TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
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B.TECH. - ELECTRONICS & COMMUNICATION ENGINEERING
Course Structure R-22

SEMESTER III

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
1	**BS**	D3BSM4	Complex Analysis and Vector Calculus	3	1	0	4	40	60	100
2	**ES**	D3ESDLD	Digital Logic Design	2	0	0	2	40	60	100
3	**ES**	D3ESNT	Network Theory	2	0	0	2	40	60	100
4	**PC**	D43PC1	Electronic Circuit Analysis	3	1	0	4	40	60	100
5	**PC**	D43PC2	Signals and Systems	3	1	0	4	40	60	100
6	**ES**	D3ESDLL	Digital Logic Design Lab	0	0	2	1	40	60	100
7	**PC**	D43PC3	Electronic Circuit Design Lab	0	0	2	1	40	60	100
8	**PC**	D43PC4	Electronic Circuit Simulation Lab	0	0	2	1	40	60	100
9	**PC**	D43PC5	Basic Simulation Lab	0	0	2	1	40	60	100
10	**MC**	MC002	Constitution of India *	3	0	0	0	0	0	0
TOTAL				**16**	**3**	**8**	**20**	**360**	**540**	**900**

SEMESTER IV

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
1	**PC**	D44PC6	Probability Theory and Stochastic Processes	3	0	0	3	40	60	100
2	**PC**	D44PC7	Analog and Digital Communications	3	0	0	3	40	60	100
3	**PC**	D44PC8	Pulse and Digital Circuits	3	0	0	3	40	60	100
4	**PC**	D44PC9	Linear and Digital IC Applications	3	0	0	3	40	60	100
5	**PC**	D44PC10	Electromagnetic Theory and Transmission Lines	3	0	0	3	40	60	100
6	**PC**	D44PC11	Analog & Digital Communications Lab	0	0	2	1	40	60	100
7	**PC**	D44PC12	Pulse and Digital Circuits Lab	0	0	2	1	40	60	100
8	**PC**	D44PC13	Linear and Digital IC Applications Lab	0	0	2	1	40	60	100
9	**PC**	D44PC14	Real Time Based Projects	0	0	4	2	40	60	100
10	**MC**	MC003	Intellectual Property Rights*	3	0	0	0	0	0	0
TOTAL				**18**	**0**	**10**	**20**	**360**	**540**	**900**

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. III Semester **L/T/P/C**
3/1/0/4

COMPLEX ANALYSIS AND VECTOR CALCULUS (D3BSM4)

COURSE OBJECTIVES:

1. Differentiation and Integration of Complex Valued functions.
2. Evaluation of Integrals using Cauchy's integral formula and residue theorem.
3. Laurent Series Expansion of Complex Functions.
4. The physical quantities involved in Engineering field related to Vector valued functions.
5. The basic properties of vector valued functions and their applications to line-surface and volume integrals.

COURSE OUTCOMES:

Upon completion of the Course, the students will be able to

CO1: Analyze the complex functions with reference to their analyticity.

CO2: Integration using Cauchy's integral theorem, formula and finding the Taylor and Laurent's series expansion of complex functions.

CO3: Solve problems on Residues using different methods.

CO4: Evaluation of real integrals.

CO5: Compute derivatives of vector valued functions, gradient functions.

CO6: Evaluate the line-surface and volume integrals and converting them from one to another.

UNIT-I:

Functions of a Complex Variable: Introduction, Continuity, differentiability, analyticity, properties, Cauchy Riemann equations in Cartesian and polar co-ordinates, harmonic and conjugate harmonic functions, Milne Thompson method.

UNIT-II:

Complex Integration: Line integral, Cauchy integral theorem, Cauchy integral formula, generalized Cauchy integral formula. Power series-Taylor's series, Laurent series. Singular points, isolated singular points, pole of order m, essential singularit.

UNIT III:

Residues, **Evaluation of integrals:** Residue, Cauchy residue theorem, Types of real integrals improper real integrals a) $\int_{-\infty}^{\infty} f(x)dx$ b) $\int_{c}^{c+2\Pi} f(cos\Theta, sin\Theta)dx$

UNIT IV:

Vector Differentiation: Vector point functions and scalar point functions- Gradient - Divergence and Curl. Directional**,** Derivatives - Tangent plane and normal line-Vector Identities -Scalar potential functions- Solenoidal and Irrotational vectors.

UNIT-V:

Vector Integration Line- Surface and Volume Integrals- Theorems of Green- Gauss and Stokes (without proofs) and their applications.

Text Books:

1. Erwinkreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.
2. Veerarajan T., "Engineering Mathematics for first year", Tata McGraw Hill, New Delhi, 2008.
3. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill, New Delhi, 11th Reprint, 2010.
4. Dennis G. Zilland Patrick Shanahan, "A first course in complex analysis with applications",Johns and Bartlett publishers.

