HYDERABAD INSTITUTE OF TECHNOLOGY AND MANAGEMENT
B.TECH. HR-2021 COURSE STRUCTURE - ECE
(Applicable from the batch admitted during 2021-22 and onwards)

### III – Semester (II – Year)

<table>
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**Mandatory Course (Non-Credit)**

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### IV – Semester (II – Year)

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B.Tech II Year–III Sem  
Subject Code: 21BS3MT03  
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**LAPLACE TRANSFORMS, NUMERICAL METHODS & COMPLEX VARIABLES**  
(Common to ECE/ EEE)

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** To provide the student with
1. Concept, properties of Laplace transforms
3. Various methods to find roots of an equation.
4. Concept of finite differences and to estimate the value for the given data using interpolation.
5. Evaluation of integrals using numerical techniques
7. Differentiation and integration of complex valued functions.
9. Expansion of complex functions using Taylor’s and Laurent’s series

**Course Outcomes**
After learning the contents of this paper the student must be able to
1. Solve the differential equations by Laplace transform technique
2. Calculate the roots of algebraic equations and numerical solution of Ordinary Differential equations by Numerical techniques
3. Analyse the complex function with reference to their analyticity, integration of complex functions by Cauchy’s integral and residue theorems
4. Expand complex function by Taylor’s and Laurent’s series.

**Module I**
**Unit 1: Laplace Transforms**
Laplace Transform of standard functions; first and second shifting theorems; Laplace transforms of functions when they are multiplied and divided by ‘t’. Laplace transforms of derivatives and integrals of function; Laplace transforms of Unit step and Impulse functions; Laplace transform of periodic functions.

**Unit 2: Inverse Laplace Transform**
Finding inverse Laplace transforms by different methods, convolution theorem (without proof), solving ODEs by Laplace Transform method.

**Module II**
**Unit 1: Numerical Solution of An Equation**
Solution of polynomial and transcendental equations – Bisection method, Iteration Method, Newton- Raphson method and Regula-Falsi method.

**Unit 2: Interpolation**
Finite differences- forward differences- backward differences-central differences-operational relations; Interpolation using Newton’s forward and backward difference formulae. Gauss’s
forward and backward formulae; Lagrange’s method of interpolation, Newton’s Divide and Difference interpolation method.

**Module III**

**Unit 1: Numerical Integration**

Trapezoidal rule and Simpson’s 1/3rd and 3/8 rules.

**Unit 2: Solutions of Ordinary Differential Equations**

Ordinary differential equations: Taylor’s series; Picard’s method; Euler and modified, Euler’s methods; Runge-Kutta method of fourth order.

**Module IV**

**Unit 1: Complex Functions**

Limit, Continuity and Differentiation of Complex functions,

**Unit 2: Analytic Functions**

Analyticity, Cauchy-Riemann equations (without proof), Harmonic function and finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties

**MODULE V**

**Unit 1: Complex Integrals**

Line integral, Cauchy’s theorem (without proof), Cauchy’s Integral formula (without proof), Zeros of analytic functions, Singularities.

**Unit 2: Series**

Taylor’s series, Laurent’s series; Poles and Residues, Cauchy Residue theorem (without proof).

**Text Books**


**Reference Books**


**Equivalent MOOC Courses**

1. Laplace Transforms: [https://nptel.ac.in/courses/111/106/111106139/](https://nptel.ac.in/courses/111/106/111106139/)
2. Complex variables: [https://nptel.ac.in/courses/111/106/111106141/](https://nptel.ac.in/courses/111/106/111106141/)
3. Numerical Methods: [https://nptel.ac.in/courses/127/106/127106019/](https://nptel.ac.in/courses/127/106/127106019/)

**E-Books**

2. Introductory methods of numerical analysis by S.S. Sastry [https://1lib.in/book/3380466/2e7cbd](https://1lib.in/book/3380466/2e7cbd)
4. Advanced Engineering Mathematics by Erwin Kreyszig
   https://1lib.in/book/1213502/92e465
5. Advanced Modern Engineering Mathematics by Glyn James
   https://1lib.in/book/1204739/431eb2
6. Complex Analysis by Lars V Ahlfors
   https://1lib.in/book/842200/9692f4

**CO-PO/PSO Mapping**

<table>
<thead>
<tr>
<th>Course Outcomes (COs)</th>
<th>Program Outcomes (POs)</th>
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**CO-PO/PSO Mapping Chart**

(3/2/1 indicates strength of correlation)
3 – High; 2 – Medium; 1 – Low
B. Tech II Year–III Sem

Subject Code: 21PC3CS01

DATA STRUCTURES

Prerequisite: Knowledge of C Programming

Course Objectives
1: To make student knowledgeable in data structure concepts
2: To make students apply the data structure concepts in relevant applications
3: To make students apply the graph techniques in relevant applications
4: To make students determine the best sorting technique to process the data

Course Outcomes
At the end of the course the student s will be able to:
1: Identify the concepts of data structures in relevant applications
2: Apply the concept of data structures for the new situations
3: Apply the graph traversal techniques to solve map related problems
4: Analyze the best sorting technique pertaining to the area applied

Module I

Module II

Module III
Linked Lists – Singly Linked List, Implementation using arrays, Implementation using Queues, Circular Linked List- Doubly linked list- Implementation of doubly linked list, implementation using De queue.
Trees- General trees, Binary trees, Implementation using array and linked representation, tree traversals- in order, preorder, post order, Breadth-first traversal, Implementation, Application of tree traversals.

