SProbability Theory and Stochastic Process

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. ISem. (3rd Semester)			
Course Code 24BS3T07	**Probability Theory and Stochastic Process**	L	T	P	C
Prerequisites	Mathematics-1	3	0	0	3

Course Objectives

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

Course Outcomes

After completion of this course, the learners will be able to

CO1	Understand the concepts of Random variable and probability Distribution and Density functions
CO2	Perform operations on single Random variables.
CO3	Perform operations on multiple Random variables.
CO4	Determine temporal characteristics of Random Signals and LTI Systems of Random Signals.
CO5	Determine the spectral characteristics and LTI Systems of Random Signals and Understand the concepts of Noise.

Unit-1: Probability & Random Variable CO1 10L

Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events, Random Variable-Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

Unit-2: Operations on Single Random Variables –Expectations CO2 15L

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

Unit-3: Operations on Multiple Random Variables - Expectations CO3 12L

Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence. Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions. Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables,

Linear Transformations of Gaussian Random Variables

Unit-4: Random Processes – Temporal Characteristics CO4 12L

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

Unit-5: Spectral Characteristics CO5 11L

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

Noise Sources:

Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties.

Textbook(s)

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

Reference book(s)

1. Bruce Hajck - Random Processes for Engineers, Cambridge unipress, 2015.
2. Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic.
3. Processes, 4th Ed., PHI, 2002.

Web reference(s)

1. https://link.springer.com/book/10.1007/978-3-030-40183-2M

Universal Human Values – Understanding Harmony and Ethical Human Conduct

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24BS3T09	**Universal Human Values – Understanding Harmony and Ethical Human Conduct**	L	T	P	C
Prerequisites	Nil	2	1	0	3

Course Objectives

To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and the movement towards value-based living in a natural way. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Define the terms like Natural Acceptance, Happiness, and Prosperity
CO2	Identify one's self, and one's surroundings (family, society nature)
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life
CO4	Relate human values with human relationship and human society.
CO5	Justify the need for universal human values and harmonious existence
CO6	Develop as socially and ecologically responsible engineers

Unit-1: Introduction to Value Education CO1 6L

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education). Lecture 2: Understanding Value Education. Tutorial 1: Practice Session PS1 Sharing about Oneself. Lecture 3: self-exploration as the Process for Value Education

Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations Tutorial 2: Practice Session PS2 Exploring Human Consciousness Lecture 5: Happiness and Prosperity – Current Scenario Lecture 6: Method to Fulfil the Basic Human Aspirations Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

Unit-2: Harmony in the Human Being CO2 6L

Lecture 7: Understanding Human being as the Co-existence of the self and the body. Lecture 8: Distinguishing between the Needs of the Self and the Body. Tutorial 4: Practice Session PS4 Exploring the difference of the Needs of self and body. Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the Self. Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the Self. Lecture 11: Harmony of the self with the body Lecture 12: Programme to ensure self-regulation and Health Tutorial 6: Practice Session PS6

Exploring Harmony of self with the body.

Unit-3: Harmony in the Family and Society CO3 6L

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction. Lecture 14: 'Trust' – the Foundational Value in Relationship. Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust. Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect. Lecture 16: Other Feelings, Justice in Human-to-Human Relationship. Lecture 17: Understanding Harmony in the Society. Lecture 18: Vision for the Universal Human Order. Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

Unit-4: Harmony in the Nature/Existence CO4 4L

Lecture 19: Understanding Harmony in the Nature. Lecture 20: Interconnectedness, self-regulation, and Mutual Fulfilment among the Four Orders of Nature. Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels. Lecture 22: The Holistic Perception of Harmony in Existence. Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

Unit-5: Implications of the Holistic Understanding – a Look at Professional Ethics CO5, CO6 6L

Lecture 23: Natural Acceptance of Human Values. Lecture 24: Definitiveness of (Ethical) Human Conduct. Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order. Lecture 26: Competence in Professional Ethics.

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education. Lecture 27: Holistic Technologies, Production Systems, and Management Models-Typical Case Studies Lecture 28: Strategies for Transition towards Value-based Life and Profession. Tutorial 14: Practice Session PS14 Exploring Transition Steps towards Universal Human Order.

Textbook(s)

1. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, Excel Books, 2nd Revised Edition 2019.
2. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, Excel Books, 2nd Revised Edition 2019.

Reference book(s)

1. Human Values - A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
2. Jeevan Vidya: Ek Parichaya- A.Nagaraj, Jeevan VidyaPrakashan, Amarkantak, 1999
2. The Story of Stuff-Annie Leonard, Free Press, Reprint edition,2011.
3. The Story of My Experiments with Truth-Mohandas Karamchand Gandhi, Fingerprint Publishing, First Edition 2009.
4. Small is Beautiful-E. F Schumacher,HarperCollins,1980.
5. Slow is Beautiful - Cecile Andrews, New Society Publishers; First Edition,2006.
6. Economy of Permanence - J C Kumarappa, Sarva Seva Sangh Prakashan,2007.
7. Bharat Mein Angreji Raj – PanditSunderlal,Prabhat Prakashan; First Edition,2018.
8. Rediscovering India -Dharampal,Society for Integrated Development of Himalayas, 2003.
9. Hind Swaraj or Indian Home Rule – M.K. Gandhi, Navajivan,later Printing

edition,1938.
10. India Wins Freedom - Maulana Abdul Kalam Azad,Orient BlackSwan,First Edition,1988.
11. Vivekananda - Romain Rolland,Prabhat Prakashan Publisher,2019.
12. Gandhi - Romain Rolland,General Press, First Edition,2022.

