VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING & TECHNOLOGY HYDERABAD
B.TECH. II YEAR
(ELECTRONICS AND COMMUNICATIONS ENGINEERING)

III SEMESTER **R18**

Course Code	Title of the Course	L	T	P	Contact Hours/ Week	Credits
18BS1MT04	Complex Analysis and Special Functions	3	0	0	3	3
18PC1EC01	Network Theory	3	1	0	4	4
18PC1EC02	Electronic Devices and Circuits	3	0	0	3	3
18PC1IT01	Data Structures	3	0	0	3	3
18PC1EC03	Signals and Systems	3	0	0	3	3
18PC2EC01	Electronic Devices and Circuits Laboratory	0	0	3	3	1.5
18PC2EC02	Basic Simulation Laboratory	0	0	3	3	1.5
18PC2IT01	Data Structures Laboratory	0	0	3	3	1.5
Total		**15**	**1**	**9**	**25**	**20.5**
18MN6HS03	Gender Sensitization	0	0	2	2	0

IV SEMESTER **R18**

Course Code	Title of the Course	L	T	P	Contact Hours/ Week	Credits
18PC1EE06	Control Systems	3	0	0	3	3
18PC1EC04	Analog and Digital Communication	3	1	0	4	4
18PC1EC05	Analog Circuits	3	0	0	3	3
18PC1EC06	Digital System Design	3	0	0	3	3
18ES1EC54	Random Variables and Stochastic Processes	3	0	0	3	3
18PC2EC03	Digital System Design Laboratory	0	0	3	3	1.5
18PC2EC04	Analog and Digital Communication Laboratory	0	0	3	3	1.5
18PC2EC05	Analog Circuits Laboratory	0	0	3	3	1.5
18PC2CS04	Python Programming Practice	0	0	2	2	1.0
Total		**15**	**1**	**11**	**27**	**21.5**

L – Lecture T – Tutorial P – Practical

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING & TECHNOLOGY

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

(18BS1MT04) COMPLEX ANALYSIS AND SPECIAL FUNCTIONS
(Common to ECE and EIE)

COURSE PREREQUISITES: Integral and Differential Calculus

COURSE OBJECTIVES: Student will gain knowledge of
- Analytic functions and its properties
- Complex integration
- Singular points, residues and their classification
- The notion of Conformal mapping
- Bessel and Legendre equations

COURSE OUTCOMES: After completion of the course, the student will be able to
CO-1: Apply Cauchy-Riemann equations to study analyticity of functions
CO-2: Evaluate contour integrals using Cauchy's integral theorems
CO-3: Evaluate contour integrals using residue theorem
CO-4: Analyze the image of the given curve under the given transformation
CO-5: Solve ordinary differential equations using the notion of Bessel's equations

UNIT-I:
Functions of Complex Variables: Functions of a complex variable, Continuity, Differentiability, Analyticity, Singular point, Cauchy-Riemann equations in Cartesian and polar coordinates, Harmonic and conjugate harmonic functions, Milne – Thompson method. Analyticity of Exponential, trigonometric, hyperbolic functions and their properties.

UNIT-II:
Integration of Complex Function, Power Series: Line integral, evaluation along a path and by indefinite integration. Cauchy's integral theorem, Cauchy's integral formula. Expansion of Taylor's series and Laurent series (without proofs).

UNIT-III:
Residues and Real Integrals: Classifications of singular points: Isolated singular point, removable, pole of order m, essential singularity. Residues – Evaluation of residue by formulae, Residue theorem, Evaluation of real integrals (applications).

UNIT-IV:
Conformal Mapping: Definition of Conformal mapping, transformation of e^z, log(z), z^2, Sin z, cos z, z + a/z. Basic transformations -Translation, rotation, inversion. Bilinear transformation - fixed point, cross ratio, properties, invariance of circles, determination of bilinear transformation mapping three given points to three assigned points.

UNIT-V:
Special Functions- Bessel Function: Bessel functions, Recurrence relations, properties. Generating function and Orthogonal properties.

UNIT-VI:

Special Functions-Legendre Function: Legendre polynomials, Properties, Rodrigue's formula, Recurrence relations Generating function, and Orthogonal properties.

TEXT BOOKS:

1. Higher Engineering Mathematics - B. S. Grewal, Khanna Publishers, 36th Edition, 2010
2. Higher Engineering Mathematics – B. V. Ramana; Tata McGraw-Hill, New Delhi,11th Reprint, 2010
3. Complex Variables & Its Applications- Churchill and Brown, International Edition, McGraw-Hill, 1996.