Module IV
Priority Queue-ADT, Implementation, Heap, sorting with a priority Queue, Adaptable priority Queues Hash Tables and Skip Lists-Maps and Dictionaries, Hash tables, Sorted Maps, Skip lists, Sets, Multi sets and Multi maps
Graphs: Definitions, Terminologies, Matrix and Adjacency List Representation of Graphs, Traversal methods: Breadth First Search and Depth First Search.

Module V
Search trees-Binary search tree, Implementation, Operations, Balanced Search trees-AVL
Trees, Splay trees, (2, 4) trees, Red Black trees.

Text Books

Reference Books
2. Data Structures using C by E. Balagurswamy.
3. Data Structures, S. Lipscutz Schumaum; Outlines, TMH

CO-PO/PSO Mapping

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Pre-requisite: Semiconductor Physics: Insulators, Semiconductors, and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semiconductors, extrinsic semiconductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors.

Course Objectives
1. To understand operation of semiconductor devices.
2. To understand DC analysis and AC models of semiconductor devices.
3. To apply concepts for the design of Regulators and Amplifiers
4. To verify the theoretical concepts through laboratory and simulation experiments

Course Outcomes
Upon completion of the Course, the students will be able to:
1. Understand the characteristics of various electronic components and their Applications
2. Analyze the Bipolar Junction Transistor characteristics and the biasing techniques
3. Evaluate the Field Effect Transistor characteristics and its applications
4. Design and analyze the Small Signal BJT and FET Amplifiers

Module 1
Unit 1 Junction Diode Characteristics
Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode, Diode as a switch.

Unit 2 Special Semiconductor Diodes
Operation and characteristics of Zener Diode, Breakdown mechanisms, Zener diode applications, Operation and characteristics of Photo diode, Tunnel Diode and LED

Module 2
Unit 1 Applications of Diodes I
Rectifiers and Filters- Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, Filters- Inductor filter, Capacitor filter

Unit 2 Applications of Diodes II
Clippers & Clampers - Diode clippers, Transistor clippers, Clipping at two independent levels, Comparators, Applications of Voltage comparators. Clamping Circuit Theorem, Practical Clamping Circuits, Effect of Diode Characteristics on Clamping Voltage, Synchronized Clamping.

Module 3
Unit 1 Bipolar Junction Transistor
Junction transistor, transistor voltage and current components, transistor equation, transistor configurations, 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.

**Unit 2 Transistor Biasing and Thermal Stabilization**
Need for biasing, operating point, load line analysis, BJT biasing- fixed bias, collector to base bias, self bias, Stability factors, \((S, S', S'')\), Bias compensation, Thermal runaway, Thermal stability.

**Module 4**
**Unit 1 Small Signal Low Frequency Transistor Amplifier Models**
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 2 MOSFET**
Comparison between BJT and MOSFET, MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET Characteristics in Enhancement and Depletion mode

**Module 5**
**Unit 1 MOSFET Amplifiers**
Basic concepts of MOS Amplifiers and operation of common-source, common-gate and common-drain amplifiers

**Unit 2 Operation and characteristics of SCR, UJT, Photo transistor, Thermistor, LDR**

**Text Books**
1. Electronic Devices and Circuits- Jacob Millman, McGraw Hill Education

**Reference Books**
1. Electronic Devices and Circuits- Salivahanan, Kishore Kumar, McGraw Hill Education

**Web Resources**
1. https://www.allaboutcircuits.com/
2. https://www.circuitbasics.com/
### CO-PO/PSO Mapping

#### CO-PO/PSO Mapping Chart

(3/2/1 indicates strength of correlation)

3 – High; 2 – Medium; 1 - Low

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### Semester I-I

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<td><strong>Module 1:</strong></td>
<td><strong>Unit 1</strong> Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode, Diode as a switch. <strong>Unit 2</strong> Special Semiconductor Diodes: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, Photo diode, Tunnel Diode, SCR, UJT. Construction, operation and characteristics of all the diodes are required to be considered. <strong>Module 2:</strong></td>
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<td><strong>Unit 1:</strong> Diode and Applications: Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times. Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper- Clamping Circuit Theorem, Clamping Operation, Types of Clampers.</td>
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DIGITAL LOGIC DESIGN

Pre-requisite: Basic knowledge on Digital Electronics

Course Objectives
This course provides in-depth knowledge of Digital logic techniques of digital circuits, which is the basis for design of any digital circuit.
1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To impart the concepts of combinational, sequential logic circuits.
3. To learn the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.

Course Outcomes
1. Understand the numerical information in different forms and Boolean Algebra theorems
2. Solve Boolean expressions using Boolean Theorems-maps
3. Design and analyze combinational and sequential circuits
4. Implement logic families and realization of logic gates

Module I
Unit 1: Number Systems
Number base conversions, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.