Web reference(s)

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf
8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

Signals and systems

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24ES3T06	**Signals And Systems**	L	T	P	C
Prerequisites	Differential equations and Integrals, Laplace Transforms, Series and expansions	3	0	0	3

Course Objectives

Provide detail of study about signals and systems ,To analyze the spectral characteristics of signal using Fourier series and Fourier transforms , To understand the characteristics of systems, To introduce the concept of sampling process and To know various transform techniques to analyze the signals and systems.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Differentiate the various classifications of signals and systems
CO2	Analyze the frequency domain representation of signals using Fourier concepts
CO3	Classify the systems based on their properties and determine the response of LTI Systems.
CO4	Know the sampling process and various types of sampling techniques.
CO5	Apply Lap lace to analyze signals and Systems
CO6	Apply Lap lace and z-transforms to analyze signals and Systems

Unit-1: Introduction CO1 9L

Signals

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 - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function **.** Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions , Orthogonal in complex functions ,Related problems.

Unit-2: Fourier Series And Fourier Transform CO2, CO3 9L

Fourier Series

Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlets conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series ,Complex Fourier spectrum. 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, Related problems.

Unit-3: Analysis Of Linear Systems CO4 12L

Linear System

Introduction - Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant(LTV)system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system, Related problems. Introduction - Filter characteristics of linear systems. Distortion less transmission through a system, Signal band width, system band width, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time .

Unit-4: Correlation and Sampling Theorem CO5 10L

Correlation

Introduction Correlation: Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parsevals theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering

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, Related problems .

Unit-5: Laplace transforms and Z-Transform CO6 10L

Laplace transforms

Introduction, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.Ts, Inverse Laplace transform, Relation between L.Ts, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

Z-transforms

Concept of Z-Transform of a discrete sequence .Region of convergence in Z Transform, constraints on ROC for various classes of signals, Inverse Z transform, properties of Z-transforms .Distinction between Laplace ,Fourier and Z transforms. .

Textbook(s)

1. Signals, Systems&Communications-B.P.Lathi,BSPublications,2003.
2. Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H. Nawab,PHI,2ndEdn,1997
3. Signals&Systems-SimonHaykinandVanVeen,Wiley,2ndEdition,2007

Reference book(s)

1. Principles of Linear Systems and Signals–BP Lathi, Oxford University Press,2015
2. Signals and Systems–TK Rawat, Oxford University press,2011 Engineering

Web reference(s)

1. https://www.loc.gov/rr/scitech/selected-internet/signals.html

Electronic Devices and Circuits

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. ISem. (3rd Semester)			
Course Code 24EC3PCT02	**Electronic Devices and Circuits**	L	T	P	C
Prerequisites	Engineering Physics, Basic Electronics	3	0	0	3

Course Objectives

- To learn and understand the basic concepts of semiconductor physics.
- Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
- To learn and understand the application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
- Acquire knowledge about the principle of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics.
- To learn and understand the purpose of transistor biasing and its significance
- Small signal equivalent circuit analysis of BJT and FET transistor amplifiers and compare different configurations.

Course Outcomes	
After completion of this course, the learners will be able to	
CO1	Apply the basic concepts of semiconductor physics.
CO2	Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
CO3	Analyze the construction, working principle of Semiconductor Devices and Diode Circuits.
CO4	Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions.
CO5	Apply small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.

UNIT-1: Review of Semiconductor Physics CO1 12L

Mobility and Conductivity, Intrinsic and extrinsic semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors.

Junction Diode Characteristics

Energy band diagram of PN junction Diode, Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in p-n junction Diode, Diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance.

UNIT-2: Special Semiconductor Devices CO2 12L

Zener Diode, Breakdown mechanisms, Zener diode applications, Varactor Diode, LED, Photodiode, Tunnel Diode, UJT, PNPN Diode, SCR, Construction, operation and V-I characteristics.

Diode Circuits

The Diode as a circuit element, The Load-Line concept, The Piecewise Linear Diode model, Clipping (limiting) circuits, Clipping at Two Independent Levels, Peak Detector, Clamping

circuits, Comparators,Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, Filters, Inductor filter, Capacitor filter, π-section Filter, comparison of various filter circuits in terms of ripple factors

UNIT- 3: Transistor Characteristics CO3 12L

Junction transistor, transistor current components, transistor equation in CB configuration, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

Transistor Biasing and Thermal Stabilization

Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in VBE, Ic, and β, Stability factors, (S,S' ,S''), Bias compensation, Thermal runaway, Thermal stability.

UNIT- 4 : Small Signal Low Frequency Transistor Amplifier Models CO4 10L

BJT

Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers

UNIT- 5 : FET CO5 14L

FET types, JFET operation, characteristics, small signal model of JFET.

MOSFET

MOSFET Structure, Operation of MOSFET: operation in triode region, operation in saturation region, MOSFET as a variable resistor, derivation of V-I characteristics of MOSFET, Channel length modulation, MOS transconductance, MOS device models: MOS small signal model, PMOS Transistor, CMOS Technology, Comparison of Bipolar and MOS devices.

CMOS amplifiers

General Considerations, Common Source Stage, Common Gate Stage, Source Follower, comparison of FET amplifiers

Textbook(s)

1.Millman’s Electronic Devices and Circuits- J. Millman, C. C. Halkias and Satyabrata Jit, Mc-Graw Hill Education, 4th edition, 2015.
2.Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, Mc-Graw Hill, 5th edition, 2022.
3. Fundamentals of Microelectronics-Behzad Razavi, Wiley, 3rd edition, 2021.

Reference book(s)

1. Basic Electronics-Priciples and Applications, Chinmoy Saha,Arindam Halder, Debarati Ganguly,Cambridge University Press.
2. Electron Devices and Circuits- Atul P. Godse, Uday A. Bakshi ,Technical Publications,2020.
3. Electronics devices & circuit theory- Robert L.Boylestad and LouiNashelsky, Pearson, 11th edition, 2015.
4. Electronic Devices and Circuits - David A. Bell, Oxford University Press, 5th edition, 2008.