Reference Books:

1. N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint 2008.
2. B.S.Grewal-, "Higher Engineering Mathematics", Khanna Publishers, 36th Edition, 2010.
3. S.R.K.Iyengar and R.K.Jain, "Advanced Engineering Mathematics", Narosa Publications.
4. Saff E.B.and A.D.Snider, "Fundamentals of Complex Analysis", Pearson Publications.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. III Semester **L/T/P/C**
2/0/0/2

DIGITAL LOGIC DESIGN (D3ESDLD)

COURSE OBJECTIVES:

1. To learn basic techniques for the design of Digital Circuits and fundamental concepts used in the design of Digital Systems.
2. To understand common forms of number representation in Digital Electronic Circuits and to be able to convert between different representations.
3. To implement simple Logical operations using Combinational Logic Circuits
4. To impart students the concepts of Sequential Circuits,
5. To implement memory devices using RAM and ROM

COURSE OUTCOMES:

Upon completion of the Course, the students will be able to

CO1: Convert numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.

CO2: Realize simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize Combinational Functions.

CO3: Design and analyze of Combinational Circuits and to use standard combinational functions/building blocks to build larger more complex circuits.

CO4: Design of Sequential Logic circuits and synthesizing of threshold functions.

CO5: Design and analyze small sequential circuits and devices and to use standard Sequential functions/building blocks to build larger more Complex Circuits

UNIT–I: Number System and Switching Functions: Number Systems, Base Conversion Methods, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes.

UNIT-II: Boolean Algebra: Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

Minimization of Boolean Functions: Introduction, The Minimization with theorem, The Karnaugh Map Method, Tabular Method.

UNIT–III: Combinational Circuits: Introduction, Adders, Subtractors, Multiplexers, Demultiplexers, Encoders, Decoders, Code Converters, Comparators and Hazards.

UNIT–IV: Sequential Circuits-I: Introduction, Basic Differences between Combinational and Sequential circuits, the Binary Cell, Latch, Flip-Flop-Types, and Race around condition, Excitation tables and characteristic equations. Conversion from one type of Flip-Flop to another, preset and Clear inputs, Timing and Triggering Consideration, Clock Skew.

UNIT–V: Sequential Circuits-II: Introduction, Register-Types, Counter–Types, Design of Ripple (mod-N) Counter, Ring Counter.

TEXT BOOKS

1. Morris Mano, "Digital Design", PHI, 3rd Edition.
2. Zvi Kohavi & Niraj, K. Jha, "Switching and Finite Automata Theory", 3rd Edition, Cambridge.

REFERENCES BOOKS

1. Anand Kumar, "Switching Theory and Logic Design" PHI, 2008
2. Charles H. Roth, "Fundamentals of Logic Design" Thomson Publications, 5th Edition, 2004.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. III Semester **L/T/P/C**
2/0/0/2

NETWORK THEORY (D3ESNT)

Prerequisite: Mathematics, Fundamentals of Electrical Engineering

COURSE OBJECTIVES:

1. To understand Network Topology.
2. To analyse transients in Electrical systems.
3. To evaluate Network parameters of given Electrical network
4. To design basic filter configurations.

COURSE OUTCOMES:

After this course, the student will be able to

CO1: Obtain the transient and steady-state response of electrical circuits.
CO2: Analyze circuit analysis using Laplace transform.
CO3: Discuss about two port networks.
CO4: Design network filters.

UNIT-I:

Network topology: Definitions– Graph – Tree, Basic cut set and Basic Tie set matrices for planar networks – Loop and Nodal methods of analysis of Networks with dependent &independent voltage and current sources - Duality &Dual networks.

UNIT- II:

Solution of First and Second order networks: Solution of first and second order differential equations for Series and parallel R-L, R-C, R- L-C circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response.

UNIT - III:

Electrical Circuit Analysis Using Laplace Transforms: Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, Application of Laplace Transforms to RL, RC and RLC (series)for impulse and step.

UNIT – IV:

Two Port Network and Network Functions: Network functions driving point and transfer impedance function networks, necessary conditions for driving point functions and for transfer function, Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks.

UNIT - V:

Introduction to Filters: Introduction to filters –single tuned and double tuned filters - low pass – high pass and band pass, Band rejection filter – RC, RL, filters- constant K and m derived filters and composite filter design.

TEXT BOOKS:

1. D. Roy Choudhury, "Networks and Systems", New Age International Publications, 1998.
2. W.H. Hayt and J.E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.

REFERENCE BOOKS:

1. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw HillEducation, 2004.
2. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.
3. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
4. Electric Circuits by Schaum's outlines.
5. Problems & Solutions in Electrical Engineering by V.C. Natesan, Parkersmith's

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3/1/0/4

ELECTRONIC CIRCUIT ANALYSIS (D43PC1)

COURSE OBJECTIVES:

1. To introduce circuit diodes, BJTs and transistors studied earlier.
2. To give understanding of various types of amplifier circuits such as small signal, cascaded amplifiers.
3. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.
4. To introduce concept of different types of oscillators.
5. To familiarize about frequency response of amplifier of tuned or untuned using BJT.

