteristics of Random Process.
CO 5	Understand the concepts of Noise and Information theory in Communication systems

4. COURSE CONTENT

UNIT - I

Probability & Random Variable: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent 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, 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, 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, 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. Entropy, 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.

5. TEXT BOOKS

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

6. REFERENCE BOOKS

1) Bruce Hajck - Random Processes for Engineers, Cambridge unipress, 2015.
2) Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic Processes, 4th Ed., PHI, 2002.
3) B.P. Lathi - Signals, Systems & Communications, B.S. Publications, 2003.
4) S.P Eugene Xavier -Statistical Theory of Communication, New Age Publications, 2003.

7. ELECTRONIC RESOURCES

https://nptel.ac.in/courses/111102111

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**
CO 2	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**
CO 3	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**
CO 4	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**
CO 5	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**

COURSE CONTENT

ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES								
II Year - II Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC402PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course overview includes understanding static and dynamic electromagnetic fields, their interaction with matter, and the behavior of electromagnetic waves.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields, and apply them to solve physics and engineering problems.
2) 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.
3) To study the propagation, reflection and transmission of planewaves inbounded and unbounded media.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Acquire the knowledge of Basic Laws, Concept sand proofs related to Electrostatic Fields and Magneto static Fields.
CO 2	Characterize the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions.
CO 3	Analyze the Wave Equations and classify conductors, dielectrics and evaluate the UPW Characteristics for several practical media of interest.
CO 4	Analyze the Design aspect of transmission line parameters and configurations.

4. COURSE CONTENT

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, 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, 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 Two Equations for Magnetostatic Fields,

Maxwell's Two Equations for Electrostatic Fields 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

Transmission Lines: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Equivalent Circuit, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading.SC and OC Lines, λ/4, λ/2, λ/8 Lines, Reflection Coefficient, VSWR Smith Chart — Configuration and Applications, Single Stub Matching.

5. TEXT BOOKS

1) William H. Hayt Jr. and John A. Buck- Engineering Electromagnetics, 8th Ed., McGraw Hill, 2014
2) Matthew N.O. sadiku and S.V. Kulkarni - Principles of Electromagnetics, 6th Ed., Oxford University Press, Aisan Edition, 2015.

6. REFERENCE BOOKS

1) JD. Kraus -Electromagnetics with Applications ,5th Ed., TMH
2) Umesh Sinha, Satya Prakashan -Transmission Lines and Networks, (Tech. India Publications), New Delhi, 2001.
3) JD Ryder -Networks, Lines and Fields, 2nd Ed., PHI, 1999.

7. ELECTRONIC RESOURCES

https://nptel.ac.in/courses/108104087

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**3**	**2**
CO 2	**3**	**3**	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	**3**
CO 3	**3**	**3**	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**3**	**2**
CO 4	**3**	**3**	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	**3**

COURSE CONTENT

ANALOG AND DIGITAL COMMUNICATIONS								
II Year - II Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC403PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course provides a foundational understanding of information transmission systems, covering both continuous-wave (analog) and discrete (digital) methods.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To develop ability to analyze system requirements of Analog and digital communication systems.
2) To understand the generation, detection of various Analog and digital modulation techniques.
3) To acquire the vortical knowledge of each block in AM, FM transmitters and receivers.
4) To understand the concepts of baseband transmissions.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Design and analyze various Analog and Digital Modulation and Demodulation techniques.
CO 2	Model the noise present in continuous wave Modulation techniques.
CO 3	Implement the Super heterodyne Receiver concept and Pulse Modulation Techniques in various applications
CO 4	Analyze and design the base band Transmission

4. COURSE CONTENT

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, Demodulation of SSB Waves, principle of Vestigial side band modulation.

UNIT - II

Angle Modulation: Basic concepts of Phase 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: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis.

UNIT - III

Transmitters: Classification of Transmitters, AM Transmitters, FM Transmitters

Receivers: Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison of AM and FM Receivers.

UNIT - IV

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, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

UNIT - V

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.

