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

Course Code	Course Name	Subject Area	Category	Periods Per Week			Credits	Scheme of Examination Max Marks		
				L	T	P		CIA	SEE	Total
THEORY										
EC301PC	Signals and Systems	PCC	CORE	3	1	0	4	40	60	100
EC302PC	Analog Circuits	PCC	CORE	3	0	0	3	40	60	100
MA303BS	Numerical Methods and Complex Variables	BSC	Foundation	3	1	0	4	40	60	100
EC304PC	Network analysis and Synthesis	PCC	CORE	3	0	0	3	40	60	100
EC305PC	Digital Logic Design	PCC	CORE	3	0	0	3	40	60	100
PRACTICAL										
EC306PC	Analog Circuits Laboratory	PCC	CORE	0	0	2	1	40	60	100
EC307PC	Digital logic Design Laboratory	PCC	CORE	0	0	2	1	40	60	100
EC308PC	Basic Simulation Laboratory	PCC	CORE	0	0	2	1	40	60	100
MANDATORY COURSE										
*MC309	Gender Sensitization Laboratory	MC-III	MC	0	0	2	0			
			Total Credits	**15**	**2**	**8**	**20**			

COURSE CONTENT

SIGNALS AND SYSTEMS								
II Year - I Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC301PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**1**	**-**	**4**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: 16	Practical Classes: Nil				**Total Classes: 64**		
Prerequisite: Nil								

1. COURSE OVERVIEW

The course provides the fundamental mathematical tools to analyze how systems respond to inputs by examining signals, covering topics like signal classification, linear time-invariant (LTI) systems, convolution, and transforms such as Fourier, Laplace, and Z-transforms.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Classify signals and systems and their analysis in time and frequency domains.
2) Study the concepts of distortion less transmission through LTI systems, convolution and correlation properties.
3) Understand Laplace and Z-transforms their properties for analysis of signals and systems.
4) Identify the need for sampling of CT signals, types and merits and demerits of each type.

3. COURSE OUTCOMES

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

CO 1	Characterize various signals, systems and their time and frequency domain analysis, using transform techniques.
CO 2	Understand and apply the concepts of Fourier series and Fourier transforms for analysis of signals.
CO 3	Identify the conditions for transmission of signals through systems and conditions for physical realization of systems.
CO 4	Understand and apply Laplace and Z-Transfors, their properties for analysis of signals and systems.
CO 5	Use sampling theorem for baseband and band pass signals for various types of sampling and for different duty cycles. Apply the correlation and PSD functions for various applications

4. COURSE CONTENT

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: 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: 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: 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, Parsevals Theorem, Power Density Spectrum, Relation between Autocorrelation 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.

5. TEXT BOOKS

1) B.P. Lathi -Signals, Systems & Communications, BSP, 2013.
2) A.V. Oppenheim, A.S. Willsky and S.H. Nawabi -Signals and Systems, 2nd Ed., Prentice Hall.

6. REFERENCE BOOKS

1) Simon Haykin and Van Veen, A. Rama Krishna Rao, -Signals and Systems, TMH, 2008.
2) Michel J. Robert - Fundamentals of Signals and Systems, MGH International Edition, 2008.
3) C. L. Philips, J. M. Parr and Eve A. Riskin -Signals, Systems and Transforms, 3rd Ed., PE, 2004.

7. ELECTRONIC RESOURCES

https://onlinecourses.nptel.ac.in/noc21_ee28/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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**
CO 2	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**3**
CO 3	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**
CO 4	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**3**
CO 5	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**

COURSE CONTENT

ANALOG CIRCUITS								
II Year - I Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC302PC	**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 typically covers basic circuit theory, including passive components (resistors, capacitors, inductors) and active devices (diodes, BJT, MOSFETs) used to process continuous electrical signals.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Learn the concepts of, load line analysis and biasing techniques
2) Learn the concepts of high frequency analysis of transistors.
3) To give understanding of various types of amplifier circuits
4) Learn the concepts of small signal analysis of BJT and FET
5) To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.

3. COURSE OUTCOMES

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

CO 1	Design the amplifiers with various biasing techniques.
CO 2	Design single stage amplifiers using BJT and FET
CO 3	Design multistage amplifiers and understand the concepts of High Frequency Analysis of BJT.
CO 4	Utilize the Concepts of negative feedback to improve the stability of amplifiers and
CO 5	Utilize the Concepts of negative feedback to improve the stability positive feedback to sustained oscillations.