COURSE OUTCOMES:

Upon completion of the Course, the student's will be able to:

CO1: Design and analyze BJT small signal amplifier circuits and applying the biasing techniques learnt earlier.

CO2: Obtain the required over all specifications like Gain, Bandwidth, etc. analyze the transistor at very high frequencies

CO3: Design and analyze small signal amplifier circuits applying the FET biasing techniques.

CO4: Utilize the Concepts of negative feedback to improve the stability of amplifiers and Positive feedback to generate sustained oscillations.

CO5: Design and realize different classes of Power Amplifiers and tuned amplifiers use able for audio and Radio applications.

UNIT- I:

Analysis and Design of Small Signal Low Frequency BJT Amplifiers:

Classification of Amplifiers, h-parameter analysis, small signal equivalent circuit of a transistor, Analysis of CE, CB, CC amplifiers. Distortion in amplifiers, Miller's theorem, Analysis of CE, CC, and CB Amplifiers, CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors, Design of single stage RC coupled amplifier, Different coupling schemes used in amplifiers, Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair.

UNIT-II:

Transistor at High Frequency: Logarithms, Decibels. The Hybrid-pi (π)–Common Emitter transistor model, CE short circuit current gain, current gain with resistive load, Single stage CE transistor amplifier response, Gain-bandwidth product.

UNIT-III:

FET Amplifiers: Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOS amplifiers, MOS Small signal model, Common source amplifier with resistive load, Diode connected and Current source loads, Source follower, Common Gate Stage amplifier.

UNIT-IV:

Positive & Negative Feedback in 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.

Oscillators: Condition for Oscillations, RC and LC type Oscillators–Frequency and amplitude stability of oscillators–Generalized analysis of LC oscillators, Quartz, Hartley, and Colpitts Oscillators RC-phase shift and Wien-bridge oscillators.

UNIT-V:

Large Signal Amplifiers: Class A Power Amplifier, Maximum Value of Efficiency of Class–A power Amplifier, Transformer Coupled Class A Power Amplifier, Class B Power Amplifier, Class B Push-Pull and Complimentary Symmetry Power Amplifiers. Distortion in amplifiers, Crossover distortion and harmonic distortion. Transistor Power Dissipation, Heat Sinks.

Tuned Amplifiers: Introduction, Q-Factor, small Signal Tuned amplifier, Single Tuned Amplifier (Capacitive coupling & Inductive Coupling).

TEXT BOOKS

1. David A. Bell, "Electronic Devices and Circuits", 5^{th}Edition, Oxford.
2. Robert L. Boylestead and Louis Nashelsky, "Electronic Devices and Circuit theory", 11^{th}Edition, 2009, Pearson.
3. Jacob Millman Christos C Halkias, "Integrated Electronics", McGraw Hill Education

REFERENCE BOOKS

1. S. Salivahanan, N. Suresh Kumar, AVallvaraj, "Electronic Devices and Circuits", 5^{th}Edition, MC GRAW HILL EDUCATION.
2. Md H Rashid, Cengage, "Electronics circuits and applications" , 2014

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. III Semester **L/T/P/C**
3/1/0/4

SIGNALS AND SYSTEMS (D43PC2)

COURSE OBJECTIVES:

1. This gives the basics of Signals and Systems required for all Electrical Engineering related courses.
2. This gives concepts of Signals and Systems and its analysis using different transform techniques.
3. This gives basic understanding of random process which is essential for random signals and systems encountered in Communications and Signal Processing areas.

COURSE OUTCOMES:

At the end of this course students will be able to

CO1: Acquire the knowledge about types of signals, classification of signals & systems, orthogonality
CO2: Analyze Fourier Representation of Continuous Time periodic and aperiodic signals
CO3: Analyze waveform synthesis using Laplace transforms, Sampling and Reconstruction of signals.
CO4: Investigate the convolution and correlation of signals
CO5: Realizes the system reliability, transfer function using state space

UNIT- I:

Introduction to Signals & Systems: Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function, signum function and ramp function.

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.

UNIT-II:

Fourier Representation of Continuous Time Signals

PERIODIC SIGNALS-FOURIER SERIES: Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirchilet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum.

NON PERIODIC SIGNALS-FOURIER TRANSFORM: Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

UNIT-III:

Laplace Transform: Concept of Region of Convergence (ROC) for Laplace Transforms, Constraints on ROC for various classes of signals, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis., Inverse Laplace Transform, Partial fraction method and long division method, Laplace transforms methods in circuit analysis, the transfer function. Analysis and characterization of LTI system using Laplace transform.