Unit 2: Boolean algebra

Module II
Unit 1: Basic Arithmetic Circuits
Half adder, Full adder, half subtractor, Full subtractor, 4-bit parallel adder/subtractor. BCD Adder

Unit 2: Combinational logic circuits

Module III
Unit 1: Introduction to Sequential Circuits
Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops,

Unit 2: Flip flop Conversions
Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.
Module IV
Unit 1: Sequential Logic Applications
Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Universal shift register, Applications of Shift Registers

Unit 2: Design of Counters
Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

Module V
Unit 1: Design and Analysis of Sequential Machines

Unit 2: Logic gates using Diodes & Transistors
AND, OR and NOT Gates using Diodes and Transistors, CMOS Logic Families and its Comparison

Text Books

Reference Books

Web Resources
1. http://blog.digitalelectronics.co.in/
2. www.nesoacademy.org/electronics-engineering/digital-electronics/digital
6. https://nptel.ac.in/courses/117105080/

E-Books

Mooc Courses
2. https://nptel.ac.in/noc/courses/noc21/SEM2/noc21-ee75/
CO-PO/PSO Mapping

### CO-PO/PSO Mapping Chart
*(3/2/1 indicates strength of correlation)*

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<td>II-I</td>
<td>Finite State Machines, Synthesis of Synchronous Sequential Circuits - Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N – Counters. Finite state machine-capabilities and limitations, Mealy and Moore models.</td>
<td>Introduction to Finite State Machines - Mealy Machine and Moore Machine, State diagram, State Assignment and minimization, Design Procedure and Realization using Flip-Flops.</td>
<td>In our syllabus students are going to design Mealy as well as Moore machines using flip flops</td>
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B.Tech II Year–III Sem  
Subject Code: 21PC3EC03

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SIGNALS AND SYSTEMS

Pre-requisite: Nil

Course Objectives
1. To understand various fundamental characteristics of signals and systems.
2. To study the importance of transform domain.
3. To understand the characteristics of LTI systems.
4. To analyze and design various systems.
5. To study the effects of sampling.

Course Outcomes
1. Understand the various signals, systems and their operations.
2. Demonstrate arbitrary signals in time and frequency domain.
3. Analyze the characteristics of linear time invariant systems.
4. Apply the different transform techniques to the signals.

Module I
Unit 1: Representation of Signals
Introduction to signals, Elementary signals, basic operations on signals, classification of Signals, Operations on Signals. System and classification of systems

Unit 2: Signal Analysis
Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Closed or complete set of orthogonal functions.

Module II
Unit 1: Fourier series
Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet’s conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

Unit 2: Fourier Transforms

Module III
Unit 1: Laplace Transforms
Laplace Transforms (L.T), Inverse Laplace Transform, and Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal.

Unit 2: Sampling Theorem
Graphical and analytical proof for Band Limited Signals, Reconstruction of signal from its samples, Effect of under sampling – Aliasing. Introduction to Band Pass Sampling.
Module IV
Unit 1: Signal Transmission through Linear Systems

Unit 2:
Signal bandwidth, System Bandwidth, Filter characteristic of Linear System, Ideal LPF, HPF, and BPF characteristics, Causality and Paley Wiener criterion for physical realization, Relationship between Bandwidth and rise time.

Module V
Unit 1: Convolution
Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Properties of Convolution.

Unit 2: Z–Transforms
Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

Text Books

Reference Books

Web Resources

E Books

Mooc Courses
### CO-PO/PSO Mapping

**CO-PO/PSO Mapping Chart**

(3/2/1 indicates strength of correlation)

3 – High; 2 – Medium; 1 – Low

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B.Tech II Year–III Sem

Subject Code: 21ES3CS05

Data Structures Lab

Pre-requisite: Programming in C and Problem Solving

Course Objectives
1. Understand various data representation techniques in the real world.
2. Implement linear and non-linear data structures.
3. Analyze various algorithms based on their time and space complexity.
4. Develop real-time applications using suitable data structure.
5. Identify suitable data structure to solve various computing problems.

Course Outcomes
1. Identify the appropriate data structures and algorithms for solving real world problems
2. Implement various kinds of searching and sorting techniques.
3. Implement data structures such as stacks, queues, search trees, and hash tables to solve various computing problems
4. Choose appropriate traversal method to find shortest distance

List of Experiments

1. Develop a program to read a linear list of items and store it in an array.
   a) Copy the contents from one array to another array
   b) Copy the contents from one array to another array in reverse order
   c) Delete the duplicate elements from an array.

2. Develop a program to implement various sorting techniques:
   a) Insertion sort
   b) Selection Sort
   c) Bubble Sort
   d) Merge Sort
   e) Quick Sort

3. a) Develop a program to create a stack and perform various operations on it.
    b) Develop a program to create a queue and perform various operations on it.

4. Develop programs for the following:
   a) Uses Stack operations to convert infix expression into postfix expression.
   b) Uses Stack operations for evaluating the postfix expression.

5. Design a program to create a singly linked list for the following operations
   a) Insert a Node at Beginning, at Ending and at a given Position
   b) Delete a Node at Beginning, at Ending and at a given Position
   c) Search, Count the Number of Nodes and Display

6. Design a program to create a doubly linked list for the following operations
   a) Insert a Node at Beginning, at Ending and at a given Position
   b) Delete a Node at Beginning, at Ending and at a given Position
   c) Search, Count the Number of Nodes and Display
7. Design a program to create a binary tree and perform various traversals.
   a) In order
   b) Pre Order
   c) PostOrder

8. Develop a program to Perform Linear Search and Binary Search on a list stored in an array.

9. Design a program to create a Hash table for the following operations
   a) Insert
   b) Delete
   c) Search

10. Develop programs to implement the following graph traversal algorithms:
    a) Depth first search.
    b) Breadth first search.

Text/Reference Books
2. Data structures using C - A. S. Tanenbaum, Y. L. Alangam, and MJ Augestien, PHI Pearson Education

CO-PO/PSO Mapping

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CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3-High; 2-Medium; 1-Low
ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Course Objectives

To learn
1. To observe the characteristics of PN Junction diode & Zener diode.
2. To Understand the concept of full wave rectifiers with & without filters
3. To Understand Switching characteristics of Transistor
4. To observe the characteristics of special type of diodes and transistors.
5. To analyze different transistor Biasing characteristics

Course Outcomes

Upon successful completion of the course, the student is able to
1. Understand the diode and transistor characteristics.
2. Determine the performance characteristics of Full wave rectifiers with and without filters
3. Analyze the concepts of special diodes and observe its characteristics.
4. Understand the Switching characteristics of Transistor.