4. COURSE CONTENT

UNIT – I

BJT Biasing: Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diode

Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Transistor Hybrid model, Determination of h-parameters from transistor characteristics, Typical values of h- parameters in CE, CB and CC configurations, Transistor amplifying action, Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier**.**

UNIT – II

FET- Biasing Techniques

FET Amplifiers: Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOSFET Amplifiers, MOS Small signal model, Common source amplifier with resistive, Diode connected and Current source loads, Source follower, Common Gate Stage, Cascode and Folded Cascode Amplifier – frequency response.

UNIT – III

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

Transistor at High Frequency: Hybrid -πmodel of Common Emitter transistor model, fα, fβ and unity gain bandwidth, Gain-bandwidth product.

UNIT – IV

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 – V

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.

5. TEXT BOOKS

1) Jacob Millman, Christos C Halkias -Integrated Electronics, McGraw Hill Education.
2) Robert L. Boylestead, Louis Nashelsky -Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson.

6. REFERENCE BOOKS

1) David A. Bell – Electronic Devices and Circuits, 5th Edition, Oxford.
2) Adel S. Sedra, Kenneth C. Smith- Microelectronic Circuits- Theory and Applications, Oxford.
3) Chinmoy Saha, Arindam Halder, Debaati Ganguly -Basic Electronics-Principles and Applications, 2018, Cambridge.

7. ELECTRONIC RESOURCES

https://onlinecourses.nptel.ac.in/noc25_ee157/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	**2**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**3**
CO 2	**2**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**3**
CO 3	**2**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**3**
CO 4	**2**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**3**
CO 5	**2**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**3**

COURSE CONTENT

NUMERICAL METHODS & COMPLEX VARIABLES								
II Year - I Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
MA303BS	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**1**	**-**	**4**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: 16	Practical Classes: Nil				**Total Classes: 64**		
Prerequisite: Mathematics courses of the first year of study.								

1. COURSE OVERVIEW

In the first part of the course, students learn methods for expressing signals and periodic functions using Fourier series and Fourier transforms, which are fundamental in analysing and processing electrical signals. The numerical methods component introduces techniques to solve polynomial and transcendental equations, interpolate experimental data, perform numerical integration, and obtain approximate solutions for ordinary differential equations—skills crucial for simulation and modelling in electronics and communication engineering.

The second part of the course focuses on complex variable theory, including analytic functions, Cauchy-Riemann equations, conformal mappings, and Möbius transformations, which have direct applications in electromagnetic fields, control theory, and wave propagation. Further, students explore complex integration using Cauchy's theorems and the residue method, along with function expansions through Taylor and Laurent series—concepts that support advanced topics like filter design, signal analysis, and stability studies..

2. COURSE OBJECTIVE

The students will try to Learn:

1) Expressing a periodic function by a Fourier series and a non-periodic function by the Fourier transform.
2) Various numerical methods to find roots of polynomial and transcendental equations.
3) Concept of finite differences and to estimate the value for the given data using interpolation.
4) Evaluation of integrals using numerical techniques
5) Solving ordinary differential equations of first order using numerical techniques.
6) Differentiation and integration of complex-valued functions.
7) Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
8) Expansion of complex functions using Taylor's and Laurent's series.

3. COURSE OUTCOMES

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

CO 1	Express any periodic function in terms of sine and cosine
CO 2	Find the root of a given polynomial and transcendental equations. Estimate the value for the given data using interpolation
CO 3	Find the numerical solutions for a given first-order ODE's
CO 4	Analyse the complex functions with reference to their analyticity, integration using Cauchy's integral and residue theorems
CO 5	Taylor's and Laurent's series expansions in complex functions

4. COURSE CONTENT

UNIT-I: Fourier Series & Fourier Transforms: 10 L

Fourier series - Dirichlet's Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms - Inverse Fourier transforms.

UNIT-II: Numerical Methods-I 10 L

Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton-Raphson method and Regula-Falsi method. Jacobi and Gauss-Seidel iteration methods for solving linear systems of equations. Finite differences: forward differences, backward differences, central differences, symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae, Lagrange's method of interpolation.

UNIT-III: Numerical Methods-II 8 L

Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8th rules. Ordinary differential equations: Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order for first order ODE

UNIT-IV: Complex Differentiation 10 L

Limit, Continuity and Differentiation of Complex Functions. Cauchy-Riemann equations (without proof), Milne-Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithm) and their properties. (All theorems without Proofs), Conformal mappings, Mobius transformations.