Web reference(s)

1.https://onlinecourses.nptel.ac.in/noc21_ee80/preview
2.https://onlinecourses.nptel.ac.in/noc21_ee55/preview

Switching Theory and Logic Circuits

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. ISem. (3rd Semester)			
Course Code 24EC3PCT03	**Switching Theory and Logic Design**	L	T	P	C
Prerequisites	Basic Electronics and Electricals	3	0	0	3

Course Objectives

- To solve a typical number base conversion and analyze new error coding techniques.
- Theorems and functions of Boolean algebra and behavior of logic gates
- To optimize logic gates for digital circuits using various techniques.
- Boolean function simplification using Karnaugh maps and Quine-McCluskey methods
- To understand concepts of combinational circuits.
- To develop advanced sequential circuits.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Classify different number systems and apply to generate various codes.
CO2	Use the concept of Boolean algebra in minimization of switching functions
CO3	Design different types of combinational logic circuits.
CO4	Apply knowledge of flip-flops in designing of Registers and counters
CO5	The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
CO6	Produce innovative designs by modifying the traditional design techniques.

UNIT-1: Review Of Number Systems & Codes CO1 12L

Representation of numbers of different radix, conversation from one radix to another radix, r□1's compliments and r's compliments of signed members. Gray code ,4 bit codes; BCD, Excess-3, 2421, 84-2-1 code etc. Error detection & correction codes: parity checking, even parity, odd parity, Hamming code.

Boolean Theorems And Logic Operations

Boolean theorems, principle of complementation & duality, De-morgan theorems. Logic operations ; Basic logic operations -NOT, OR, AND, Universal Logic operations, EX-OR, EX- NOR operations. Standard SOP and POS Forms, NAND-NAND and NOR-NOR realizations, Realization of three level logic circuits.

UNIT-2: Minimization Techniques CO2 12L

Minimization and realization of switching functions using Boolean theorems, K-Map (up to 6 variables)and tabular method(Quine-mccluskey method) with only four variables and single function.

Combinational Logic Circuits Design

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders; 4-bit adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit and carry look-a- head adder circuit, Design code converts using Karnaugh method and draw the complete circuit diagrams.

UNIT- 3: Combinational Logic Circuits Design using MSI & LSI CO3 12L

Design of encoder, decoder, multiplexer and de-multiplexers, Implementation of higher order circuits using lower order circuits . Realization of Boolean functions using decoders and multiplexers. Design of Priority encoder, 4-bit digital comparator and seven segment decoder.

Introduction of PLD's

PLDs: PROM, PAL, PLA -Basics structures, realization of Boolean functions, Programming table.

UNIT- 4 : Sequential Circuits I CO4 12L

Classification of sequential circuits (synchronous and asynchronous) , operation of NAND & NOR Latches and flip-flops; truth tables and excitation tables of RS flip-flop, JK flip- flop, T flip-flop, D flip-flop with reset and clear terminals. Conversion from one flip-flop to another flip- flop. Design of 5ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi directional shift register, universal shift, register Study the following relevant ICs and their relevant functions 7474,7475,7476,7490,7493,74121.

UNIT- 5 : Sequential Circuits II CO5 C06 12L

Finite state machine; state diagrams, state tables, reduction of state tables. Analysis of clocked sequential circuits Mealy to Moore conversion and vice-versa. Realization of sequence generator, Design of Clocked Sequential Circuit to detect the given sequence (with overlapping or without overlapping)

Textbook(s)

1. Switching and finite automata theory Zvi.KOHAVI,Niraj.K.Jha 3rdEdition,Cambridge UniversityPress,2009
2. Digital Design by M.MorrisMano, Michael D Ciletti,4th editionPHIpublication,2008
3. Switching theory and logic design by Hill and Peterson,Mc-Graw Hill TMH edition, 2012.

Reference book(s)

1. Fundamentals of Logic Design by Charles H. Roth Jr,JaicoPublishers,2006
2. Digital electronics by R S Sedha.S.Chand &companylimited,2010
3. Switching Theory and Logic Design by A. AnandKumar,PHI Learningpvtltd,2016.
4. Digital logic applications and design by John M Yarbough, Cengagelearning,2006.

Web Reference(s)

1.https://onlinecourses.nptel.ac.in/noc20_cs67/preview.
2. https://dl.acm.org/doi/10.5555/1074100.1074844

Electronic Devices and Circuits Lab

Regulation GE24	GIET Engineering College (Autonomous)				II B. Tech. I Sem. (3rd Semester)
Course Code 24EC3PCL02	**Electronic Devices and Circuits Lab**	L	T	P	C
Prerequisites	Basic Electricals and Electronics Lab	0	0	3	1.5

Course Objectives

The aim of this laboratory is to give practical exposure to students on various electronic components, semiconductor devices and electronics instruments which facilitates to design basic electronic circuits and analyze their characteristics.To analyse the characteristics and behaviour of electronic devices, including diodes ,BJT'S,FET's through experimental observation.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Construct and Analyse the Clipper and Clamper circuits using Diodes.
CO2	Implement the rectifier circuits with and without filter.
CO3	Analyse the input and output characteristics of BJT and FET.
CO4	Understand the concepts of SCR & UJT and observe its characteristics.
CO5	Measure and observe the Lissajous patterns using CRO.
CO6	Analyse the frequency response of BJT and FET amplifiers.

List of Experiment(s)

1. Clipper circuit using diode
2. Clamping circuit using diode
3. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
4. BJT Characteristics (CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. FET Characteristics (CS Configuration)
   Part A: Drain Characteristics
   Part B:Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

Note: Minimum of Ten Experiments has to be performed

Reference(s)

1.Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, Mc-Graw Hill, 5th edition, 2022.

Web Resource(s)

1.https://www.vlab.co.in/broad-area-electronics-and-communications

Switching Theory and Logic design Lab

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24EC3PCL03	**Switching Theory and Logic design Lab**	L	T	P	C
Prerequisites	Basic Electronics	0	0	3	1.5

Course Objectives

The objectives of the Switching Theory and Logic Design Lab course are to provide knowledge of digital logic design techniques, , and familiarize students with combinational and sequential logic circuits, study flip flops, shift registers and representation of switching functions

Course Outcomes

After completion of this course, the learners will be able to

CO1	Test the operation of different logic gates using relevant IC's.
CO2	Apply the concept of Boolean algebra or k-maps to reduce and Construct logic circuit for given function.
CO3	Examine the operation of different combinational logic circuits
CO4	Analyse the Truth tables of different Flip-Flops.
CO5	Design of registers using sequential logic circuits
CO6	Design of Synchronous and Asynchronous counters using Flip-Flops

List of Experiment(s)

1. Verification of truth tables of the following Logic gates Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR

2. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.