List of Experiments: (Twelve experiments to be done):

1. Analyze the characteristics of PN Junction diode and Zener Diode.
2. Design Full Wave Rectifier with & without filters and evaluate the performance parameters
3. Analyze the input and output characteristics of BJT in CE Configuration
4. Analyze the input and output characteristics of BJT in CC Configuration
5. Plot the transfer characteristics of Depletion and Enhancement mode MOSFET
6. Draw the switching characteristics of a transistor
7. Analyze the Characteristics of LED with three different wavelengths.
8. Analyze the characteristics of LDR, Photo-diode and Photo transistor
9. Determine the frequency response of Common Emitter Amplifier
10. Determine the frequency response of Common Source Amplifier
11. Analyze the Characteristics of SCR and UJT.
12. Analyze the characteristics of Thermistor
13. Design a self-bias circuit of BJT

Text Books


Reference Books

Web Resources
1. https://nptel.ac.in/courses/113/106/113106062/
2. https://nptel.ac.in/courses/113/106/113106065/

CO-PO/PSO Mapping

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Course Objectives
1. To understand the use of logic gates and to design basic gates using universal gates
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems
3. To understand the concepts and design techniques of combinational logic circuits
4. To understand the concepts and design techniques of sequential logic circuits

Course Outcomes
Upon successful completion of the course, the student is able to
1. Design and Realization of Boolean Expressions using logic gates
2. Understand how to generate different logic gates using Universal gates
3. Analyze and design combinational circuit like Adder/Subtractor, Comparators, MUX etc.
4. Design and develop sequential circuits like Shift Registers, Counters and understand memory elements

List of Experiments
1. Realization of Boolean Expressions using Gates Using ICs on breadboard
2. Design and realization logic gates using universal gates Using ICs on breadboard
3. Generation of clock using NAND / NOR gates Using ICs on breadboard
4. Design a 4 – bit Adder /Subtractor
5. Design and realization of a 4 – bit gray to Binary and Binary to Gray Converter
7. Design and realization of a Synchronous and Asynchronous counter using flip-flops
8. Design and realization of Asynchronous counters using flip-flops
9. Design and realization of 8x1 MUX using 2x1MUX
10. Design and realization of 4-bit comparator
11. Design and Realization of a sequence detector-a finite state machine
12. Realization of logic gates using DTL, TTL, ECL, etc.,

Text Books

Reference Books

Web Resources
1. http://blog.digitalelectronics.co.in/
2. www.nesoacademy.org/electronics-engineering/digital-electronics/digital

### CO-PO/PSO Mapping

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CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – High; 2 – Medium; 1 – Low
Course Objectives
1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they ‘really want to be’ in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.

Course Outcome: On completion of this course, the students will be able to
1. Explore on the basic aspiration of Human being and its fulfilment
2. Distinguish the difference between the Self and the Body
3. Explore the value of harmony in family, society and nature

Module I
Unit 1: Self- Exploration on UHV Basic Guidelines
Content and Process for Value Education Understanding the need, basic guidelines, Self-Exploration–what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration.

Unit 2: Continuous Happiness and Prosperity
A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity.

Module II
Unit 1: Understanding Harmony in the Human Being
Harmony in Myself Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’, Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha, Understanding the Body as an instrument of ‘I’

Unit 2: Understanding Harmony in self
Understanding the characteristics and activities of ‘I’ and harmony in ‘I’, Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail,

Module III
Unit 1: Understanding Harmony in the Family
Harmony and Values in Relationships in the Family- the basic Unit of human interaction, Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas & Samman; Difference between intention and competence,
Unit 2: Understanding Harmony in the Society
Understanding the harmony in the society: Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing Undivided Society (Akhand Samaj), Universal Order (SarvabhaumVyawastha).

Module IV
Unit 1: Understanding Harmony in the Nature and Existence
Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature

Unit 2: Understanding Harmony in the Existence
Understanding Existence as Co-existence (Sah-astitva) of mutually interacting Units in all-pervasive space, Holistic perception of harmony at all levels of existence.

Module V
Unit 1: Exploring Attitudes towards gender

Unit 2: Gender relationship and Culture
Gender roles and relationship matrix, sex selection and consequences, declining sex ratio, Gender Issues- Gender sensitive language, Just Relationships: Being together as equals.

Text Books
2. Towards a World of Equals: a bilingual Textbook on Gender. A Suneetha, and others… Telugu Academy, Telangana Gov. 2015

References

MOOC Course
NPTEL -Exploring Human Values: Visions of Happiness and Perfect Society - Web course
## CO-PO Mapping

### CO-PO Mapping Chart

(3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low

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COMMUNICATION SYSTEMS

Prerequisite: Signal & Systems

Course Objectives
1. To develop ability to analyse system requirements of analog communication systems.
2. To understand the generation, detection of various analog modulation techniques.
3. To acquire theoretical knowledge of each block in AM, FM transmitters and receivers.
4. To know the Spectral and temporal characteristics of Random Process.
5. To Learn the Basic concepts of Noise sources.

Course Outcomes
Upon completing this course, the student will be able to
1. Analyze different modulation and demodulation techniques
2. Understand the concepts of Random Process and its Characteristics
3. Understand the concepts of Noise in Communication systems.
4. Design various pulse modulation techniques

Module-I
Unit 1: 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

Unit 2: Suppressed carrier modulation
Time and frequency domain description, Generation of DSBSC Waves - Ring Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, Demodulation of SSB Waves, principle of Vestigial side band modulation, frequency division multiplexing.