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

UNIT - IV:

Convolution And Correlation Of Signals: Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation of functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem, Power density spectrum, Relation between Auto Correlation function and Energy/Power spectral density function, Relation between Convolution and Correlation, Detection of periodic signals in the presence of Noise by Correlation, Extraction of signal from noise by filtering.

UNIT - V:

Signal Transmission Through Linear Systems: Linear System, Impulse response, Response of a Linear System, Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI system, Filter characteristics of Linear Systems, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and Rise time.

State Space Representation Of Systems: Introduction to state space analysis, State model, Derivation of Transfer Function from State model, State Transition Matrix and its Role.

TEXT BOOKS

1. B.P. Lathi,"Signals, Systems & Communications", 2013, BS Publications.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd Ed., PHI.
3. Anand Kumar," Signals and Systems"- PHI.

REFERENCE BOOKS

1. Simon Haykin and Van Veen, Wiley, "Signals & Systems", 2nd Ed.
2. Iyer and K. Satya Prasad, "Signals and Signals" , Cengage Learning.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech III Semester **L/T/P/C**
0/0/2/1

DIGITAL LOGIC DESIGN LAB (D3ESDLL)

COURSE OBJECTIVES:

1. To study the sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices, their minimization techniques and their realizations.
2. Knowledge of the methods for analysis and synthesis of combinational and sequential circuits.
3. To study the theory and applications of 74XX combinational and sequential series IC's.

COURSE OUTCOMES:

On completion of this lab course the students will be able to:

CO1: Acquires the knowledge of 74XXIC's.

CO2: Design various combinational &sequential circuits using various Digital ICs.

CO3: Acquires the knowledge of differentiating between Linear and Digital IC's.

CO4: Acquires the knowledge of demonstrating by designing digital circuits

CO5: Acquires the knowledge of Synchronous and asynchronous digital circuits

Note:

1. To perform any Ten experiments.
2. Verify the functionality of the IC in the given application.

LIST OF EXPERIMENTS

Design and Implementation of:

1. Study of logic gates.
2. Deign a 4-bit Gray to Binary and Binary to Gray Converter.
3. Design a 16 bit Adder/ Subtractor using 4-bit Adder /Subtractor IC's.
4. Design a 3*8 Decoder.
5. Design a16x4 priority encoder using two 8x3 priority encoder.
6. Design a 16*1 multiplexer using 8x1 multiplexer.
7. Design a 16bit comparator using 4 bit comparators.
8. Study of flip flops.
9. Design an 8 bit parallel load and serial out shift register using two 4 bit shift register.
10. Design an 8 bit serial in and serial out shift register using two 4 bit shift register.
11. Deign a Ring counter and twisted ring counter using a 4-bit shift register.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. III Semester **L/T/P/C**
0/0/2/1

ELECTRONIC CIRCUIT DESIGN LAB (D43PC3)

COURSE OBJECTIVES:

1. To train the students the operational principle, analysis, design and application of the Bipolar Junction Transistor (BJT).
2. To train the students the operational principle, analysis, design and application of the Field Effect Transistor (FET).
3. To develop the students' ability on conducting engineering experiments, analyze experimental observations scientifically.
4. To initiate the students the understanding of the concepts, know-how Multisim or P-spice or Equivalent Simulation software is used for circuit design.

COURSE OUTCOMES: Upon completion of the subject, students will be able to

CO1: Design of Single & Multi stage amplifiers.
CO2: Design of Power and Tuned amplifiers.
CO3: Design of Feedback and Oscillator circuits.
CO4: Analyze the different types of FET Amplifiers.
Note: Minimum 10 Experiments are to be done in hardware.

LIST OF EXPERIMENTS:

1. Common Emitter Amplifier.
2. Common Source amplifier.
3. Two Stage RC Coupled Amplifiers.
4. Current Shunt Feedback Amplifier.
5. Voltage Series Feedback Amplifier
6. Wien Bridge Oscillator using Transistors.
7. RC Phase Shift Oscillator using Transistors.
8. Class A Power Amplifier (Transformer less).
9. Class B Push Pull Amplifier.
10. Hartley Oscillator.
11. Colpitt's Oscillator.
12. Single Tuned Voltage Amplifier.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. III Semester **L/T/P/C**
0/0/2/1

ELECTRONIC CIRCUIT SIMULATION LAB (D43PC4)

COURSE OBJECTIVES:

1. To train the students to analyze, the operational principle design and application of the Bipolar Junction Transistor (BJT).
2. To train the students to analyze the operational principle, design and application of the Field Effect Transistor (FET).
3. To develop the students' ability on conducting engineering experiments, analyze experimental observations scientifically.
4. To initiate the students the understanding of the concepts, know-how Multisim or P-spice or Equivalent Simulation software is used for circuit design.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to