3. Verification of functional table of 3 to 8-line Decoder /De-multiplexer

4. Variable logic function verification using 8 to1 multiplexer.

5. Design full adder circuit and verify its functional table.

6. Verification of functional tables of (i) JK Edge triggered Flip–Flop (ii) JK Master Slave Flip–Flop (iii) D Flip-Flop

7. Design a four-bit ring counter using D Flip–Flops/JK Flip Flop and verify output.

8. Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output

9. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.

10. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip Flops and Test It with a low frequency clock and sketch the output waveforms.

11. Design MOD–8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.

12. (a) Draw the circuit diagram of a single bit comparator and test the output

(b) Construct 7 Segment Display Circuit Using Decoder and7 Segment LED and test it.

Additional Experiments:

1. Design BCD Adder Circuit and Test the Same using Relevant IC
2. Design Excess-3 to 9- Complement convertor using only four Full Adders and test the Circuit.
3. Design an Experimental model to demonstrate the operation of 74154 De-Multilixer using LEDs for outputs.
4. Design of any combinational circuit using Hardware Description Language.
5. Design of any sequence circuit using Hardware Description Language.

Reference(s)

1. Switching Theory and Logic Design by A. AnandKumar, PHI Learningpvtltd,2016.

Web Resource(s)

1. Virtual Labs (iitkgp.ac.in)

Data Structures using Python

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24CS3SCL02	**Data Structures using Python**	L	T	P	C
Prerequisites	Programming Skills	0	0	2	2

Course Objectives

- Introduce core programming concepts of Python programming language.
- Understand various data representation techniques in the real world.
- Implement linear and non-linear data structures.
- Develop real-time applications using suitable data structure.
- Identify suitable data structure to solve various computing problems.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Implement oops concepts in Python.
CO2	Develop Programs on modules and Packages
CO3	Develop the programs on stacks, queues and linked lists.
CO4	Develop the programs on Searching and Sorting.
CO5	Design and implementation of programs on Binary Search Tree.
CO6	Design Programs that handle errors.

List of Experiment(s)

1. Write a Python program for class, Flower, that has three instance variables of type str, int, and float that respectively represent the name of the flower, its number of petals, and its price. Your class must include a constructor method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the value of each type.
2. Develop an inheritance hierarchy based upon a Polygon class that has abstract methods area( ) and perimeter( ). Implement classes Triangle, Quadrilateral, Pentagon, that extend this base class, with the obvious meanings for the area( ) and perimeter( ) methods. Write a simple program that allows users to create polygons of the various types and input their geometric dimensions, and the program then outputs their area and perimeter
3. Write a python program to implement Method Overloading and Method Overriding.
4. Write a Python program to illustrate the following comprehensions:

   a) List Comprehensions

   b) Dictionary Comprehensions

   c) Set Comprehensions

   d) Generator Comprehensions
5. Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list. Example: Original list: [1, 2, 3, 4, 5, 6, 7, 8, 9] Combinations of 2 distinct objects: [1, 2] [1, 3] [1, 4] [1, 5] .... [7, 8] [7, 9] [8, 9].
6. Write a program for Linear Search and Binary search.

7. Write a program to implement Bubble Sort and Selection Sort.
8. Write a program to implement Merge sort and Quick sort.
9. Write a program to implement Stacks and Queues.
10. Write a program to implement Singly Linked List.
11. Write a program to implement Doubly Linked list.
12. Write a program to implement Binary Search Tree.

Reference(s)

1. Data Structures and Algorithms Using Python, Rance D. Necaise, JOHN WILEY & SONS, INC.
2. ReemaThareja, Python Programming using Problem Solving Approach, First Edition,Oxford Higher Eduction.

Web Resource(s)

1.https://www.geeksforgeeks.org/python-data-structures/
2.https://www.javatpoint.com/data-structures-and-algorithms-in-python-set-1

Environmental Science

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24AC3T01	**Environmental Science** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Basic Science	2	0	0	-

Course Objectives

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future
- generations and pollution cause due to the day-to-day activities of human life
- To save earth from the inventions by the engineers.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Grasp multi-disciplinary nature of environmental studies and various Renewable and non-renewable resources.
CO2	Understand flow and bio-geo- chemical cycles and ecological pyramids &The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web and role of bio diversity in society.
CO3	Understand various causes of pollution and solid waste management and related preventive measures.
CO4	Understand the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
CO5	Illustrate the causes of population explosion, value education and welfare programmes.
CO6	Self-Sustaining Green Campus with Environment Friendly aspect of – Energy and gain the knowledge by site seeing

Unit-1: Multidisciplinary Nature of Environmental Studies and Natural resources CO1 9L

Multidisciplinary Nature of Environmental Studies

Definition, Scope and Importance Need for Public Awareness.

Natural Resources

Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources

Unit-2: Ecosystems and Biodiversity and Its Conservation CO2 9L

Ecosystems

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation

Introduction and Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Unit-3: Environmental Pollution and Disaster Management CO3 12L

Environmental Pollution

Definition, Cause, effects and control measures of: a. Air Pollution. b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management

Disaster management

Floods, earthquake, cyclone and landslides

Unit-4: Social Issues and the Environment CO4 10L

Social Issues

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, and watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

Unit-5: Human Population and The Environment CO5 CO6 10L

Human Population

Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education - HIV/AIDS –Women and Child Welfare – Role of information Technology in Environment and human health – Case studies. Field Work: Visit to a local area to document environmental

assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc

Textbook(s)

1. Erach Bharucha, Text book of Environmental Studies for Undergraduate Courses, Universities Press (India) Private Limited, 2019.
2. Palani Swamy, Environmental Studies, 2/e, Pearson education, 2014.
3. S. Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.
4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, SciTech Publications (India), Pvt. Ltd, 2010.