Module-II
Unit 1: 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

Unit 2: Radio Transmitter and Receiver

Module-III
Unit 1: Random Variable
Unit 2: Random Distributions
Binomial, Poisson, Geometric, Uniform, Exponential, Normal distribution functions (moment generating function, mean, variance and simple problems) – Chebyshev’s theorem.

Module-IV
Unit 1: Random Processes

Unit 2: Noise in AM receivers
Introduction to noise, Different types of noise: Shot noise, thermal noise, white noise, narrowband noise, AM receiver model, signal to noise ratios for coherent reception, noise in DSB-SC receiver, Noise in AM receivers using Envelope Detection, Threshold Effect.

Module-V
Unit 1: Noise in FM Receivers
FM Receiver model, Noise in FM receiver, Capture effect, FM Threshold effect, FM Threshold reduction, Pre-emphasis and De-emphasis in FM.

Unit 2: Digital Representation of Analog Signals
Sampling process, Aliasing, Signal Reconstruction, pulse amplitude modulation, time-division multiplexing, pulse position modulation, quantization process, quantization noise.

TEXTBOOKS

REFERENCE BOOKS
4. Electronic Communications – Dennis Roddy and John Coolean , 4\textsuperscript{th}Edition , PEA, 2004

Web Resources

E Books
Mooc Courses

1. https://nptel.ac.in/noc/courses/noc21/SEM2/noc21-ee74/

**CO-PO/PSO Mapping**

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B.Tech II Year–IV Sem
Subject Code: 21PC4EC07

LINEAR INTEGRATED CIRCUIT APPLICATIONS

Pre-requisite: Electronic Devices and Circuits

Course Objectives
1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce the theory and applications of analog multipliers and PLL.
3. To familiarize the Concept of filters and oscillators.
4. To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes
1. Understand the operational amplifiers with linear integrated circuits
2. Design Op-Amp circuits for Linear/Non-linear Applications
3. Design filter and timer circuits for various applications
4. Analyze the operation of Phase Locked Loops, IC Voltage Regulator and Data converters

Module I
Unit 1: Integrated Circuits-I
Classification, chip size and circuit complexity, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC Characteristics.

Unit 2: Integrated Circuits-II
741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

Module II
Unit 1: Op-amp
Basic information of Op-amp, instrumentation amplifier, an amplifier, V to I and I to V converters, Sample & hold circuits, multipliers and dividers, differentiators and integrators, Comparators.

Unit 2: Op-amp Applications
Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

Module III
Unit 1: Active Filters
Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters.

Unit 2: Oscillators
Introduction to feedback and types, Oscillator types and principle of operation - RC, Wien and quadrature type, waveform generators - triangular, saw tooth, square wave and VCO.

Module IV
Unit 1: Timers
Introduction to 555 timer, functional diagram, nonstable and astable operations and applications, Schmitt Trigger.
Unit 2: Phase Locked Loops
PLL - introduction, block schematic, principles and description of individual blocks of 565.

Module V
Unit 1: D-A Converters
Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC.

Unit 2: A-D Converters
Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC dual slope integration type ADC, DAC and ADC specifications.

Text Books

Reference Books

Web Resources
2. https://nptel.ac.in/courses/108/108/108108111/

E Books:

Mooc Courses
1. https://nptel.ac.in/noc/courses/noc21/SEM2/noc21-ee61/

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ELECTROMAGNETIC FIELDS AND WAVES

Pre-requisite: Vector algebra, Review of coordinate system and vector calculus

Course Objectives:
1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and apply them to solve physics and engineering problems.
2. To the Basic Laws, Concepts and proofs related to Magneto static Fields and apply them to solve physics and engineering problems.
3. To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell’s Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
4. To analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative media.

Course Outcomes
1. Get the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields
2. Get the knowledge of Basic Laws, Concepts and proofs related to Magneto static Fields.
3. Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell’s Equations and Boundary Conditions.
4. Understand the Characteristics of UPW for several practical media of interest, reflection and transmission coefficients for UPW propagation.

Module I
Unit 1: Electrostatics-I
Coulomb’s Law, Electric Field Intensity - Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential

Unit 2: Maxwell’s Equations for electrostatics

Module II
Unit 1: Electrostatics-II
Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time

Unit 2: Poisson's and Laplace's Equations
Poisson's and Laplace's Equations; Capacitance - Parallel plate, Coaxial, Spherical Capacitors. Illustrative Problems.

Module III
Unit 1: Magneto statics-I
Unit 2: Magneto Statics-II

Module IV
Unit 1: Maxwell's Equations (Time Varying Fields)-I

Unit 2: Maxwell's Equations (Time Varying Fields)-II
Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces.

Module V
Unit 1: EM Wave Characteristics - I

Unit 2: EM Wave Characteristics - II
Reflection and Refraction of Plane Waves - Normal incidence for perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Theorem, Illustrative Problems.

Text Books

Reference Books

Web Resources
1. https://nptel.ac.in/courses/117/103/117103065
2. https://nptel.ac.in/courses/108/106/108106157
3. https://www.youtube.com/watch?v=pGdr9WLto4A
4. https://www.youtube.com/playlist?list=PL4Pd7JNZ_gC--g2i47_B0jp5ewEqAoBO7

E Books

Mooc Courses
2. https://nptel.ac.in/noc/courses/noc21/SEM2/noc21-ee83/
### CO-PO/PSO Mapping

**CO-PO/PSO Mapping Chart**  
*(3/2/1 indicates strength of correlation)*  
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Subject Code: 21PC4EE08

Control Systems
(EEE/ECE)

Pre-requisite: Electrical circuit Analysis, M-II.