REFERENCES:

1. Advanced Engineering Mathematics - Erwin Kreyszig, 9th Edition; John Wiley
2. Advanced Engineering Mathematics - Peter 'O' Neil, Cengage Learning

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18PC1EC01) NETWORK THEORY

COURSE PREREQUISITES: Basics of Electrical Energy for Engineers

COURSE OBJECTIVES:

- To introduce the methods of network analysis
- To apply network theorems for circuit analysis
- To analyze transient response of electronic circuits
- To understand two port network parameters, filters
- To understand the concept of coupling circuits and resonance

COURSE OUTCOMES: After completion of the course, the student will be able to
CO-1: Analyze the given electric circuit using network theorems
CO-2: Design the frequency selective networks
CO-3: Understand the principle of various coupling circuits
CO-4: Appreciate and relate various two port networks
CO-5: Design series and parallel resonance circuits

UNIT-I:
Introduction to Circuit Analysis Techniques: Mesh and Nodal Analysis for DC and AC Circuits, Super-Mesh and Super Node Analysis, Duality and Dual networks.

UNIT-II:
Network Theorems: Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Millman's Theorem, Tellegen's Theorem, Compensation Theorem – for DC and AC Circuits.

UNIT-III:
Transient Analysis (First and Second Order Circuits): Transient Response of RL, RC and RLC Circuits for DC excitations, Initial Conditions, Solution using Differential Equations approach and Laplace Transform Method.
Filters:
Classification of filters, LPF, HPF, BPF, BEF, constant K- Filters, disadvantages, m-derived Filters.

UNIT-IV:
Magnetic Circuits: Magnetic Circuits – Faraday's Laws of electromagnetic induction – Concept of Self and mutual inductance – dot convention – Coefficient of coupling – composite magnetic circuits – Analysis of Series and Parallel magnetic circuits.

UNIT-V:
Locus Diagrams and Resonance: Locus diagrams – Series R-L, R-C, R-L-C and Parallel combination with variation of various parameters. Resonance – Series , Parallel circuits, Concept of bandwidth and Q factor.

UNIT-VI:

Two Port Networks: Impedance Parameters, Admittance Parameters, Hybrid Parameters, Transmission (ABCD) Parameters, Conversion of one Parameter to another, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations.

TEXT BOOKS:

1. Engineering Circuit Analysis – W. H. Hayt and J. E. Kemmerly and S. M. Durbin, TMH Publication.
2. Fundamentals of Electric Circuits - Charles K. Alexander and Matthew Sadiku, 5th Edition

REFERENCES:

1. Circuits and Networks: Analysis and Synthesis - A. Sudhakar, Shyammohan S. Pilli, Tata McGraw-Hill Education 5th Edition, 2017
2. Network Analysis - M. E. Van Valkenburg, PHI / Pearson Education, 3rd Edition, 2006

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18PC1EC02) ELECTRONIC DEVICES AND CIRCUITS
(Common to ECE, EIE and EEE)

COURSE PREREQUISITES: Engineering Physics

COURSE OBJECTIVES:

- To understand the construction, principle of operation and characteristics of various semiconductor devices
- To study the applications of various semiconductor devices
- To have the familiarity with small signal model of semiconductor devices
- To understand the concepts of feedback in amplifiers and oscillators

COURSE OUTCOMES: After completion of the course, the student will be able to

CO-1: Explain the principles of operation and substantiate the applications of various semiconductor devices

CO-2: Appreciate the need for biasing and stabilization

CO-3: Design the application specific circuits using basic active and passive components

CO-4: Explain the necessity of feedback in amplifiers and oscillators

UNIT-I:

P-N Junction Diode and Applications: Review of p-n Junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence of V-I characteristics, Ideal and Practical Diode Equivalent Circuits, Transition and Diffusion Capacitances. Breakdown Mechanisms in Semi-Conductor Diodes, Zener Diode Characteristics.

Half wave Rectifier, Full wave rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Capacitor filters, π- section filters, Zener diode as Voltage Regulator.

UNIT-II:

Bipolar Junction Transistor, Biasing and Stabilization: The Bipolar Junction Transistor(BJT), Transistor Current Components, Transistor Construction, BJT Operation, Common Base, Common Emitter and Common Collector Configurations, Limits of operation, BJT as an Amplifier, BJT Specifications.

DC and AC Load lines, Quiescent operating point, Need for Biasing, Analysis of Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector-Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization against variations in V_{BE}, β and I_{CO}, Thermal Runaway, Thermal Stability and Compensation Techniques.

UNIT-III:

Field Effect Transistor, Biasing: Construction and operation of Junction Field Effect Transistor (JFET), Volt-Ampere characteristics- Drain and Transfer Characteristics, FET as Voltage Variable Resistor, FET Biasing, Construction and operation of MOSFET, MOSFET characteristics in Enhancement and Depletion modes.

UNIT-IV:

Small Signal Low Frequency Amplifiers:

BJT Amplifiers:

Small signal low frequency transistor amplifier circuits: h-parameter representation and analysis of single stage CE, CC, CB amplifiers - Computation of voltage gain, current gain, Input impedance and Output impedance; Comparison of CB, CE, CC amplifiers.