Reference book(s)

1. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e, Cengage Publications, 2012.
2. M.Anji Reddy, “Textbook of Environmental Sciences and Technology”, BS Publication, 2014.
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.
4. J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.
5. G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.
6. Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science, 1/e, Prentice Hall of India Private limited, 1991

Web reference(s)

1. https://onlinecourses.nptel.ac.in/noc23_hs155/preview
2. https://www.youtube.com/watch?v=5QxxaVfgQ3k

Managerial Economics And Financial Analysis

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. IISem. (4th Semester)			
Course Code 24HS4T04	**Managerial Economics And Financial Analysis**	L	T	P	C
Prerequisites	Mathematics, Analytical analysis	2	0	0	2

Course Objectives

- To inculcate the basic knowledge of microeconomics and financial accounting
- To make the students learn how demand is estimated for different products, input output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes

After completion of this course, the learners will be able to	
CO1	Define the concepts related to Managerial Economics, financial accounting and management(L2)
CO2	Evaluate the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (L2)
CO3	Apply the Concept of Production cost and revenues for effective Business decision (L3)
CO4	Analyze how to invest their capital and maximize returns (L4)
CO5	Evaluate the capital budgeting techniques. (L5)
CO6	Develop the accounting statements and evaluate the financial performance of business entity (L5)

UNIT-1: Managerial Economics CO1 12L

Introduction – Nature, meaning, significance, functions, and advantages. Demand- Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT-2: Production and Cost Analysis CO2 12L

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems). .

UNIT- 3: Business Organizations and Markets CO3 10L

Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies .

UNIT- 4: Capital Budgeting CO4 14L

Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT- 5 : Financial Accounting and Analysis CO5 12L

Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbook(s)

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference book(s)

1. Ahuja Hl Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

Web reference(s)

1. https://www.slideshare.net/123ps/managerial-economics-ppt.
2. https://www.slideshare.net/rossanz/production-and-cost-45827016.
3. https://www.slideshare.net/darkyla/business-organizations-19917607.

Linear control systems

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. IISem. (4th Semester)			
Course Code 24ES4T10	**Linear Control Systems**	L	T	P	C
Prerequisites	Mathematics, Signals and Systems	3	0	0	3

Course Objectives

- To introduce the concepts of open loop and closed loop systems, mathematical models of mechanical and electrical systems, and concepts of feedback.
- To study the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system for necessary analysis.
- To develop the acquaintance in analyzing the system response in time-domain and frequency domain in terms of various performance indices.
- To analyze the system in terms of absolute stability and relative stability by different approaches.
- To design different control systems for different applications as per given specifications
- To introduce the concepts of state variable analysis, design and also the concepts of controllability and observability.

Course Outcomes

After completion of this course, the learners will be able to

C01	This course introduces the concepts of feedback and its advantages to various control systems
CO2	The performance metrics to design the control system intime-domain and frequency domain are introduced.
CO3	Control systems for various applications can be designed using time-domain and frequency domain analysis.
CO4	In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced.
CO5	Design and analyze compensators, PID controllers, and state-space models, understand state variables, controllability, observability, and time-invariant equations.

UNIT-1: Introduction CO1 12L

Concepts of System, Control Systems: Open Loop and closed loop control systems and their differences. Different examples of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models, Differential equations, Impulse Response and transfer functions. Translational and Rotational mechanical systems

UNIT-2: Transfer Function Representation CO1 14L

Transfer Function of DC Servo motor - AC Servo motor- Synchro-transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples –Block diagram algebra–Representation by Signal flowgraph-Reduction using mason’s gain formula.

Time Response Analysis

Standard test signals – Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems – Time domain specifications – Steady state response - Steady state errors and error constants.

UNIT-3: Stability Analysis In S-Domain CO3 12L

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability100

Root Locus Technique

The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT-4: Frequency Response Analysis CO4 8L

Introduction, Correlation between time and frequency response, PolarPlots, BodePlots,Nyquist Stability Criterion

UNIT-5:Classical Control Design Techniques CO5 14L

Compensation techniques – Lag, Lead, Lead-Lag Controllers design infrequency Domain, PIDControllers. State Space Analysis of Continuous Systems Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Textbook(s)

1. Automatic Control Systems 8th edition– by B.C.Kuo – Johnwiley and son's, 2003.
2. Control Systems Engineering –by I. J.Nagrathand M.Gopal, New Age International (P) Limited, Publishers, 2nd edition, 2007.
3. Modern Control Engineering–by Katsuhiko Ogata–Pearson Publications, 5th edition, 2015.

Reference book(s)

1. Control Systems by A.Nagoorkani, RB Apublications, 3 edition, 2017.
2. Control Systems by A.Anandkumar, PHI, 2 Edition, 2014.

Web reference(s)

1. https://onlinecourses.nptel.ac.in/noc21_ee80/preview
2. https://onlinecourses.nptel.ac.in/noc21_ee55/preview

Electromagnetic Waves and Transmission lines

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. IISem. (4th Semester)			
Course Code 24EC4PCT04	**Electromagnetic Waves and Transmission Lines**	L	T	P	C
Prerequisites	Engineering Physics	3	0	0	3

Course Objectives

Understand the fundamentals of electric fields, coulomb's law and gauss law Familiar with of Biot-Savart Law, Ampere's Circuital Law and Maxwell equations. Aware of electromagnetic wave propagation in dielectric and conducting media. Study the equivalent circuit of transmission lines and parameters of the transmission. Lines Learn the working of smith chart and its usage in the calculation of transmission line. parameters

Course Outcomes

After completion of this course, the learners will be able to

CO1	Determine electric field intensity using coulomb's law and Gauss law.
CO2	Determine magnetic field intensity using Biot-Savarts Law and Ampere's Circuital Law.
CO3	Analyze the electromagnetic wave propagation in dielectric and conducting media.
CO4	Examine the primary and secondary constants of different types of transmission lines
CO5	Derive the expressions for input impedance, reflection coefficient, and VSWR of transmission lines and calculate these parameters using smith chart.