5. TEXT BOOKS

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

6. REFERENCE BOOKS

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

7. ELECTRONIC RESOURCES

https://nptel.ac.in/courses/117105143
https://nptel.ac.in/courses/117101051

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**3**	**1**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
CO 2	**3**	**3**	**3**	**1**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
CO 3	**3**	**3**	**3**	**1**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
CO 4	**3**	**3**	**3**	**1**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**2**

COURSE CONTENT

LINEAR AND DIGITAL IC APPLICATIONS								
II Year - II Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC404PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course provides a comprehensive understanding of both analog (linear) and digital integrated circuits, focusing on their fundamental principles, characteristics, and diverse applications.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To introduce the basic building blocks of linear integrated circuits.
2) To introduce the theory and applications of Analog multipliers and PLL.
3) To introduce the concept sine waveform generation and introduce some special function ICs.
4) To understand and implement the working of basic digital circuits.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	A thorough understanding of operational amplifiers with linear integrated circuits.
CO 2	Attain the knowledge of functional diagrams and design applications of IC555 and IC565.
CO 3	Acquire the knowledge and design the Data converters.
CO 4	Choose the proper digital integrated circuits by knowing their characteristics.
CO 5	A thorough understanding of operational amplifiers with linear integrated circuits.

4. COURSE CONTENT

UNIT - I

Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation-Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT - II

Op-Amp, IC-555 & IC565 Applications: Introduction to Active Filters, Characteristics of Bandpass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer-Functional Diagram, Monostable and A stable Operations, Applications, IC565 PLL-Block Schematic, principle and Applications.

UNIT - III

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs – Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT - IV

Combinational Logic ICs: Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT - V

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS40XX Series ICs - All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

5. TEXT BOOKS

1) Ramakanth A. Gayakwad - Op-Amps & Linear ICs, PHI, 2003.
2) Floydand Jain- Digital Fundamentals, 8th Ed., PearsonEducation,2005.

6. REFERENCE BOOKS

1) D. Roy Chowdhury – Linear Integrated Circuits, New Age International(p)Ltd,2nd Ed., 2003.
2) John. F. Wakerly – Digital Design Principles and Practices, 3rdEd., Pearson, ,2009.
3) Salivahana -Linear Integrated Circuits and Applications, TMH, 2008.
4) William D.Stanley- Operational Amplifiers with Linear Integrated Circuits, 4thEd., Pearson Education India, 2009.

7. ELECTRONIC RESOURCES

https://onlinecourses.nptel.ac.in/noc24_ee73/preview

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
CO 2	**3**	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
CO 3	**3**	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
CO 4	**3**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
CO 5	**3**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**2**

COURSE CONTENT

ELECTRONIC CIRCUIT ANALYSIS								
II Year - II Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC405PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course provides a foundation in how electrical circuits, both analog and digital, function by studying their basic components and their interaction.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Learn the concepts of Power Amplifiers.
2) To give understanding of tuned amplifier circuits
3) Understand various multivibrators using transistors and sweep circuits.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Design the power amplifiers
CO 2	Design the tuned amplifiers and analyse is frequency response
CO 3	Design Multivibrators and sweep circuits for various applications.
CO 4	Utilize the concepts of synchronization, frequency division and sampling gates

4. COURSE CONTENT

UNIT - I

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 and D Amplifiers.

UNIT- II

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

UNIT - III

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

UNIT - IV

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.

UNIT - V

Synchronization and Frequency Division: Pulse Synchronization of Relaxation Devices, Frequency division in Sweep Circuits, Stability of Relaxation Devices, A stable Relaxation Circuits, Monostable Relaxation Circuits, Synchronization of a Sweep Circuit with Symmetrical Signals, Sine wave frequency division with a Sweep Circuit, A Sinusoidal Divider using Regeneration and Modulation.

Sampling Gates: Basic operating principles of Sampling Gates, Unidirectional and Bi-directional Sampling Gates, Four Diode Sampling Gate, Reduction of pedestal in Gate Circuits.

5. TEXT BOOKS

1) Jacob Millman, Christos C Halkias - Integrated Electronics, , McGraw Hill Education.
2) J. Millman, H. Taub and Mothiki S. PrakashRao - Pulse, Digital and Switching Waveforms –2nd Ed., TMH, 2008.

6. REFERENCE BOOKS

1) David A. Bell - Electronic Devices and Circuits, 5th Ed., Oxford.
2) Robert L. Boylestead, Louis Nashelsky - Electronic Devices and Circuits theory, 11th Ed., Pearson, 2009
3) Ronald J. Tocci - Fundamentals of Pulse and Digital Circuits, 3rd Ed., 2008.
4) David A. Bell - Pulse, Switching and Digital Circuits, 5th Ed., Oxford, 2015.