JFET Amplifiers:

JFET Small Signal Model, FET Common Source Amplifier, Common Drain Amplifier.

UNIT-V:

Feedback Amplifiers and Oscillators: Concept of feedback, Types of feedback, general characteristics of negative feedback amplifiers, voltage series, voltage shunt, current series and current shunt feedback configurations and their analysis (BJT version), Illustrative problems.

Classification of oscillators, Conditions for oscillations, RC phase shift oscillator, Generalized analysis of LC oscillators – Hartley and Colpitts oscillators, Piezoelectric crystal oscillator, Stability of oscillators.

UNIT-VI:

Special Purpose Semiconductor Devices: Tunnel Diode, Varactor Diode, Photo Diode, Photo Transistor, UJT, LED, SCR

TEXT BOOKS:

1. Electronic Devices and Circuits – J. Millman, Halkias, and Satyabratha Jit, Tata McGraw Hill, 2nd Edition, 2007.
2. Electronic Devices and Circuits – R. L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 11th Edition, 2016.

REFERENCES:

1. Integrated Electronics - J. Millman and Christos C. Halkias and Chetan D. Parikh, Tata McGraw Hill, 2nd Edition, 2010.
2. Electronic Devices and Circuits – T. F. Bogart Jr., J. S. Beasley and G. Rico, Pearson Education, 6th Edition, 2004.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18PC1IT01) DATA STRUCTURES
(Common to CSE, ECE and IT)

COURSE OBJECTIVES:

- To impart the basic concepts of data structures and algorithms
- To introduce various searching and sorting techniques
- To demonstrate operations of linear and non-linear data structure
- To develop an application using suitable data structure

COURSE OUTCOMES: After completion of the course, the student will be able to
CO-1: Understand basic concepts of data structures, computation complexity
CO-2: Understand linear data structures, various sorting, searching techniques
CO-3: Understand various operations of linear and non-linear data structures
CO-4: Identify appropriate and efficient data structure to implement a given problem

UNIT-I:
Introduction to Data Structures: Abstract Data Types (ADT), Asymptotic Notations. Time- Space trade off. Searching: Linear Search and Binary Search Techniques and their time complexities.
Linear Data Structures: Stacks - ADT Stack and its operations: Applications of Stacks: Recursion, Expression Conversion and evaluation.

UNIT-II:
Linear Data Structures: Queues - ADT queue, Types of Queue: Linear Queue, Circular Queue, Dequeue: Operations on each types of Queues

UNIT–III:
Linked Lists: Singly linked lists: Representation in memory, Operations: Traversing, Searching, insertion, Deletion from linked list; Linked representation of Stack and Queue.
Doubly linked List, Circular Linked Lists: All operations

UNIT–IV:
Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Binary Search Tree, AVL Tree; Tree Operations on each of the trees and their algorithms with time complexities.
B-Trees: Definition, Operations.

UNIT–V:
Priority Queue: Definition, Operations and their time complexities.
Sorting: Objective and properties of different sorting algorithms: Heap Sort, Merge Sort; Radix sort

UNIT–VI:
Dictionaries- Definition, ADT, Linear List representation, operations- insertion, deletion and searching, Hash Table representation, Hash function-Division Method, Collision

Resolution Techniques-Separate Chaining, open addressing-linear probing, quadratic probing, double hashing, Rehashing.
Graphs: Graph terminology –Representation of graphs –Graph Traversal: BFS (breadth first search) –DFS (depth first search) –Minimum Spanning Tree.

TEXT BOOKS:
1. Horowitz and Sahani, "Fundamental of Data Structure", Galgotia Publication
2. Lipschutz, "Data Structure", Schaum Series

REFERENCES:
1. Mark Allen Weiss, "Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition, Addison-Wesley Publishing Company
2. R. G. Dromey, "How to Solve it by Computer", 2nd Impression, Pearson Education.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18PC1EC03) SIGNALS AND SYSTEMS
(Common to ECE and EIE)

COURSE OBJECTIVES:
- To understand various fundamental characteristics of signals and systems
- To study the importance of transform domain
- To analyze and design various systems
- To study the effects of sampling

COURSE OUTCOMES: After completion of the course, the student will be able to
CO-1: Classify the signals and implement various operations on signals
CO-2: Analyze the spectral characteristics of signals and systems
CO-3: Understand the conditions for physical realizability of a system
CO-4: Appreciate the processes of discretization of signals

UNIT-I:
Representation of Signals: Continuous time and Discrete Time signals, Classification of Signals – Periodic and aperiodic, even and odd, energy and power signals, deterministic and random signals, causal and non-causal signals, complex exponential and sinusoidal signals. Concepts of standard signals. Various operations on Signals.

UNIT-II:
Signal Analysis: Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Closed or complete set of orthogonal functions.
Fourier Series Representation of Periodic Signals: Dirichlet conditions, Representation of Continuous time periodic signals using Trigonometric and Exponential Fourier series, Complex Fourier spectrum, Gibb's Phenomenon.