CO1: Analyze Single & Multi stage amplifiers.
CO2: Analyze Power and Tuned amplifiers.
CO3: Analyze Feedback and Oscillator circuits.
CO4: Analyze the different types of FET Amplifiers.
Note: Minimum 10 Experiments are to be simulated using Multisim or P-spice or Equivalent Simulation

LIST OF EXPERIMENTS:

1. Common Emitter Amplifier.
2. Common Source amplifier.
3. Two Stage RC Coupled Amplifiers.
4. Current Shunt Feedback Amplifier.
5. Voltage Series Feedback Amplifier
6. Wien Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistors
8. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier
10. Hartley Oscillator
11. Colpitt's Oscillator
12. Single Tuned Voltage Amplifier.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech III Semester **L/T/P/C**
0/0/2/1

BASIC SIMULATION LAB (D43PC5)

Course Objectives:

1. To provide background and fundamentals of MATLAB or equivalent tool for the analysis and processing of signals and to generate various continuous and discrete time signals.
2. To determine the Fourier Transform of signals and to convert a continuous time signal to discrete and reconstruction using Sampling theorem.
3. To apply convolution and correlation for continuous time signal.
4. To use Laplace and Z transforms for analyzing continuous /discrete time signals and systems.

Course Outcomes:

CO1: Understanding of MATLAB tool.

CO2: To analyze various signals and sequences in MATLAB including operations.

CO3: To verify Wiener-Khintchine Relations and Sampling Theorem.

Note:

All the experiments are to be simulated using MATLAB or equivalent software Minimum of 12 experiments 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 reliability and stability properties.
9. Gibbs Phenomenon Simulation.
10. For the given poles and zeros, find the transfer function and plot the Pole-Zero maps in S-plane, also find the stability of the system.
11. Sampling Theorem Verification.
12. Removal of noise by Autocorrelation / Cross correlation.
13. Extraction of Periodic Signal masked by noise using Correlation.
14. Verification of Weiner-Khintchine Relations.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech III Semester **L/T/P/C**
3/0/0/0

CONSTITUTION OF INDIA

Course Objectives:

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes:

Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before thearrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
- Discuss the passage of the Hindu Code Bill of 1956.

Unit - 1 History of Making of the Indian Constitution- History of Drafting Committee.
Unit - 2 Philosophy of the Indian Constitution- Preamble Salient Features
Unit - 3 Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit - 4 Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit - 5 Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit - 6 Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested Reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech IV Semester **L/T/P/C**
3/0/3/3

PROBABILITY THEORY AND STOCHASTIC PROCESSES (D44PC6)

Course Objectives:

1. Understand the elementary aspects of probability theory
2. This gives basic understanding of random signals
3. Utilization of Random signals and systems in Communications and Signal Processing areas
4. To know the Temporal and Spectral Characteristics of Random Process

Course Outcomes:

Upon completing this course, the student will be able to

CO1: Define probability and interpret probability by modeling sample spaces.

CO2: Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance.

CO3: Compute the problems involving multiple random variables

CO4: Apply the principles of random process in system concepts

CO5: Determine the Spectral and Temporal characteristics of random signal.

UNIT-I:

Probability and Random Variable

Probability: Probability introduced through Sets and Relative Frequency, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events.

Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables.

UNIT -II:

Distribution & Density Functions: Distribution and Density functions and their Properties - Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh and Conditional Distribution, methods of defining Conditional Event, Conditional Density, and Properties.

Operation on One Random Variable – Expectations: Introduction, 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 Transformations for a Continuous Random Variable, Non- monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable

UNIT-III:

Multiple Random Variables: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, 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.

Operations on Multiple Random Variables: 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-IV:

Stochastic Processes – Temporal Characteristics: The Stochastic 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, Nth 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 and its Properties, Linear System Response of Mean and Mean-squared Value, Autocorrelation Function, Cross-Correlation Functions, Gaussian Random Processes, Poisson Random Process.

UNIT-V:

Stochastic Processes – Spectral Characteristics: Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, 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 Spectral Density of Input and Output of a Linear System. Noise- White and colored Noise

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Athanasios Papoulis and S.Unnikrishna Pillai, “Probability, Random Variables and Stochastic Processes”, 4 Ed., TMH.
2. Pradip Kumar Gosh, “Theory of Probability and Stochastic Processes”, University Press
3. Henry Stark and John W. Woods, “Probability and Random Processes with Application to Signal Processing”, 3 Ed.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. IV Semester **L/T/P/C**
3/0/0/3

ANALOG AND DIGITAL COMMUNICATIONS (D43PC7)

COURSE OBJECTIVES:

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.

COURSE OUTCOMES:

After completion of this course the student is able to:

CO1: Design and analyze various Analog and Digital Modulation and Demodulation techniques.

CO2: Model the noise present in continuous wave Modulation techniques.