UNIT-V: Complex Integration: 10 L

Line integrals, Cauchy's theorem, Cauchy's Integral formula, zeros of analytic functions, singularities, Taylor's series, Laurent's series, Residues, Cauchy Residue theorem and their properties. (All theorems without Proofs).

5. TEXT BOOKS

1) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
2) S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

6. REFERENCE BOOKS

1) M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical Methods for Scientific and Engineering Computations, New Age International Publishers.
2) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3) J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, McGraw-Hill, 2004.

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**	**3**	**2**
CO 2	**2**	**3**										**2**	**2**	**3**
CO 3	**2**	**3**											**2**	**3**
CO 4	**3**	**-**	**1**		**2**								**3**	**-**
CO 5	**3**	**3**			**1**							**2**	**3**	**3**

COURSE CONTENT

NETWORK ANALYSIS AND SYNTHESIS								
II Year - I Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC304PC	**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

The course begins with description with circuit elements, sources. Understanding of various interesting network theorems applied to solve linear, time invariant network problems efficiently in time and s-domain. Steady and transient solution of network problems with various sources including impulse source.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To understand the basic concepts on RLC circuits.
2) To know the behavior of the steady state and transient states in RLC circuits.
3) To understand the two port network parameters.
4) Learn the design concepts of various filters and attenuators.

3. COURSE OUTCOMES

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

CO 1	Gain the knowledge on basic RLC circuits behaviour.
CO 2	Analyse the Steady state and transient analysis of RLC Circuits.
CO 3	Characterization of two port network parameters.
CO 4	Analyse the Design aspect of various filters and attenuators
CO 5	Analyse the Design aspect of various attenuators

4. COURSE CONTENT

UNIT - I

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

UNIT - II

Transient and Steady state analysis: RC, RL and RLC 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, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

UNIT-IV

Filters: Classification of Filters, Filter Networks, Constant-K Filters-Low pass, high pass, Band pass, band-stop filters, M-derived Filters- T and π filters- Low pass, high pass

Attenuators: Types — T, π , L, Bridge T and lattice ,Asymmetrical Attenuators T, π , L Equalizers-Types- Series, Shunt, Constant resistance, bridge T attenuation, bridge T phase, Lattice attenuation, lattice Phase equalizers

UNIT – V

Network Synthesis: Driving point impedance and admittance, transfer impedance and admittance, network functions of Ladder and non ladder networks, Poles, Zeros analysis of network functions**,** Hurwitz polynomials, Positive Real Functions, synthesis of LC, RC and RL Functions by foster and causer methods.

5. TEXT BOOKS

1) Van Valkenburg -Network Analysis, 3rd Ed., Pearson, 2016.
2) JD Ryder - Networks, Lines and Fields, 2nd Ed., PHI, 1999.

6. REFERENCE BOOKS

1) J. Edminister and M. Nahvi - Electric Circuits, Schaum's Outlines, Mc Graw Hills Education, 1999.
2) A. Sudhakar and Shyammohan S Palli - Networks & Circuits, 4th Ed., Tata Mc Graw - Hill Publications.
3) William Hayt and Jack E. Kimmerley - Engineering Circuit Analysis, 6th Ed., William Hayt and Jack E. Kimmerley, McGraw Hill Company.

7. ELECTRONIC RESOURCES

https://www.ee.iitb.ac.in/~belur/ee225/books/AndersonAndVongpanitlerd-Network-Analysis-and-Synthesis1973.pdf

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**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**3**	**2**
CO 2	**2**	**3**	**2**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**2**	**3**
CO 3	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**
CO 4	**2**	**3**	**3**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**2**	**3**
CO 5	**3**	**2**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**3**	**2**

COURSE CONTENT

DIGITAL LOGIC DESIGN								
II Year - I Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC305PC	**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

Course is about to design and analyze digital circuits and systems using fundamental principles of binary numbers, Boolean algebra, and logic gates.

2. COURSE OBJECTIVE

The students will try to Learn:

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

3. COURSE OUTCOMES

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

CO 1	Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems.
CO 2	Define Postulates of Boolean algebra and to minimize combinational functions, and
CO 3	Design the combinational circuits.
CO 4	Design and analyse sequential circuits for various cyclic functions.
CO 5	Characterize logic families and analyze them for the purpose of AC and DC parameters

4. COURSE CONTENT

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

Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL, CML and CMOS Logic Families and its Comparison, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs,IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT – III

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

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.

UNIT - IV

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

Sequential Machines: Finite State Machines, Synthesis of Synchronous Sequential Circuits- Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N –Counters.