Course Objectives
1. To model the electrical & Mechanical LTI Systems
2. To obtain the transfer function model
3. To Study the time domain response of LTI system.
4. To study the frequency response of LTI System.
5. To model system using state space analysis

Course Outcomes
1. Apply various control strategies to different applications (power systems, electrical drives, mechanical systems)
2. Apply various time domain and frequency domain techniques to assess the system performance.
3. Design a suitable controller and/or a compensator for the specific application to improve the system performance.
4. Test system controllability and observability using state space representation and applications of state space representation to various systems.

Module I
Unit 1: Mathematical modelling of systems

Unit 2: Block diagram algebra & Servo motors
Block diagram representation of systems considering electrical systems as examples - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason’s gain formula, Synchro’s, AC & DC servo motor characteristics.

Module II
Unit 1 Time domain Analysis

Unit:2 Frequency domain Analysis
Advantages of frequency response, frequency response of LTI system, Frequency domain specifications, correlation between time domain and frequency domain specifications.

Module III
Unit 1: Stability analysis using Routh-Hurwitz & Root Locus
Unit 2: Frequency response plots
Polar Plots-Nyquist Plots, Relative stability using Nyquist criterion – gain and phase
Margin. Closed-loop frequency response.-Bode plots.

Module IV
Unit 1: P, PI and PID controllers
Effect of addition of pole and zero to open loop transfer function, Design specifications–
Effects of proportional derivative, proportional integral systems, and PID controllers.

Unit 2: Design of compensators.
Practical constraints to implement PID controllers, Designing of Lag, Lead and
Lead- Lag compensators, Design problems.

Module V
Unit 1: State Space Model
Concepts of state, state variables and state space model, derivation of state models from block
diagrams, Solution of state equations. Eigen values and Stability Analysis. Diagonalization of
State Matrix.

Unit 2: Solution of state equations of LTI systems
Solving the Time invariant state Equations- State Transition Matrix and its Properties.
Controllability and Observability. Pole-placement by state feedback. Discrete-time systems.
discrete-time systems.

Text Books

Reference Books

MOOC Courses
https://onlinecourses.nptel.ac.in/noc20_ee90

E-Books
1. file:///C:/Users/Naresh/Downloads/Control%20Systems%20Engineering%20by%20Norm
an%20S.%20Nise%20(2-lib.org).pdf
2. file:///C:/Users/Naresh/Downloads/Control%20Systems%20Engineering%20by%20I.%20Nagar
ath%20M.%20Gopal%20(2-lib.org).pdf
## CO-PO/PSO Mapping

**CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation)**

- 3 – High; 2 – Medium; 1 - Low

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Course Objective
1. Understanding the basic principles and phenomena in the area of medical diagnostic Instrumentation.
2. To apply different concepts to design of bio-potential amplifiers for various healthcare applications To study the concepts behind the origin of electricity in human beings.
3. To understand the concepts of bio-signal analysis and brain-computer interface

Course Outcomes
1. Analyze and evaluate the effect of different diagnostic and therapeutic methods, their risk potential. Physical principles, possibilities for different medical procedures.
2. To have a basic understanding of medical terminology, relevant for biomedical instrumentation, and the function of bio amplifiers
3. To understand and describe the physical and medical principles used as a basis for biomedical instrumentation.
4. Students should be able to explain the concepts of bio-signal analysis methods and brain computer interfacing concepts.

Module I
Unit 1 Anatomy and Physiology
Elementary ideas of cell structure, Heart and circulatory system, Central nervous system, Autonomic nervous system (ANS), Neuron & Action Potential, Muscle action, Respiratory system, Body temperature.

Unit 2 Overview of Medical Electronics Equipment
Introduction to sensors and transducers, Signal characteristics, Classification, application and specifications of diagnostic, therapeutic and clinical laboratory equipment, method of operation of these instruments. Computer Aided Diagnosis.

Module II
Unit 1 Bio-potential Electrodes
Origin of bio potential and its propagation. Evoked potentials, Examples of Biomedical signals- EEG, ECG and EMG.

Unit 2 Types of Electrodes
Surface, needle and micro electrodes and their equivalent circuits. Properties and effects of noise in biomedical instruments.

Module III
Unit 1 Bio Amplifier
Need for bio-amplifier - single ended bio-amplifier, differential bio-amplifier - right leg driven ECG amplifier, Filtering

Unit 2 Isolation Amplifiers
Transformer and optical isolation - isolated DC amplifier and AC carrier amplifier, Chopper amplifier. Power line interference.
Module IV

Unit 1 Biomedical Recorders
Direct Methods: ECG, EEG & EMG; Descriptions and applications. UNIT 2 Indirect Methods: PET & fMRI; Descriptions and applications.

Module V

Unit 1 Bio-Signal Processing and Brain-Computer Interface
Bio-Signal Processing: Segmentation, Types of Noise in Bio-signals, Time domain Analysis (RMS, RMV), Frequency Domain Analysis (Fourier Transformation)

Unit 2 Brain-Computer Interface
Introduction: Paradigms, Applications, advantages & disadvantages

Text Books

References

Web resources
1. https://openstax.org/books/anatomy-and-physiology/pages/1-introduction

E-books
1. https://www.elsevier.com/books/biosensors-and-bioelectronics/karunakaran/978-0-12-803100-1
3. https://www.amazon.in/Switchable-Bioelectronics-Onur-Parlak-ebook/dp/B087F45W78

MOOC Courses
1. https://www.mooc-list.com/course/introduction-biomedical-engineering-coursera
## CO-PO/PSO Mapping

### CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
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Course Objective

1. To introduce growing need of English Language Skills for Employability (ELSE).
2. To help the students understand the importance of inter-personal communication, team dynamics and role behaviour at the work place
3. To enhance their Behavioural skill and Entrepreneurship skills.