UNIT-III:
Fourier Transform: Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signals, standard signals and periodic signals, properties of Fourier transform, Inverse Fourier Transform.
Laplace Transform: Concept of Region of Convergence (ROC) for Laplace transform, Properties of ROC, Inverse Laplace Transform, Relation between Laplace Transform and Fourier transform of a signal.
Introduction to Hilbert Transform and its properties.

UNIT-IV:
Signal Transmission through Linear Systems: Classification of Continuous time and discrete time Systems, impulse response, Response of a linear system, Transfer function and Filter characteristics of an LTI system, Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley -Wiener criterion for physical realization.

UNIT-V:

Convolution and Correlation of Signals: Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Properties of Convolution, Concepts of correlation, properties of correlation. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation.

Sampling Theorem: Representation of continuous time signals by its samples - Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of band pass signals.

UNIT-VI:

Z –Transform: Basic principles of z-transform, region of convergence, properties of ROC, Properties of z-transform, Poles and Zeros. Inverse z-transform – Power series method, Residue Theorem method, Convolution Method and Partial fraction expansion method.

TEXT BOOKS:

1. Signals, Systems and Communications - B. P. Lathi, BS Publications, 2009.
2. Signals and Systems – Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab, 2nd Edition, PHI, 1997.

REFERENCES:

1. Signals and Systems - A. Anand Kumar, 2nd Edition, PHI, 2012
2. Signals and Systems - Simon Haykin and Barry Van Veen, 2nd Edition, John Wiley, 1998.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester	**L**	**T/P/D**	**C**
	0	**3**	**1.5**

(18PC2EC01) ELECTRONIC DEVICES AND CIRCUITS LABORATORY

COURSE PREREQUISITES: Engineering Physics

COURSE OBJECTIVES:

- To identify various active and passive components
- To understand the functionality of various measuring instruments
- To know the characteristics of various active devices

COURSE OUTCOMES: After completion of the course, the student will be able to

CO-1: Understand the specifications of various devices and measuring equipment

CO-2: Analyze the characteristics of various semiconductor devices

CO-3: Appreciate the effect of feedback on the systems' performance

Part A: (Only for viva-voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 2 lab sessions):

1. Identification, Specification, testing of R, L,C components (color codes), Potentiometers (SPDT, DPDT and DIP), Coils, Gang Condensers, Relays, Bread Board, PCB.
2. Identification, Specification, testing of Active devices : Diodes, BJT, Low power JFET, MOSFET, Power Transistors, LED, LCD, SCR,UJT.
3. Study and operation of:
    - Multimeters (Analog and Digital)
    - Function Generator
    - Regulated Power Supplies
    - CRO

Part B:

1. V-I characteristics of PN junction diode under forward and reverse bias.
2. V-I characteristics of Zener diode and voltage regulator using Zener Diode.
3. Full wave Rectifier without filter and with π filter: Computation of Ripple factor and Regulation efficiency
4. Input and Output characteristics of CE transistor configuration and computation of h-parameters.
5. Input and Output characteristics of CB transistor configuration and computation of of h-parameters.
6. Characteristics of FET under CS configuration.
7. Frequency response of CE Amplifier.
8. Frequency response of CS Amplifier.
9. Frequency response of Voltage series feedback amplifier.
10. RC phase shift Oscillator using transistors.
11. Colpitt's Oscillator using transistors.
12. Characteristics of UJT

Experiments over and above curriculum:

1. UJT Relaxation Oscillator.
2. Transistor as a switch

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester	**L**	**T/P/D**	**C**
	0	**3**	**1.5**

(18PC2EC02) BASIC SIMULATION LABORATORY
(Common to ECE and EIE)

COURSE OBJECTIVES:
Using simulation tool

- To understand the simulation of generation of various (Continuous/Discrete) signals
- To study various arithmetic operations on signals and to study various transforms applied for signals
- To understand the characteristics of LTI system and to find its response for various excitations
- To study about the mathematical tools used for signal estimation in the presence of noise

COURSE OUTCOMES: After completion of the course, the student will be able to
CO-1: Synthesize the given waveform using standard test signals and sequences and to find the symmetry of the signal
CO-2: Classify the given system based on its characteristics
CO-3: Analyze the effect of various transformations applied on independent and dependent variables of a signals
CO-4: Synthesize the given waveform

The experiments are to be software simulated using suitable software.