Unit-1: Electrostatics CO1 15L

Review of Co-ordinate Systems, Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial Capacitors, Illustrative Problems.

Unit-2: Magnetostatics CO2 15L

Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.

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, Illustrative Problems

Unit-3: EM Wave Characteristics CO3 10L

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types, Illustrative Problems. 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, Illustrative Problems.

Unit-4: Transmission Lines – I CO4 10L

Types, Parameters, T & π Equivalent Circuits, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line, Lossless lines, distortion less lines, Illustrative Problems

Unit-5: Transmission Lines – II CO5 10L

Input Impedance Relations, Reflection Coefficient, VSWR, Average Power, Shorted Lines, Open Circuited Lines, and Matched Lines, Low loss radio frequency and UHF Transmission lines, UHF Lines as Circuit Elements, Smith Chart – Construction and Applications, Quarter wave transformer, Single Stub Matching, Illustrative Problems.

Textbook(s)

1. Elements of Electromagnetic – Matthew N. O. Sadiku, Oxford University Press, 7th edition, 2018.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2 nd Edition, 2008.

Reference book(s)

1. Engineering Electromagnetics – William H. Hayt, John A. Buck, Jaleel M. Akhtar, TMH, 9th edition, 2020.
2. Electromagnetic Field Theory and Transmission Lines –G. S. N. Raju, Pearson Education 2006
3. Electromagnetic Field Theory and Transmission Lines: G SasiBhushana Rao,Wiley India 2013.
4. Networks, Lines and Fields John D. Ryder, Second Edition, Pearson Education, 2015.

Web reference(s)

1. https://onlinecourses.nptel.ac.in/noc22_ee43/preview

Electronic Circuit Analysis

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code 24EC4PCT05	**Electronic Circuit Analysis**	L	T	P	C
Prerequisites	Knowledge of electronic devices and circuits & also solve the fundamental problems in engineering physics related to semiconductors.	3	0	0	3

Course Objectives

The main objectives of this course are:

- To learn hybrid- π parameters at high frequency and compare with low frequency parameters.
- Learn and understand the purpose of cascading of single stage amplifiers and derive the overall voltage gain.
- Analyze the effect of negative feedback on amplifier characteristics and derive the characteristics.
- Learn and understand the basic principle of oscillator circuits and perform the analysis of different oscillator circuits.
- Compare and analyze different Power amplifiers like Class A, Class B, Class C, Class AB and other types of amplifiers.
- Analyze different types of tuned amplifier circuits.

Course Outcomes

After completion of this course, the learners will be able to	
CO1	Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
CO2	Design and analysis of multistage amplifiers using BJT and FET and Differential amplifier using BJT.
CO3	Know the effect of negative feedback on amplifier characteristics and derive the characteristics.
CO4	Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
CO5	Know the classification of the power and tuned amplifiers and their analysis with performance comparison.

UNIT-1: Small Signal High Frequency Transistor Amplifier models CO1 14L

BJT

Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid π conductance, Hybrid π capacitances, validity of hybrid π model, determination of high frequency parameters in terms of low-frequency parameters , CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

FET

Analysis of common Source and common drain Amplifier circuits at high frequencies.

UNIT-2: Multistage Amplifiers CO2 12L

Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its

analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Differential amplifier using BJT.

UNIT- 3: Feedback Amplifiers CO3 12L

Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

UNIT- 4 : Oscillators CO4 10L

Oscillator principle, condition for oscillations, types of oscillators, RC phase shift and Wien bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators using BJT, Frequency and amplitude stability of oscillators.

UNIT-5 : Power Amplifiers CO5 12L

Power Amplifiers

Classification of amplifiers(A to H), Class A power Amplifiers, Class B Push-pull amplifiers, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks.

Tuned Amplifiers

Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, , staggered tuned amplifiers.

Textbook(s)

1. Integrated Electronics- J.Millman and C.C.Halkias, Tata McGraw Hill, 1972.
2. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition, 2009.
3. Electronic Devices and Integrated Circuits – B.P. Singh, Rekha, Pearson publications, 2006

Reference book(s)

1. Electronic Circuit Analysis and Design – Donald A.Neaman, McGraw Hill, 2010.
2. Micro electronic Circuits - Sedra A.S. and K.C. Smith, Oxford University Press, Sixth Edition, 2011.
3. Electronic Circuit Analysis - B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy, Pearson Publications.

Web reference(s)

1. https://digimat.in/nptel/courses/video/108102095/L30.html
2. https://nptel.ac.in/courses/117106088
3. https://www.smartzworld.com/notes/electronic-circuit-analysis-pdf-notes-eca-pdf/

Analog Communications

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. IISem. (4th Semester)			
Course Code 24EC4PCT06	**Analog Communications**	L	T	P	C
Prerequisites	Basic Electronics, Mathematics	3	0	0	3

Course Objectives

- Familiarize with the fundamentals of analog communication systems.
- Familiarize with various techniques for analog modulation and demodulation of signals.
- Distinguish the figure of merits of various analog modulation methods.
- Develop the ability to classify and understand various functional blocks of radio
- transmitters and receivers.
- Familiarize with basic techniques for generating and demodulating various pulse
- modulated signals.

Course Outcomes

After completion of this course, the learners will be able to	
CO1	Describe the Modulation and Demodulation techniques of standard AM.
CO2	Compare different types of Amplitude Modulation and Demodulation techniques.
CO3	Analyse the concepts of generation and detection of Angle Modulated signals.
CO4	Outline the Radio Receivers with different sections.
CO5	Interpret the Radio Transmitters completely.
CO6	Illustrate the noise performance in Analog Modulation techniques and also the concepts of Pulse Analog Modulation and Demodulation techniques.

UNIT-1: Amplitude Modulation CO1 10L

Introduction to Fourier transform, Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Time domain and Frequency domain descriptions, Single tone modulation, Power relations in AM waves, Generation of AM waves: Square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelope detector, Related problems.