CO3: Implement the Super heterodyne Receiver concept and Pulse Modulation Techniques in various applications

CO4: Analyze and design the base band Transmission model.

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.

TEXT BOOKS

1. Simon Haykin, "Analog and Digital Communications", John Wiley, 2005.
2. Wayne Tomasi, "Electronics Communication Systems", 5th Ed. PHI, 2009.

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 Systems", TMH, 2004.
4. K. Sam Shanmugam,"Analog and Digital Communication", Willey, 2005.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. IV Semester **L/T/P/C**
3/0/0/3

PULSE AND DIGITAL CIRCUITS (D43PC8)

Course Objectives:

1. To explain the complete response of R-C and R-L-C transient circuits.
2. To explain clippers, clampers, switching characteristics of transistors and sampling gates.
3. To construct various multivibrators using transistors, design of sweep circuits and sampling gates.
4. To discuss and realize logic gates using diodes and transistors.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Learn the concepts and applications of RC and RLC circuits.

CO2: Understand the applications of clipping and clamping circuits.

CO3: Learn various switching devices such as diode, transistor and to design various time base generators.

CO4: Design Multivibrators for various applications

CO5: Realizing logic gates and sampling gates using diodes and transistors.

UNIT – I

Linear Wave Shaping: High pass and low pass RC circuits and their response for Sinusoidal, Step, Pulse, Square, & Ramp inputs, High pass RC network as Differentiator, Low pass RC circuit as an Integrator, Attenuators and its application as a CRO Probe, RL and RLC Circuits and their response for Step Input, Ringing Circuit, Illustrative Problems

UNIT – II

Non-Linear Wave Shaping: Diode clippers, Transistor clippers, Clipping at two independent levels, Emitter coupled clipper, Comparators, Applications of Voltage comparators. Clamping Operation, Clamping circuit taking Source and Diode resistances into account, Clamping Circuit Theorem, Practical Clamping Circuits, effect of Diode Characteristics on Clamping Voltage.

UNIT – III

Switching Characteristics of Devices: Diode as a Switch, Piecewise Linear Diode Characteristics, Diode Switching times, Transistor as a Switch, Tranistor switching times.

Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, Transistor Miller Time Base generator, Transistor Bootstrap Time Base Generator, Transistor Current Time Base Generators.

UNIT – IV

Multivibrators: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using transistors, Commutating Capacitor, Monostable Multivibrator (collector Coupled only), Astable Multivibrator (collector Coupled only) and Applications of Multivibrators.

UNIT – V Realization of Logic Gates: AND, OR and NOT gates using Diodes and transistors, DCTL, RTL, DTL, TTL, CML (ECL) and CMOS Logic Families and its Comparison, Sampling Gates.

TEXT BOOKS:

1. .J. Millman, H. Taub and Mothiki S. Prakash Rao, "Pulse Digital and Switching Waveforms", 3 rd Ed., 2017, McGraw Hill.
2. David A. Bell, "Pulse, Switching and Digital Circuits", 5th Edition 2015, OXFOR University Press.

REFERENCE BOOKS:

1. Venkata Rao K, Rama Sudha K, Manmadha rao G, "Pulse and Digital Circuits", Pearson, 2010
2. A. Anand Kumar," Pulse and Digital Circuits", 2nd Ed, 2011, PHI.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. IV Semester. **L/T/P/C**
3/0/0/3

LINEAR AND DIGITAL IC APPLICATIONS (D43PC9)

COURSE OBJECTIVES:

1. To introduce the basic building blocks of linear integrated circuits.
2. To teach the linear and non-linear applications of operational amplifiers.
3. To introduce the theory and applications of analog multipliers and PLL.
4. To teach the theory of ADC and DAC.
5. To implement the concept and working of basic digital circuits.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:
CO1: Understand Operational Amplifiers with Linear Integrated Circuits.
CO2: Design circuits using Operational Amplifiers for various Applications.
CO3: Design different ADC's and DAC's.
CO4: Understand different families of Digital Integrated Circuits and their Characteristics.
CO5: Design Combinational and Sequential circuits using IC's.

UNIT - I:

Operational Amplifier: IC packages, Study of differential op-amp, Ideal and Practical Op-Amp, Op-Amp Characteristics-DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Adder, Differential Amplifier (Subtractor), Differentiators and Integrators, Instrumentation Amplifier, Comparators, Schmitt Trigger, Introduction to Voltage Regulators-Three Terminal Voltage Regulators.

UNIT-II:

Op-Amp & IC-555 Applications: Introduction to Active Filters, Characteristics and Analysis of 1^{st} order Low Pass, High Pass, Band Pass, Band Reject and All Pass filters, waveform Generators - Triangular, Sawtooth, Square wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications.

UNIT - III:

PLL & Data Converters: IC565 PLL - Block Schematic, Description of Individual Blocks, Applications.