Course Outcomes

After undergoing this course, the student will be able to;
1. Understand the concept and process of employability skills.
2. Demonstrate the employability skills in both verbal and non-verbal communications.
3. Apply skill identification strategies to bring out the results on social and industry demands.
4. Recognize right professional, Entrepreneurship skills and social ethical values.

Module I - Wings of Fire
Unit 1: “Orientation” an excerpt from Wings of fire-An Autobiography of Abdul Kalam by Arun Tiwari.

Unit 2: Grammar
Vocabulary- Omission of Articles, Collective Nouns, Prepositions, Collocations.
Reading- Observation Passage, Survey Passage
Writing- Comprehension Passages based on graphs, charts & other illustrations.

Module II- 5 Points Someone
Unit 1: The Gift an excerpt from 5 Points Someone by Chetan Bhagat

Unit 2: Grammar
Vocabulary- Advanced Collocations, Proverbs, Idioms, One word Substitute
Reading – Complex passage, Reading Comparison,
Writing- Usage of Idioms and Proverbs in Passage

Module III – Wise Leaders Wanted & Shift Your Perspective: Connect to Your Noble Purpose
Unit 1: “Wise Leaders Wanted & Shift Your Perspective: Connect to Your Noble Purpose” an excerpt from From Smart to Wise: Acting and Leading with Wisdom Kaipa, Prasad, and Navi Radjou.

Unit 2: Grammar
Vocabulary- Technical vocabulary, Auxiliaries and Modals,
Reading- Technical Comprehension,
Writing- Creative Resume.
Module IV- Variation Under Nature
Unit 1: “Variation Under Nature” an excerpt from Origin of Species by Charles Darwin
Unit 2: Grammar
Vocabulary- Coherence-Cohesive devices, Figures of speech
Reading- Inferring Reading, Survey, Question, Read, Recite and Review (SQ3R)

Module V- Let's Build a Company: A Start-up Story Minus the Bullshit
Unit 1: Let's Build a Company: A Start-up Story Minus the Bullshit by Harpreet Grover and Vibhore Goyal
Unit 2: Grammar
Vocabulary- Topic/Situation based Vocabulary, Tongue Twisters.
Reading- Critical Reading of known/unknown passages
Writing- Common Errors in Tenses, Description of hobbies, Future plans,
Reported Speech: Direct & Indirect Speech, Email Writing, Formal letter writing (Enquiry, Apology, Leave, Request) Notice Writing, Information Transfer, Technical report writing

Textbooks

References
1. Writing Skills Practice Book for EFL - English Teaching Forum Writing
   Skills Practice Book for EFL. Beginning/Intermediate Level.
4. Murphy, R. Intermediate English Grammar.

CO-PO/PSO Mapping

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Prerequisites
1. Basic knowledge of interpersonal and communication skills.
2. Enriching the speaking and writing ability
3. Basic grammar rules of (LSRW)
4. Basic Spoken English skills

Course Objectives
1. To improve the communication skills, body language, facial expression and gesture.
2. To be able to understand the concept of employability skills (Quantum dexterity) and enhancing ones’ behavior in the personal, professional and social forum.
3. To evaluate the LSRW (listening, speaking, reading and writing) through assessment.
4. To learn the basic grammar for improving spoken and written communication.
5. To become problem solver, analyze and apply critical and analytical skills.
6. To identify the Employability skills, assigning tasks (Group Discussion, JAM, Role play etc.,) for day today evaluation.

Course Outcomes
After undergoing this course, the student will be able to;
1. Understand the explicit and implicit of importance of employability skills.
2. Demonstrate life skills like team work, learning skills, problem solving, attitude, adaptability and flexibility.
3. Apply critical and analytical skills to bring out the solution on problem/case study.
4. Recognize the need of appropriate words, Phrases & functional grammar and apply them in both spoken and written communication.

List of Experiments

Activity 1: Narration (Historical places, events, Picture narration, Memorable incidents of life)
   Self-Introduction, Daily Routine, Likes & Dislikes, Vocabulary, Triangular Activity (Person based- S-P), Imperatives & JAM Targeted Skills- Listening-Speaking- Audio-Video clips

Activity 2: Quantum of Dexterity (QOD)-- Ability (Personal, Behavioural & Professional)
   Request/Permission/Order, Survival kit, Career Objective Professional, Hidden Talents (Personal), Character Traits (Behavioural) Targeted Skills- Reading-Writing – Concluding an open-ended Story, Creative Writing.

**Activity 4:** Flick Flow/Extempore Mind Mapping, Wh- questions, Steps of Presentation, Use of Visual Aids, Individual/Group Presentation for practice.

**Targeted Skills:** Speaking Skills

**Activity 5:** On Job Training- Formal & Informal communication, Resume E-mail Etiquette, Telephonic & Interview Etiquette, Situation based- Santa’s Bag, topic/case study-based Group Discussion (Job Consultancy/Role Play).