UNIT-2: DSB & SSB Modulation CO1 14L

Double sideband suppressed carrier modulator: Time domain and frequency domain description, Generation of DSBSC Waves: Balanced Modulator, Ring Modulator, Detection of DSBSC Waves: Coherent detection, COSTAS Loop, Squaring Loop.

Single sideband suppressed carrier modulator: Time domain and Frequency domain description, Generation of SSBSC Waves: Frequency discrimination method, Phase discrimination method, Demodulation of SSB Waves: Coherent Detection.

Vestigial sideband modulation

Time domain description, Frequency domain description, Generation of VSB Modulated wave, Envelope detection of a VSB Wave pulse Carrier, Comparison of different AM Techniques, Applications of different AM Systems, Related problems**.**

UNIT- 3: Angle Modulation CO3 12L

Introduction, Basic concept of phase modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave, Generation of FM Waves: Direct Method, Indirect Method, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM, Related problems.

UNIT- 4: Radio Transmitters CO4, CO5 12L

Classification of Transmitters, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter: Variable reactance type and Phase modulated FM Transmitter, Frequency stability in FM Transmitter.

Radio Receivers

Receiver Types: Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics, Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Amplitude limiting, Comparison of FM & AM Receivers, Communication Receivers,Extension of Super Heterodyne principle and additional circuits.

UNIT- 5 : Noise CO2, CO6 12L

Review of noise and noise sources, Noise figure, Noise in Analog communication Systems: Noise in DSB & SSB Systems, Noise in AM System and Noise in Angle Modulation Systems, Threshold effect in Angle Modulation System, Pre-emphasis & De-emphasis.

Pulse Analog Modulation

Types of Pulse modulation, PAM (Single polarity, double polarity), PWM: Generation & Detection of PWM, PPM: Generation and Detection of PPM, Time Division Multiplexing, TDM Vs FDM.

Textbook(s)

1. Communication Systems, Simon Haykin, Michael Moher, Wiley, 5th Edition, 2009.
2. Principles of Communication Systems, H Taub, D L Schilling, Gautam Sahe, TMH, 4th Edition, 2017.
3. Modern Digital and Analog Communication Systems, B.P.Lathi, Zhi Ding, Hari Mohan Gupta, Oxford University Press, 4th Edition, 2017.

Reference book(s)

1. Electronics & Communication Systems, George Kennedy, Bernard Davis, S R M Prasanna, TMH, 6th Edition, 2017.
2. Communication Systems, R P Singh, S D Sapre, TMH, 3nd Edition, 2017.
3. Communication Systems (Analog and Digital), Dr. Sanjay Sharma, Katson Books, 7th Reprint Edition, 2018

Web reference(s)

1. http://nptel.ac.in/courses/117102059/ Prof. Surendra Prasad.
2. https://ict.iitk.ac.in/wp-content/uploads/EE320A-Principles-Of-Communication CommunicationSystems-4ed-Haykin.pdf.

Signals and systems

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code 24EC4PCL04	**Signals And Systems Lab**	L	T	P	C
Prerequisites	Mathematics, Engineering Physics	0	0	3	1.5

Course Objectives

The aim of this laboratory is to develop the understanding of the basic ideas of the signals and systems encountered in engineering. The main focus will be on the methods for characterizing and analyzing continuous-time and discrete time signals and systems through experimental observation.

Course Outcomes	
After completion of this course, the learners will be able to	
CO1	Understand basics of MATLAB syntax, functions and programming.
CO2	Generate and characterize various continuous and discrete time signals.
CO3	Perform the basic operations on the signals.
CO4	Analyze the convolution and correlation.
CO5	Analyze the spectral characteristics of signals using Fourier analysis
CO6	Analyze the systems using Laplace transform and Z-transform.

List of Experiment(s)

I. Generation of Basic Signals (Analog and Discrete)

1. Unit step
2. Unit impulse
3. Unit Ramp
4. Sinusoidal
5. Signum

II. Operations on signals

1. Addition & Subtraction
2. Multiplication & Division
3. Maximum & minimum

III. Energy and power of signals ,even and odd signals

IV. Transformation of the independent variable

1. Shifting (Delay & Advance)
2. Reversing
3. Scaling

V. Convolution & Deconvolution

VI. Correlation

VII. Fourier Series Representation

VIII. Fourier Transform and Analysis of Fourier Spectrum

IX. Laplace Transforms

X. Z-Transforms

Reference(s)

1. Signals, Systems&Communications-B.P.Lathi,BSPublications,2003.

Web Resource(s)

1.https://ssliitg.vlabs.ac.in

Electronic circuit Analysis

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code 24EC4PCL05	**Electronic Circuit Analysis Lab**	L	T	P	C
Prerequisites	EDC Lab	0	0	3	1.5

Course Objectives

To study the concepts of Electronic Circuit Analysis Lab are typically designed to provide students with practical experience in analyzing and designing electronic circuits. Here are some common objectives you might find. These objectives help bridge the gap between theoretical knowledge and practical application, preparing students for real-world engineering challenges.

Course Outcomes	
After completion of this course, the learners will be able to	
CO1	Teach students how to design electronic circuits and use simulation software to predict circuit behaviour before physical implementation .
CO2	Develop hands-on skills in assembling and testing electronic circuits on breadboards or printed circuit boards .
CO3	ability to use various electronic measuring instruments, such as oscilloscopes, MultiMate's, and function generators .
CO4	Train students to collect, analyze, and interpret experimental data, and compare it with theoretical predictions .
CO5	Install an understanding of safety protocols and best practices for working with electronic circuits and laboratory equipment .
CO6	Identify the type and semiconductor various parameters .