7. ELECTRONIC RESOURCES

https://onlinecourses.nptel.ac.in/noc23_ee34/preview

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**3**	**1**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**1**	**3**	**3**
CO 2	**3**	**3**	**3**	**1**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**3**	**3**
CO 3	**3**	**3**	**3**	**1**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**3**	**3**
CO 4	**3**	**3**	**3**	**1**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**1**	**3**	**3**

COURSE CONTENT

ANALOG AND DIGITAL COMMUNICATIONS LAB								
II Year - II Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
EC406PC	**Core**	**-**	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course provides a foundational understanding of information transmission systems, covering both continuous-wave (analog) and discrete (digital) methods.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To develop ability to analyze system requirements of Analog and digital communication systems.
2) To understand the generation, detection of various Analog and digital modulation techniques.
3) To acquire the vortical knowledge of each block in AM, FM transmitters and receivers.
4) To understand the concepts of baseband transmissions.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics
CO 2	Design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics
CO 3	Apply different types of Sampling with various Sampling rates and duty Cycles
CO 4	Design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically

4. LIST OF EXPERIMENTS/DEMONSTRATIONS:

Note:

Minimum 12 experiments should be conducted:

All these experiments are to be simulated first either using MATLAB, COMSIM or any other simulation package and then to be realized in hardware

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) DPCM Generation and Detection
12) Frequency Shift Keying: Generation and Detection
13) Binary Phase Shift Keying: Generation and Detection
14) Generation and Detection (i) DPSK (ii) QPSK
15) Generate FSK modulated signal using PLL

*Prove practically the Figure of Merit of DSB-SC is unity for single tone modulation

5. BOOKS

Lab manual.

6. MATERIALS ONLINE

Course template
Lab manual

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**1**	**-**	**3**	**1**	**2**	**2**	**-**	**2**	**3**	**2**	**-**	**1**	**1**	**-**
CO 2	**1**	**-**	**3**	**1**	**2**	**2**	**-**	**2**	**3**	**2**	**-**	**1**	**1**	**-**
CO 3	**1**	**-**	**3**	**1**	**2**	**2**	**-**	**2**	**3**	**2**	**-**	**1**	**1**	**-**
CO 4	**1**	**-**	**3**	**1**	**2**	**2**	**-**	**2**	**3**	**2**	**-**	**1**	**1**	**-**

COURSE CONTENT

LINEAR AND DIGITAL IC APPLICATIONS LAB								
II Year - II Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC407PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course provides a comprehensive understanding of both analog (linear) and digital integrated circuits, focusing on their fundamental principles, characteristics, and diverse applications.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To introduce the basic building blocks of linear integrated circuits.
2) To introduce the theory and applications of Analog multipliers and PLL.
3) To introduce the concept sine waveform generation and introduce some special function ICs.
4) To understand and implement the working of basic digital circuits.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Design and implementation of various analog circuits using 741 ICs.
CO 2	Design and implementation of various Multivibrators using 555 timer.
CO 3	Design and implement various circuits using digital ICs.
CO 4	Design and implement ADC, DAC and voltage regulators.

4. LIST OF EXPERIMENTS/DEMONSTRATIONS:

Note:

Minimum 12 experiments should be conducted.

Verify the functionality of the IC in the given application.

Design and Implementation of:

1) Design an Inverting and Non-inverting Amplifier using Op Amp and calculate gain.
2) Design Adder and Subtractor using Op Amp and verify addition and subtraction process.
3) Design a Comparator using Op Amp and draw the comparison results of A=B, A<B, A>B.
4) Design a Integrator and Differentiator Circuits using IC741 and derive the required condition practically.
5) Design a Active LPF, HPF cutoff frequency of 2 KHZ and find the roll off of it.
6) Design a Circuit using IC741 to generate sine/square/triangular wave with period of 1KHZ and draw the output waveform.
7) Construct Mono-stableMultivibratorusingIC555 and draw its output waveform.
8) Construct Astable Multivibrator using IC555 and draw its output waveform and also find its duty cycle.
9) Design a Schmitt Trigger Circuit and find its LTP and UTP.

10) Design Frequency modulator and demodulator circuit and draw the respective waveforms.
11) Design VoltageRegulatorusingIC723, IC 7805/7809/7912 and find its load regulation factor.
12) Design R-2R ladder DAC and find its resolution and write a truth table with respective voltages.
13) Design Parallel comparator type/ counter type/ successive approximation ADC and find its efficiency.
14) Design a Gray code converter and verify its truth table.
15) Design an even priority encoder using IC 74xx and verify its truth table.
16) Design a 8x1 multiplexer using digital ICs.
17) Design a 4-bit Adder/Subtractor using digital ICs and Add/Sub the following bits. (i)1010 (ii)0101 (iii)1011
18) 0100 0010 1001.
19) Design a Decade counter and verify its truth table and draw respective waveforms.
20) Design a Up/down counter usingIC74163 and draw read/write waveforms.
21) Design a Universal shift register using IC 74194/195 and verify its shifting operation.
22) Design a 16x4 RAM using 74189 and draw its read/write operation.
23) Design a 8x3 encoder/3x8 decoder and verify its truth table.