1. Basic Operations on Matrices
2. Generation of various signals and sequences (Periodic and Aperiodic), such as UNIT-Impulse step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on signals and sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal / Sequence and Real and imaginary parts of Signal.
5. Convolution between (i) Signals and (ii) Sequences.
6. Auto Correlation and Cross Correlation of (i) Signals and (ii) Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous / Discrete System.
8. Computation of Unit sample, Unit step and sinusoidal responses of the given LTI system and verifying its Physical realiazability and stability properties.
9. Verification of Gibb's Phenomenon.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Verification of Sampling Theorem.
12. Verifying the applications of Correlation:
    i. Estimating the period of a periodic signal masked by noise
    ii. Removal of Noise from the combination of signal and noise

Experiments over and above the curriculum:

1. Verification of properties of FS and FT
2. Verification of Wiener - Khinchine relation

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester	**L**	**T/P/D**	**C**
	0	**3**	**1.5**

(18PC2IT01) DATA STRUCTURES LABORATORY
(Common to ECE, CSE and IT)

COURSE OBJECTIVES:

- To impart the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting
- To understand the basic concepts about stacks, queues, lists
- To understand the concepts of trees and graphs

COURSE OUTCOMES: After completion of the course, the student will be able to
CO-1: Implement all operations on different linear data structures
CO-2: Develop all operations on different non-linear data structures
CO-3: Apply various searching and sorting techniques
CO-4: Apply appropriate data structure for any given problem

WEEK 1
a) Implement Stack using Array

WEEK 2
a) Program to convert infix expression to postfix expression.
b) Program to Postfix evaluation.

WEEK 3
Implement the following
a) Linear Queue using Array b) Circular Queue using Array

WEEK 4
Implement Dequeue using Array

WEEK 5
Implement Single Linked List operations

WEEK 6
Implement following
a) Circular Linked List Operations b) Double Linked List Operations

WEEK 7
Implement following
b) Stack using Linked List c) Queue using Linked List

WEEK 8
Implement BST operations

WEEK 9
Implement B Tree operations

WEEK 10
Implement following sorting techniques
a) Merge b) Heap c) Radix

WEEK 11
Implement following Hashing Techniques
a) Separate Chaining b) Linear Probing

WEEK 12
Implement following Graph traversals
a) BFS b) DFS

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18MN6HS03) GENDER SENSITIZATION

COURSE DESCRIPTION:
This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features a number of exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

ACTIVITIES:
Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments.

COURSE OBJECTIVES:
- To sensitize students on issues of gender in contemporary India
- To provide a critical perspective on the socialization of men and women
- To expose the students to debates on the politics and economics of work
- To enable students to reflect critically on gender violence
- To expose students to more egalitarian interactions between men and women

COURSE OUTCOMES: After completion of the course, the student will be able to
CO-1: Understand important issues related to gender in contemporary India
CO-2: Attain a finer grasp of how gender discrimination works in our society and how to counter it
CO-3: Acquire insight into the gendered division of labour and its relation to politics and economics
CO-4: Respond to put an end to gender violence
CO-5: Equipped to work with the other gender treating them as equals

MODULE 1: Introduction to Gender
 Definition of Gender
 Basic Gender Concepts and Terminology
 Exploring Attitudes towards Gender
 Social Construction of Gender

MODULE 2: Gender Roles and Relations
 Types of Gender Roles

 Gender Roles and Relationships Matrix
 Gender-based Division and Valuation of Labour

MODULE 3: Gender Development Issues
 Identifying Gender Issues
 Gender Sensitive Language
 Gender, Governance and Sustainable Development
 Gender and Human Rights
 Gender and Mainstreaming

MODULE 4: Gender-based Violence
 The concept of violence
 Types of Gender-based violence
 The relationship between gender, development and violence
 Gender-based violence from a human rights perspective

MODULE 5: Gender and Culture
 Gender and Film
 Gender and Electronic Media
 Gender and Advertisement
 Gender and Popular Literature

MODULE 6: Gender and Studies
 Knowledge: Through the Lens of Gender Point of View, Gender and the Structure of Knowledge
 Whose History: Questions for Historians and Others, Reclaiming a Past, Writing Other Histories

TEXT BOOK:
1. "Towards a World of Equals: A Bilingual Textbook on Gender", A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu, Telugu Akademi, Telangana Government, 2015.

REFERENCES:
1. Sen, Amartya. "More than One Million Women are Missing." New York Review of Books 37.20 (20 December 1990). Print. 'We Were Making History...' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.
2. Tripti Lahiri. "By the Numbers: Where Indian Women Work." Women's Studies Journal (14 November 2012) Available online at: http://blogs.wsj.com/India real time/2012/11/14/by-the-numbers-where-India-women-work/>
3. Abdulali Sohaila "I Fought For My Life ...and Won. "Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
4. K. Kapadia. The Violence of Development: the Politics of Identity, Gender and Social Inequalities in India. London: Zed Books, 2002.
5. T. Banuri and M. Mahmood, Just Development: Beyond Adjustment with a Human Face, Karachi: Oxford University Press, 1997

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18PC1EE06) CONTROL SYSTEMS

COURSE PREREQUISITES: Ordinary Differential Equations and Laplace Transform

COURSE OBJECTIVES:

- To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
- To assess the system performance using time domain analysis and methods for improving it
- To assess the system performance using frequency domain analysis and techniques for improving the performance
- To design various controllers and compensators to improve system performance

COURSE OUTCOMES: After completion of the course, the student will be able to
CO-1: Analyze the system steady state and transient performance
CO-2: Evaluate the effects of feedback on system performance
CO-3: Obtain the transfer function/ state space models
CO-4: Design suitable controller and compensator for the improvement of system performance

UNIT-I:
Introduction to Control Problem: Open-Loop and Closed-loop systems, benefits of Feedback. Mathematical models of physical systems. Transfer function models of linear time-invariant systems –RLC Circuits, DC and AC servo motors. Block diagram algebra and Signal Flow Graphs.