List of Experiment(s)

1. Determination of Ft of a given transistor.
2. Determination Voltage-Series Feedback Amplifier
3. Determination Current-Shunt Feedback Amplifier
4. Determination Frequency of RC Phase Shift/Wien Bridge Oscillator
5. Determination Frequency of Hartley/Colpitts Oscillator
6. Determination Two Stage RC Coupled Amplifier
7. Determination Darlington Pair Amplifier
8. Determination Boots trapped Emitter Follower
9. Calculate Efficiency of Class A Series-fed Power Amplifier
10. Calculate Efficiency of Transformer-coupled Class A Power Amplifier
11. Calculate Efficiency of Class B Push-Pull Power Amplifier
12. Calculate Efficiency of Complementary Symmetry Class B Push-Pull Power Amplifier
13. Determination gain of Single Tuned Voltage Amplifier

14. Determination gain Double Tuned Voltage Amplifier

Note: Minimum of Ten Experiments has to be performed. The students are required to design the circuit and perform the simulation using Multisim / Equivalent Industrial Standard Licensed simulation software tool. Further they are required to verify the result using necessary hardware equipment. .

Reference(s)

1. Electronic Circuit Analysis and Design –Donald A.Neaman, McGrawHill, 2010.
2. Micro electronic Circuits-Sedra A.S. and K.C. Smith, Oxford University Press, Sixth Edition, 2011.

Web Resource(s)

1. www.vlab.co.in
2. https://phet.colorado.edu/en/simulations/filter?subjects=eca&type=html,prototype

Soft Skills

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech.II Sem. (4th Semester)			
Course Code 24HS4L01	Soft Skills	L	T	P	C
Prerequisites	Basic Communication Skills	0	1	2	2

Course Objectives

- To prepare to face global competition for employment and excellence in profession.
- To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

Course Outcomes	
After completion of this course, the learners will be able to	
CO1	Assimilate and understood the meaning and importance of soft skills and learn how to develop them.
CO2	Understand the significance of soft skills in the working environment for professional excellence.
CO3	Prepare to undergo the placement process with confidence and clarity.
CO4	Ready to face any situation in life and equip themselves to handle them effectively.
CO5	Understand and learn the importance of etiquette in both professional and personal life

UNIT – 1: Introduction CO1 6L

Introduction- Emergence of life skills, Definition & Meaning, Importance& need, reasons for skill gap, Analysis--Soft Skills vs Hard skills, Linkage between industry and soft skills, Challenges, Personality Developments. Soft Skills, Soft Skills vs English - Improving Techniques

UNIT – II: Intra-Personal CO2 6L

Definition-Meaning – Importance-SWOT analysis, Johari windows - Goal Setting- quotient skills - Emotional Intelligence- Attitudinal skills - Right thinking- Problem Solving-Time management, stress management

UNIT – III: Inter-Personal CO3 6L

Definition – Meaning – Importance-Communications skills- Team Work, managerial skills - Negotiation skills- Leadership skills, corporate etiquettes

UNIT – IV: Verbal Skills CO4 6L

Definition and Meaning-Listening skills, need- types, advantages, Importance-Improving Tips for Listening, Speaking, need- types, advantages, Importance- Improving Tips, Reading- Writing Skills, Report, Resume, statement of purpose, need- types, advantages, Importance-Improving Tips

UNIT – V: Non Verbal Skills& Interview skills CO5 6L

Definition and Meaning – Importance- Facial Expressions- Eye Contact – ProxemicsHaptics -Posture, cross cultural body language, body language in interview room, appearance and dress code – Kinetics- Para Language - tone, pitch, pause, neutralization of accent, use of appropriate language, Interview skills, interview methods and questions.

Textbook(s)

1. Sherfield, M. Robert at al, Cornerstone Developing Soft Skills, 4/e, Pearson Publication, New Delhi, 2014.
2. Alka Wadkar, Life Skills for Success, 1/e, Sage Publications India Private Limited, 2016.

Reference book(s)

1. Sambaiah.M. Technical English, Wiley publishers India. New Delhi. 2014.
2. Gangadhar Joshi, From Campus to Corporate, SAGE TEXT.
3. Alex.K, Soft Skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
4. Meenakshi Raman and Sangita Sharma, Technical Communication: Principle and Practice, Oxford University Press, 2009.
5. Shalini Varma, Body Language for Your Success Mantra, 4/e, S. Chand Publication, New Delhi, 2014.
6. Stephen Covey, Seven Habits of Highly Effective People, JMD Book, 2013.

Web reference(s)

1. https://onlinecourses.nptel.ac.in/noc20_hs60/preview
2. http://www.youtube.com/@softskillsdevelopment6210
3. https://youtube.com/playlist?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&si=Fs05Xh8ZrOPsR8F4
4. https://www.coursera.org/learn/people-soft-skills-assessment?language=English
5. https://www.edx.org/learn/soft-skills

Design Thinking & Innovation

Regulation GE24	GIET Engineering College (Autonomous)	II B. Tech. IISem (4th Semester)			
Course Code 24BS4L04	**Design Thinking & Innovation**	L	T	P	C
Prerequisites	Critical Thinking , Communication Skills & Adaptability	1	0	2	2

Course Objectives: The objectives of the course are to

- Bring awareness on innovative design and new product development.
- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Define the concepts related to design thinking.
CO2	Explain the fundamentals of Design Thinking and innovation.
CO3	Apply the design thinking techniques for solving problems in various sectors.
CO4	Analyze to work in a multidisciplinary environment .
CO5	Evaluate the value of creativity.

UNIT-1 Introduction to Design Thinking **C01** **12L**

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry**.**

UNIT-2 Design Thinking Process **C02** **10L**

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity

Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development**.**

UNIT-3 Innovation **C03** **12L**

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity**.**

Activity

Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation

UNIT-4 Product Design C04 12L

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity

Importance of modeling, how to set specifications, Explaining their own product design.

UNIT-5 Design Thinking in Business Processes C05 14L

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity

How to market our own product, about maintenance, Reliability and plan for start up.

Textbook(s)

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference book(s)

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

Web reference(s)

1. https://nptel.ac.in/courses/110/106/110106124/
2. https://nptel.ac.in/courses/109/104/109104109/