UNIT – V

Finite state machine: capabilities and limitations, Mealy and Moore models, State equivalence and machine minimization, simplification of incompletely specified machines, Merger graphs. Asynchronous design-modes of operation, Hazards, synthesis of SIC fundamental mode circuits, synthesis of burst mode circuits. Introduction to ASM Charts.

5. TEXT BOOKS

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

6. REFERENCE BOOKS

1) Morris Mano, Fredriac J. Hill, Gerald R. Peterson - Introduction to Switching Theory and Logic Design –3rd Ed., John Wiley & Sons Inc.
2) Charles H. Roth - Fundamentals of Logic Design, 5th ED., Cengage Learning, 2004.

7. ELECTRONIC RESOURCES

https://onlinecourses.nptel.ac.in/noc21_ee39/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**	**2**	**3**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**2**
CO 2	**3**	**2**	**2**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**3**
CO 3	**2**	**3**	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**
CO 4	**3**	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**
CO 5	**3**	**2**	**3**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**2**

COURSE CONTENT

ANALOG CIRCUITS LAB								
II Year - I Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC306PC	**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 typically covers basic circuit theory, including passive components (resistors, capacitors, inductors) and active devices (diodes, BJT, MOSFETs) used to process continuous electrical signals.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Learn the concepts of, load line analysis and biasing techniques
2) Learn the concepts of high frequency analysis of transistors.
3) To give understanding of various types of amplifier circuits
4) Learn the concepts of small signal analysis of BJT and FET
5) To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.

3. COURSE OUTCOMES

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

CO 1	Design amplifiers with required Q point and analyse amplifier characteristics
CO 2	Examine the effect multistage amplification on frequency response
CO 3	Investigate feedback concept in amplifiers and oscillator

4. LIST OF EXPERIMENTS/DEMONSTRATIONS:

Verify any twelve experiments in H/W Laboratory

1) Perform an experiment to choose Q-point for a Transistor that operate in active region and observe the effect of external Load resistance on Q-point.
2) Design a Self bias Circuit and determine the Q-point of the Transistor and its Stability factor by both simulation and realization with hardware components.
3) Obtain the I/O Characteristics of CE, CB, CC amplifiers. Calculate h-parameters from the Characteristics.
4) Design and Simulate a Common Drain Amplifier with voltage divider bias and determine the Stability factor.
5) Obtain the Drain and Transfer characteristics of CD, CS amplifiers of JFET. Calculate gm, rd from the Characteristics.
6) By experiment prove that the voltage gain of Emitter Follower Circuit is one.
7) Design a Common Emitter Amplifier with a gain of 30db and Bandwidth of 10KHZ and plot the frequency response practically.
8) Design a two stage RC Coupled amplifier and prove that gain is increased and analyze the effects of coupling capacitance.

9) Practically prove that the Darlington pair has high input impedance.
10) Draw the high frequency response of common emitter transistor amplifier and calculate fα, fβ and gain bandwidth product.
11) Design a cascode amplifier for a given specifications
12) Design four topologies of feedback amplifiers and draw the frequency response of them with and without feedback.
13) Design an RC phase shift oscillator circuit and derive the gain condition for oscillations practically for given frequency.
14) Design a Colpitts oscillator circuit for the given frequency and draw the output waveform.

5. REFERENCE BOOKS

Lab manual for Analog Circuits.

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**	**-**	**2**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**1**	**1**	**-**
CO 2	**1**	**-**	**2**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**1**	**1**	**-**
CO 3	**1**	**-**	**2**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**1**	**1**	**-**

COURSE CONTENT

DIGITAL LOGIC DESIGN LABORATORY								
II Year - I Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC307PC	**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

The Course is about to design and analyze digital circuits and systems using fundamental principles of binary numbers, Boolean algebra, and logic gates.

2. COURSE OBJECTIVE

The students will try to Learn:

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

3. COURSE OUTCOMES

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

CO 1	Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems.
CO 2	Define Postulates of Boolean algebra and to minimize combinational functions, and design the combinational circuits.
CO 3	Design and analyze sequential circuits for various cyclic functions.
CO 4	Characterize logic families and analyze them for the purpose of AC and DC parameters