UNIT-II:
Time Response Analysis: Standard test signals. Time response of first and second order systems for standard test inputs. Application of initial and final value theorems. Design specifications for second-order systems based on the time-response.

UNIT-III:
Stability and Root Locus: Concept of Stability, Routh-Hurwitz Criterion, Relative Stability analysis. Root-Locus technique. Construction of Root-loci.

UNIT-IV:
Frequency-Response Analysis: Relationship between time and frequency response. Bode plots- transfer function from bode plot-phase and gain margins- stability analysis. Polar and Nyquist plots, Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margins.

UNIT-V:
Introduction to Controller Design: Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness of control systems.
Root-loci method of feedback controller design- Application of Proportional, Integral and Derivative Controllers. Design specifications in frequency-domain. Frequency-domain methods of design- Lead and Lag compensators.

UNIT-VI:

State space Analysis: Concepts of state variables. State space model - RLC circuits and DC motors. State Transition Matrix and its properties- Transformations: State space to Transfer function and vice versa. Eigenvalues and Stability Analysis. Concept of controllability and observability.

TEXT BOOKS:

1. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009
2. K. Ogata, "Modern Control Engineering", Prentice Hall, 1991.

REFERENCES:

1. Richard C. Dorf and Robert H. Bishop "Modern Control Systems"
2. B. C. Kuo, "Automatic Control System", Prentice Hall, 1995.
3. M. Gopal, "Control Systems: Principles and Design", McGraw-Hill Education, 1997.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester	**L**	**T/P/D**	**C**
	3	**1**	**4**

(18PC1EC04) ANALOG AND DIGITAL COMMUNICATION

COURSE PREREQUISITES: Signals and Systems

COURSE OBJECTIVES: Providing the ability
- To understand the principles of various analog and digital modulation and demodulation techniques
- To analyze the noise performance of analog Modulation systems
- To understand the concepts of Pulse analog and digital modulation
- To study the concepts of base band transmission
- To understand the principle of Uncertainty of an event and relating it to a communication system

COURSE OUTCOMES: After completion of the course, the student will be able to
CO-1: Appreciate the difference between analog and digital communication systems
CO-2: Differentiate and explain about baseband transmission and pass band transmission of information
CO-3: Understand the effect of filter characteristics of a communication channel on the transmitted signal
CO-4: Analyze and compare various modulation schemes with reference to their Noise performance
CO-5: Explain the practical significance of information content of source, methods to represent a communication source efficiently

UNIT-I:
Amplitude Modulation: Introduction to Communication System, Need for modulation, Amplitude Modulation, Definition, Time domain and Frequency domain description of AM Waves, Power relations in AM Waves, Generation and Demodulation Techniques of AM Waves, Time domain and Frequency domain description of DSB-SC, SSB, VSB Waves, Generation and Demodulation Techniques of DSB-SC,SSB-SC.
Narrow Band representation of Noise, Noise in Amplitude Modulation System.

UNIT-II:
Angle Modulation: Frequency Modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow Band FM, Wide Band FM, Transmission Bandwidth of FM Wave, Generation and Demodulation of FM Wave, Noise in Angle Modulation System, Pre-emphasis and De-emphasis, FDMA.
Radio Receivers: Characteristics of Radio Receiver, TRF Receiver and its limitations, Super Heterodyne Receiver, choice of local oscillator frequency, choice of IF and tracking of Radio Receiver.

UNIT-III:
Pulse Analog and Digital Modulation: Generation and Demodulation Techniques of PAM, PWM and PPM.

Elements of Digital Communication System, Elements of PCM: Sampling, Quantization, Encoding, Quantization Error, Companding, DPCM, Adaptive DPCM, Delta Modulation, Adaptive Delta Modulation, TDM.
Various Line Coding Formats: Unipolar, Polar, Bi-polar, Power Spectral Density of various line coding formats, Inter Symbol Interference, Nyquist Criterion to reduce ISI.

UNIT-IV:
Digital Modulation Techniques: Introduction, ASK Modulator, Coherent ASK Detector, Non-Coherent ASK Detector, FSK, Bandwidth and frequency Spectrum of FSK, Non-Coherent FSK Detector, Coherent FSK Detector, BPSK, Coherent BPSK Detection, QPSK, DPSK, DEPSK.