ADC&DAC: 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:

Digital Integrated Circuits: Classification of Integrated Circuits, Comparison of Various Logic Families, CMOS Transmission Gate, IC interfacing. TTL Driving CMOS & CMOS Driving TTL, Combinational Logic ICs - Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs – Binary to Gray, Gray to Binary & BCD to Binary Code Converters, Decoders, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Magnitude Comparators.

UNIT - V:

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS 40XX Series ICs - All Types of Flip-flops, Shift Registers, Synchronous Counters, Decade Counters.

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

TEXT BOOKS:

1. Ramakanth A Gayakwad, "OP-Amp and Linear ICs ", 4th ED. PHI, 2015.
2. D. Roy Chowdhury, "Linear Integrated Circuits", New Age International (p) Ltd, 5th Edition,2020.
3. John F.Wakerly, "Digital Design Principles& Practices", Pearson Education Asia, 4th ED., 2012.

REFERENCES

1. K. Lal Kishore, "Op-Amp Linear Integrated Circuits Application", Pearson 1st Edition 2007.
2. RP Jain, "Modern Digital Electronics", 4th Ed., MC GRAW HILL EDUCATION, 2009.
3. Sergio Franco,"Design with operational amplifiers & Analog Integrated circuits", Mc Graw Hill. 3rd Edition, 2017.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. IV Semester **L/T/P/C**
3/0/0/3

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES (D43PC10)

COURSE OBJECTIVES:

This is a structured foundation course, dealing with concepts, formulations and applications of Electromagnetic Theory and Transmission Lines, and is the basic primer for all electronic communication engineering subjects. The main objectives of the course are:

1. To explain the basics of electrostatic and magneto static concepts and show the time varying electromagnetic fields as applied to high frequency circuit design.
2. To interpret the electromagnetic wave characteristics at interface of different boundaries.
3. To illustrate the importance of transmission line theory and applications of it to circuit design with the help of Smith chart.
4. To understand the basic concepts of guided waves.

COURSE OUTCOMES:

Upon completion of the Course, the students will be able to:

CO1: Analyze the electric fields due to different charge distributions and analyze the electric fields in different mediums.

CO2: Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions, and use them for solving engineering problems.

CO3: Analyze the EM wave propagation and attenuation in various media and analyze the importance of pointing theorem.

CO4: Determine the Transmission Line parameters for different lines characterize the distortions and estimate the characteristics for different lines.

CO5: Choose smith chart to design transmission lines, to find the reflection coefficient for given impedance and vice versa

UNIT – I:

Electrostatics: Introduction to coordinate systems and Vector analysis. 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, Illustrative Problems.

UNIT – II:

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

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface : Dielectric- Dielectric and Dielectric- Conductor Interfaces, Illustrative Problems.

UNIT – III:

EM Wave Characteristics - I: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves - Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics- Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Depth of penetration, Polarization of uniform Plane wave.

EM Wave Characteristics - II: Reflection and Refraction of Plane Waves - Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem - Application.

UNIT – IV:

Transmission Lines - I: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Infinite Line Concepts, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Lossless, Distortion less and High Frequency Transmission Lines, Condition for Minimum Attenuation, Line Distortion, Loading - Types of Loading.

UNIT – V:

Transmission Lines - II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines - Impedance Transformations, Significance of Z_{min} and Z_{max} , Single and Double Stub Matching, Smith Chart - Configuration and Applications, Illustrative Problems.

TEXT BOOKS

1. Matthew N.O. Sadiku and S.V. Kulkarni,"Principles of Electromagnetics", 6^{th}Ed. Oxford University Press, Asian Edition, 2015.
2. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", 2^{nd}Ed. 2000, PHI.
3. Umesh Sinha, SatyaPrakashan, "Transmission Lines and Networks ", 2001, (Tech. India Publications), New Delhi.

REFERENCE BOOKS

1. William H. Hayt Jr. and John A. Buck, "Engineering Electromagnetics" 8thEd. 2014, McGraw Hill Education.
2. John D. Ryder, "Networks, Lines and Fields", 2^{nd}Ed. 1999, PHI.

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ELECTRONICS & COMMUNICATION ENGINEERING

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0/0/2/1

ANALOG AND DIGITAL COMMUNICATIONS LAB (D43PC11)

Course Objectives:

1. To understand modulation, demodulation techniques used in communication system, and develop the Modulation techniques used in both time and frequency domains.
2. To gain the knowledge on pre-emphasis and de-emphasis circuits used in Analog communication.
3. 3.To analyze various digital modulation techniques like ASK, FSK, PSK, DPSK and QPSK
4. To analyze the fundamentals in PLL, VCO.

Course Outcomes:

Upon completion of the lab, students will be able to:

CO1: Design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics.

CO2: Design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics.

CO3: Apply different types of Sampling with various Sampling rates and duty Cycles.

CO4: Design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically.