5. BOOKS

Lab manual

6. MATERIALS ONLINE

Course template
Lab manual

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**1**	**0**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**1**	**1**
CO 2	**1**	**0**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**1**	**1**
CO 3	**1**	**0**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**1**	**1**
CO 4	**1**	**0**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**1**	**1**

COURSE CONTENT

ELECTRONIC CIRCUIT ANALYSIS LABORATORY								
II Year - II Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC408PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course provides a foundation in how electrical circuits, both analog and digital, function by studying their basic components and their interaction.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Learn the concepts of Power Amplifiers.
2) To give understanding of tuned amplifier circuits
3) Understand various multivibrators using transistors and sweep circuits.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Design power amplifiers and find its efficiency
CO 2	Design tuned amplifiers and find its Q-factor
CO 3	Design various multivibrators and sweep circuits. Understand the necessity of linearity
CO 4	Design sampling gates and understanding the concepts of frequency division

4. LIST OF EXPERIMENTS/DEMONSTRATIONS:

Note:
Minimum 12 experiments should be conducted.

Verify the functionality of the IC in the given application.

Design and Implementation of:

1) Design transformer coupled class A power amplifier and draw the input and output waveforms find its efficiency
2) Design class B power amplifier and draw the input and output waveforms, find 2nd order and above harmonics.
3) Prove that the complementary symmetry pushpull amplifier eliminate cross over distortion.
4) Design class C power amplifier and draw the input and output waveforms
5) Design a single tuned amplifier and determine the Q of its tuned circuit practically.
6) Design a Bistable Multivibrator and analyze the effect of commutating capacitors and draw the wave forms at base and collector of transistors.
7) Design an Astable Multivibrator and draw the wave forms at base and collector of transistors.

8) Design a Monostable Multivibrator and draw the input and output waveforms

9) Draw the response of Schmitt trigger for gain of greater than and less than one.

10) Design a Bootstrap sweep circuit using BJT and draw its output time base waveform

11) Design a Miller sweep circuit using BJT and draw its output time base waveform.

12) Design a constant current sweep generator and draw input and output waveforms

13) Design unidirectional and bidirectional sampling gates

14) Prove practically Schmitt Trigger generates square wave

15) Frequency division with sweep circuit

.

5. REFERENCE BOOKS

Lab manual for Basic Simulation.

6. MATERIALS ONLINE

Course template
Lab manual

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**1**	**0**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**1**	**1**
CO 2	**1**	**0**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**1**	**1**
CO 3	**1**	**0**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**1**	**1**
CO 4	**1**	**0**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**1**	**1**

COURSE CONTENT

INTELLECTUAL PROPERTY RIGHTS								
II Year - II Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
***MC410**	**Mandatory**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**-**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite:								

1. COURSE OVERVIEW

The Intellectual Property Rights (IPR) course is designed to provide students with a comprehensive understanding of the legal frameworks that protect creative and innovative works. It covers the principles, laws, and practices surrounding the protection of intellectual property such as: Patents, Trademarks, Copyrights, Designs and Trade Secrets.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Significance of intellectual property and its protection.
2) Introduce various forms of intellectual property.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Distinguish and Explain various forms of IPRs.
CO 2	Identify criteria to fit one's own intellectual work in particular form of IPRs.
CO 3	Apply statutory provisions to protect particular form of IPRs.
CO 4	Appraise new developments in IPR laws at national and international level
CO 5	Understand the new development of intellectual property.

4. COURSE CONTENT

UNIT – I **(10L)**

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II **(10L)**

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III **(10L)**

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, international copyright law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV **(9L)**

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V **(9L)**

New development of intellectual property: new developments in trade mark law; copyright law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copyright law, international patent law, and international development in trade secrets law.

5. TEXT BOOKS

1) Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

6. REFERENCE BOOKS

1) Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	**2**		**2**					**2**	**2**	**2**		
CO 2	**3**	**3**	**2**		**2**					**2**	**2**	**2**		
CO 3	**3**	**2**	**3**	**2**	**2**					**2**	**2**	**2**		
CO 4	**3**	**2**	**3**	**2**	**2**					**2**	**2**	**2**		
CO 5	**3**	**2**	**2**	**3**	**3**					**2**	**2**	**2**		