UNIT-V:
Optimal Reception of Digital Signal: Baseband signal receiver, Probability of Error, Optimum Filter, Matched Filter, Probability Of Error Using Matched Filter, Probability Of Error For Various Line Encoding Formats, Correlator Receiver, Calculation of Probability of Error for ASK, FSK, BPSK.

UNIT-VI:
Information Theory and Coding: Information Theory: Entropy, Mutual Information, Differential Entropy, Channel capacity theorem, Exchange between bandwidth and SNR, Source coding, requirements of efficient source codes, Efficient binary source coding methods, introduction to principles of channel coding, Differences between source coding and channel coding.

TEXT BOOKS:

1. Principles of Communication Systems – H. Taub, D. L. Schilling, Goutham Saha, McGraw Hill, 4th Edition, 2013.
2. Modern Digital and Analog Communication Systems – B. P. Lathi, Zhi Ding, Oxford, 4th Edition, 2011.

REFERENCES:

1. Communication Systems –Simon Haykin, Wiley, 4th Edition, 2009.
2. Digital and Analog Communication Systems - K. SamShanmugam, Wiley Student Edition, 2006.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18PC1EC05) ANALOG CIRCUITS
(Common to ECE and EEE)

COURSE PREREQUISITES: Electronic Devices and Circuits

COURSE OBJECTIVES:

- To understand the principle of multi stage amplification
- To understand the principle of large signal amplification
- To learn about process of wave shaping circuit
- To study the applications of operational amplifier
- To study the IC versions of various waveform generators

COURSE OUTCOMES: After completion of the course, the student will be able to

CO-1: Analyse and compute the parameters of single stage and multistage amplifiers

CO-2: Appreciate the design considerations of various large signal amplifiers

CO-3: Design the wave shaping circuit for a specified output

CO-4: Explain various characteristics of an operational amplifier

CO-5: Appreciate the applications of various linear integrated circuits

UNIT-I:

Frequency Response of BJT Amplifiers: Analysis at low and high frequencies, Effect of coupling and bypass capacitors, Hybrid-π Common Emitter transistor model, CE short circuit gain, CE current gain with resistive load, Single-stage CE transistor amplifier response at high frequencies.

UNIT-II:

Multistage Amplifiers: Introduction, Methods of inter-stage coupling, n-stage cascaded amplifier, Miller's Theorem, CE-CC Amplifier, Darlington Pair.

MOS Amplifiers: MOS Small signal Model, Common source amplifier with Resistive load, Diode connected load, and current source load, Source follower, Cascode Amplifiers.

UNIT-III:

Power Amplifiers: Classification of power amplifiers, Series-fed and Transformer coupled Class A audio power amplifier, Efficiency of Class A amplifier , Class B amplifier, Transformer-coupled Class B push-pull amplifier, Complementary-symmetry Class B push-pull amplifier, Efficiency of Class B amplifier, Cross Over Distortion, Heat sinks.

Tuned Amplifiers: Introduction, Small signal single tuned amplifiers, Double-tuned amplifiers, Effect of cascading single and double tuned amplifiers on bandwidth.

UNIT-IV:

Linear and Non-Linear Wave Shaping: High pass, Low pass RC circuits and their response for sinusoidal, step, pulse, square inputs. RC network as a differentiator and integrator. Attenuators.

Diode clippers, clipping at two independent levels, Transfer characteristics of clippers, Clamping operation, clamping circuits, Clamping circuit theorem.

UNIT-V:

Linear Integrated Circuits: Classification, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp DC and AC characteristics, modes of operation-inverting, non-inverting, differential.

OP-AMP Applications: Basic application of Op-amp, Instrumentation amplifier, ac amplifier, V to I and I to V converters, Sample and Hold circuits, Differentiators, Integrators, Comparators.

UNIT-VI:

Data Converters and Waveform Generators: D-A and A- D Converters: weighted resistor DAC, R-2R ladder DAC, Different types of ADCs- Successive approximation ADC and Dual slope ADC, Parallel comparator.

Introduction to 555 timer, functional diagram, Mono-stable, As table and Schmitt Trigger operations, PLL – operation and application.

TEXT BOOKS:

1. Integrated Electronics - Jacob Millman and Christos C. Halkias and Chetan D. Parikh, Tata McGraw-Hill Education, 2nd Edition, 2010.
2. Op-Amps and Linear ICs – Ramakanth A. Gayakwad, PHI,1987
3. Pulse, Digital and Switching Waveform, J. Millman, H. Taub; Surya Prakash Rao M., 3rd Edition, McGraw-Hill, 2017.