Note: Minimum 12 experiments should be conducted:

Experiments are to be simulated first either using MATLAB or any other simulation software tools or then testing to be done in hardware.

LIST OF EXPERIMENTS:

Cycle-I

1. Amplitude modulation and demodulation
2. Frequency modulation and demodulation
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. Study of spectrum analyzer and Measurement of frequency spectrum of AM and FM Signals

Cycle-II

1. PCM Generation and Detection
2. Delta Modulation
3. Frequency Shift Keying: Generation and Detection
4. Binary Phase Shift Keying: Generation and Detection
5. Generation and Detection (i) DPSK (ii) QPSK
6. Generate FSK modulated signal using PLL

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. IV Semester **L/T/P/C**
0/0/2/1

PULSE AND DIGITAL CIRCUITS LAB (D43PC12)

Course Objectives:

1. Ability to design an Integrator & Differentiator using R, L&C circuits.
2. Ability to design Clipping, Clamping, and Pulse circuits such as Multivibrators, Time Base Generators.
3. Ability to understand the switching characteristics of devices
4. Realization of Logic Gates using Diodes and Transistors.
5. To gain the knowledge on existing and future Analog circuits.

Course Outcomes:

Upon completion of the Lab, students will be able to:

CO1: Design RC circuits.
CO2: Design Multivibrators for various Applications.
CO3: Design Time Base Generators and Relaxation Oscillators.
CO4: Design different types of Digital Circuits by using Logic Gates and Flip-Flops.

Note: Minimum Twelve experiments to be conducted:

1. Linear wave Shaping
   a. RC Low Pass Circuit for different time constants
   b. RC High Pass Circuit for different time constants
2. Non-linear wave shaping
   a. Transfer characteristics and response of Clippers
   i) Positive and Negative Clippers
   ii) Clipping at two independent levels
   b. The steady state output waveform of clampers for a square wave input
   i) Positive and Negative Clampers
   ii) Clamping at different reference voltage
3. Different types of Comparators.
4. Switching characteristics of a transistor
5. Design a Bistable Multivibrator and draw its waveforms
6. Design an Astable Multivibrator and draw its waveforms
7. Design a Monostable Multivibrator and draw its waveforms
8. Response of Schmitt Trigger circuit for loop gain less than and greater than one
9. The output- voltage waveform of Boot strap sweep circuit
10. The output- voltage waveform of Miller sweep circuit
11. Response of a transistor Current sweep circuit
    a. Response of Unidirectional gate
    b. Response of Bidirectional gate using transistors
12. Study of Logic Gates.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. IV Semester **L/T/P/C**
0/0/2/1

LINEAR AND DIGITAL IC APPLICATIONS LAB (D43PC13)

COURSE OBJECTIVES:

1. Linear and non-linear applications of operational amplifiers (741).
2. Applications of 555 timers and 565PLL
3. Voltage regulators using 78xx, 79xxand IC723.
4. Knowledge of the methods for analysis and synthesis of combinational and sequential circuits
5. To study the theory and applications of 74xx combinational and sequential series IC's.

COURSE OUTCOMES:

Upon completion of the lab, students will be able to:

CO1: Understand various applications using operational amplifier (741).

CO2: Design circuits using IC 555, IC 565 for various applications and voltage regulators. Acquires the knowledge of 74X IC's.

CO3: Design various combinational & sequential circuits using various Digital ICs.

CO4: Acquires the knowledge of differentiating between Linear and Digital IC's.

List of Experiments:

Part-1: TO VERIFY THE FOLLOWING FUNCTIONS

Note: **Minimum of 8 experiments should be completed**

1. Adder, Subtractor using IC 741Op-Amp.
2. Comparator using IC 741Op-Amp.
3. Integrator using IC741Op-Amp.
4. Differentiator using IC741Op-Amp.
5. Schmitt Trigger circuit using IC 741.
6. Three Terminal Voltage Regulators-7805, 7809, 7912.
7. Active Low Pass & High Pass filters (first order).
8. IC 555 Timer - Monostable Operations.
9. IC 555 Timer - Astable Operations.
10. 10 IC565- PLL Applications

Part-II: DESIGN AND IMPLEMENTATION OF:

Note: **Minimum of 4 experiments should be completed**

1. Design a Ring counter using a 4-bit shift register.
2. Design a twisted ring counter using a 4-bit shift register.
3. Design a decade counter
4. Design a modulo counter using two decade counters
5. Design a 4 digit hex counter using synchronous one digit hex counter.
6. Design a 4 digit hex counter using Asynchronous one digit hex counter.
7. Design a 4 bit pseudo random sequence generator using 4-bit ring counter.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. IV Semester **L/T/P/C**
3/0/0/0

INTELLECTUAL PROPERTY RIGHTS (MC003)

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

UNIT – II:
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:
Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV:
Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V:
New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

Suggested Reading:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.