**Targeted Skills:** Listening-Writing- Speaking

**CO-PO/PSO Mapping**

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**CO-PO Mapping Chart**

(3/2/1 indicates strength of correlation)

3 – High; 2 – Medium; 1 – Low
B.Tech II Year–IV Sem  
Subject Code: 21PC4EC11

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COMMUNICATION SYSTEMS LABORATORY

Prerequisites: Basic knowledge of Analog and digital signals.

Course Objectives:
1. This gives the basics of communications required for all Electronics and Communication Engineering related courses.
2. To understand the behavior of Analog and Pulse Modulations.
3. To understand the characteristics of Frequency Division Multiplexing.
4. To understand Analog and Digital demodulations, and PLL operation

Course Outcomes
Upon successful completion of the course, the student is able to
1. Understand Basics of MATLAB syntax, functions and programming and analyze the generation Analog Modulations in MATLAB.
2. Analyze the Fourier Transform of a given signal and plotting its magnitude spectrum of Frequency Multiplexing.
3. Determine the differences between Time & Frequency domain between Signals Amplitude & Frequency Spectrum.
4. Understand the Frequency modulator and demodulator. Also understand PLL Operations

List of Experiments
1. Generate amplitude modulated signal using trainer kit and realize the same using OCTAVE or any equivalent software. Also, realize the effect of modulation by varying modulation index.
2. Demodulation of amplitude modulated signal using trainer kit. Realize the same using OCTAVE or any equivalent software.
3. Generation and detection of DSB-SC signal using trainer kit and realize the same using OCTAVE or any equivalent software.
4. Generation and detection of SSB-SC signal using trainer kit and realize the same using OCTAVE or any equivalent software.
5. Generate frequency modulated wave using trainer kit. Design FM signal demodulator using PLL.
6. Perform phase modulation and demodulation using OCTAVE or any equivalent software.
7. Time division multiplexing & de-multiplexing using trainer kit/ OCTAVE or any equivalent software.
8. Frequency division multiplexing & de-multiplexing using trainer kit/ OCTAVE or any equivalent software.
10. Generation and detection of pulse width modulated signal using trainer kit.
11. Design and understand the characteristics of pre-emphasis and de-emphasis circuits using breadboard.
12. Verification of Sampling Theorem using OCTAVE or any equivalent software.

Text Books
Reference Books

Web Resources
1. https://nptel.ac.in/courses/117/105/117105143/
2. https://nptel.ac.in/courses/117/102/117102059/
3. https://nptel.ac.in/courses/117/108/117108107/

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CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – High; 2 – Medium; 1 – Low
Course Objectives
1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce the theory and applications of analog multipliers and PLL.
3. To teach the linear and non-linear applications of operational amplifiers.
4. To introduce the theory and applications of 555 timer and PLL.
5. To teach the theory of ADC and DAC.
6. To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes
Upon successful completion of the course, the student is able to
1. A thorough understanding of operational amplifiers with linear integrated circuits.
2. To design circuits using operational amplifiers for various applications and to study different kinds of voltage regulators.
3. To analyze different active filters and to introduce the concepts of waveform generation, oscillators
4. To develop the knowledge in functional diagrams and applications using linear ICs like 555, 565 and to study oscillators.

List of Experiments
1. Design Inverting and Non-Inverting Amplifiers using OpAmps on Breadboard.
2. Design Adder and Subtractor using OpAmp on Breadboard.
4. Design Integrator Circuit using IC741 on Breadboard.
6. Active filter Applications-LPF, HPF (First Order)
7. IC 741 waveform Generators-Sine, Square wave and Triangular Waves.
8. Mono-Stable Multivibrator using IC555.
10. Schmitt Trigger Circuits using IC741.
11. IC 565-PLL Applications.
12. Voltage Regulator using IC723.

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

Reference Books
1. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.
2. Operational Amplifiers & Linear Integrated Circuits: Theory & Applications, Denton Daibey, TMH.
4. Digital Fundamentals - Floyd and Jain, Pearson Education.
Web References
1. https://nptel.ac.in/courses/117/106/108106105/

E -Books
1. https://open.umn.edu/opentextbooks/textbooks/574
2. https://books.google.co.in/books/about/Linear_Integrated_Circuits.html?id=-zAe0P33B

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CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – High; 2 – Medium; 1 – Low
SIGNALS AND SYSTEMS LABORATORY

Course Objectives
1. To develop ability to analyze linear systems and signals.
2. To develop critical understanding of mathematical methods to analyze linear systems and signals.
3. To know the various transform techniques
4. To analyze sampling principles

Course Outcomes
Upon successful completion of the course, the student is able to
1. Understand the concepts of continuous time and discrete time systems.
2. Analyze systems in complex frequency domain.
3. Understand sampling theorem and its implications.
4. Understand the concept of convolution and correlation.

List of Experiments
1. Basic operations on Matrices
2. Generation of various signals such as Unit impulse, Unit step, Ramp, square, sawtooth, sinusoidal triangular.
3. Operations on signals such as addition, multiplication, scaling shifting and folding.
4. Computation of energy and average power of signals.
5. Convolution of signals.
6. Autocorrelation and cross correlation of signals.
7. Verification of linearity and time invariance properties of a given continuous time system.
8. Find the Fourier transform of a given signal and plot its magnitude and phase spectrum.
9. Computation of a Unit sample, Unit step and sinusoidal responses of the given LTI system and verify its physical realizability and stability properties.
10. Waveform synthesis using Laplace transform.
11. Locating the zeros and poles and plotting the pole zero maps in S-plane and Z-plane for the given transfer function.
12. Verification of sampling theorem.

Text Books

Reference Books
Web Resources

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