4. LIST OF EXPERIMENTS/DEMONSTRATIONS:

Verify any twelve experiments in H/W Laboratory

1) Realization of Logic circuit to generate r's Compliment using Logic Gates.
2) Realization of given Boolean function using universal gates and minimizing the same.Compare the gate count before and after minimization.
3) Design and realize Full Adder circuit using gates/universal gates. Implement Full Subtractor using full adder.
4) Designing a 2 – bit Comparator using AND, OR and NOT gates. Realize 4 – bit Comparator using 2 — bit Comparators.
5) Realize 2:1 MUX using the given gates and Design 8:1 using 2:1 MUX.
6) Implement the given Boolean function using the given MUX(ex: code converters).
7) Realize a 2x4 Decoder using logic gates and implement 3x8 Decoder using 2x4 Decoder.
8) Implement the given Boolean function using given Decoders.
9) Convert Demultiplexer to Decoder and vise versa.
10) Verification of truth tables of flipflops using different clocks (level triggering, positive and negative edge triggering) also converts the given flipflop from one type to other.

11) Designing of Universal n-bit shift register using flipflops and Multiplexers. Draw the timing diagram of the Shift Register.
12) Design a Synchronous binary counter using D-flipflop/given flipflop.
13) Design a asynchronous counter for the given sequence using given flipflops.
14) Designing of MOD 8 Counter using JK flipflops.
15) Designing of sequence detecting State Machine with minimal states using the given flipflops.
16) Designing of Parity Bit(even/odd) generator using the given flipflops.
17) Realize all logic gates with TTL logic.
18) Realize all logic gates with DTL logic.

*Design a sequence detector to detect a given sequence and verify practically

*Design a serial subtractor for 4-bit binary numbers

5. REFERENCE BOOKS

Lab manual for Digital Logic Design.

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	**3**	**2**	**3**	**1**	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**2**	**3**	**2**
CO 2	**3**	**2**	**2**	**1**	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**2**	**3**	**2**
CO 3	**2**	**3**	**3**	**2**	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**1**	**2**	**3**
CO 4	**3**	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**

COURSE CONTENT

BASIC SIMULATION LABORATORY								
II Year - I Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC308PC	**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

The course provides the fundamental mathematical tools to analyze how systems respond to inputs by examining signals, covering topics like signal classification, linear time-invariant (LTI) systems, convolution, and transforms such as Fourier, Laplace, and Z-transforms.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Classify signals and systems and their analysis in time and frequency domains.
2) Study the concepts of distortion less transmission through LTI systems, convolution and correlation properties.
3) Understand Laplace and Z-transforms their properties for analysis of signals and systems.
4) Identify the need for sampling of CT signals, types and merits and demerits of each type.

3. COURSE OUTCOMES

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

CO 1	Generate, analyze and perform various operations on Signals/Sequences both in time and Frequency domain.
CO 2	Analyze and Characterize Continuous and Discrete Time Systems both in Time and Frequency domain along with the concept of Sampling.
CO 3	Generate different Random Signals and capable to analyze their Characteristics
CO 4	Apply the Concepts of Deterministic and Random Signals for Noise removal Applications and on other Real Time Signals

4. LIST OF EXPERIMENTS/DEMONSTRATIONS:

Verify any twelve experiments in H/W Laboratory

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. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Verification of Sampling Theorem.
15. Removal of noise by Autocorrelation / Cross correlation.
16. Extraction of Periodic Signal masked by noise using Correlation.
17. Verification of Weiner-Khinchine Relations.
18. Checking a Random Process for Stationarity in Wide sense.

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	**3**	**2**	**3**	**1**	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**2**	**3**	**2**
CO 2	**3**	**2**	**2**	**1**	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**2**	**3**	**2**
CO 3	**2**	**3**	**3**	**2**	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**1**	**2**	**3**
CO 4	**3**	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**

COURSE CONTENT

GENDER SENSITIZATION LAB								
II Year - I Semester: ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
***MC309**	**Mandatory**	**-**	**-**	**2**	**0**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Nil								

1. COURSE OVERVIEW

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.

2. COURSE OBJECTIVE

The students will try to Learn:

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

3. COURSE OUTCOMES

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

CO 1	Students will have developed a better understanding of important issues related to gender in contemporary India.
CO 2	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
CO 3	Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
CO 4	Students will acquire insight into the gendered division of labor and its relation to politics and economics.
CO 5	Men and women students and professionals will be better equipped to work and live together as equals.

4. COURSE CONTENT

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. First lessons in Caste.

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 OutIs 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".
- ESSENTIAL READING: The Textbook, "Towards a World of Equals: A Bilingual Textbook 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 Academy, Telangana Government in 2015.

ASSESSMENT AND GRADING:

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

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**					
CO 2								**3**	**3**					
CO 3								**3**	**3**					
CO 4								**3**	**3**					
CO 5								**3**	**3**					