REFERENCES:

1. Electronic Circuit Analysis - S. Salivahanan, N. Suresh Kumar, Tata McGraw-Hill Education, 3nd Edition, 2013.
2. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 4th Edition, 2008.
3. Pulse and Digital Circuits – K. Venkata Rao, K. Rama Sudha, G. Manmadha Rao, Pearson Edition India, 2010.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18PC1EC06) DIGITAL SYSTEM DESIGN
(Common to ECE, EIE and EEE)

COURSE PREREQUISITES: Basic Electronics

COURSE OBJECTIVES:
- To understand and analyse the logic families
- To understand the different ways of number representation and simplification of Boolean functions with reference to digital circuit design
- To understand the design principles of combinational and sequential circuits
- To understand the role of state machine in digital system designs
- To introduce the principles involved in implementing a digital system using PLDs

COURSE OUTCOMES: After completion of the course, the student will be able to
CO-1: Identify suitable logic family for the implementation of digital ICs
CO-2: Apply the fundamental concepts of digital logic in the design of digital system
CO-3: Analyze and design combinational and sequential logic building blocks of a digital system
CO-4: Apply state machines in the design of digital systems
CO-5: Implement digital systems using various programmable logic devices

UNIT-I:
Digital Logic Families: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing
Number Systems and Codes: Number Systems, Representation of unsigned and Signed Numbers – Binary Arithmetic, Binary Codes, Code Conversions

UNIT-II:
Switching Functions and Logic Simplification: Boolean Algebra postulates and theorems, Algebraic Simplification, Digital logic gates, Multilevel NAND/NOR realizations, Boolean function representations: Canonical and Standard forms, Karnaugh map up to 5 variables, Don't care combinations.

UNIT-III:
Combinational Circuits: Half Adder, Full Adder, Ripple Carry Adder, Half Subtractor, Full Subtractor, Binary Adder/Subtractor, BCD adder, 4-bit Magnitude Comparator, Encoder, Priority Encoder, Decoder, Multiplexer, De-Multiplexer, Barrel shifter.

UNIT-IV:
Sequential Design: Classification of sequential circuits, Latches and Flip Flops, SR, JK, D, T and Master-Slave JK Flip Flops, Flip-Flop Conversions, Ripple and Synchronous Counters, Shift Registers, Sequence generator and sequence detector. Introduction to Finite State Machines (mealy and Moore).

UNIT – V:

Algorithmic State Machine Charts: Introduction to ASM charts, system Design using data path and control subsystems, ASM charts for Binary Multiplier and Dice Game Controller.

UNIT-VI:

Programmable Logic Devices: Logic implementation using Programmable logic devices (PLDs): Read Only Memory (ROM), Programmable Logic Array (PLA), Programmable Array Logic (PAL), Basic architectures of CPLD and FPGA, FPGA Programming Technologies: SRAM, Antifuse, EPROM

TEXT BOOKS:

1. Digital Design – Morris Mano, PHI, 3rd Edition, 2006.
2. Modern Digital Electronics, R. P. Jain, Tata McGraw-Hill, 4th Edition, 2009.
3. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2009.

REFERENCES:

1. Digital Circuits and Systems, D. V. Hall, Tata McGraw-Hill, 1989.
2. Digital Electronics- An Introduction to Theory and Practice, W. H. Gothmann, PHI, 2nd Edition, 2006.
3. Fundamentals of Logic Design, Charles H. Roth, Larry L. Kinney, 6th Edition, Cengage Learning

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18ES1EC54) RANDOM VARIABLES AND STOCHASTIC PROCESSESS

COURSE OBJECTIVES:

- To introduce elementary probability theory as a basis for courses on statistical analysis, random variables and stochastic processes
- To introduce the concepts of random variables and stochastic processes
- To analyze the LTI systems driven by stationary random process as input
- To model the random phenomena mathematically
- To introduce the concepts of internal noise and external noise with reference to a system and classify various types of internal noise sources in a system and the concept of their mathematical modelling

COURSE OUTCOMES: After completion of the course, the student will be able to

CO-1: Mathematically model the random phenomena and solve simple probabilistic problems

CO-2: Characterize different types of random variables and compute statistical averages of these random variables

CO-3: Characterize the random processes in the time and frequency domains

CO-4: Analyze the LTI systems with random inputs

CO-5: Appreciate the concept of internal Noise of a system and its effect on the performance of a given system

UNIT-I:

The Random Variable: Introduction, Review of Probability Theory-Conditional Probablity and Baye's theorem, Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Conditional Density, Properties.

UNIT-II:

Operation on One Random Variable – Expectations: Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic and Non –Monotonic Transformations for a random variable.

UNIT-III:

Multiple Random Variables: Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem: Unequal Distribution, Equal Distributions.

Operations on Multiple Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variables case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-IV:

Random Processes – Temporal Characteristics: Concept of Random Process, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-order and Wide-Sense Stationarity, Nth-order and Strict-Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

UNIT-V:

Random Processes – Spectral Characteristics: The Power Density Spectrum: Properties, Relationship between Power Density Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Density Spectrum and Cross-Correlation Function, Poisson Process.

UNIT-VI:

Linear Systems With Random Inputs: Response of Linear Systems for random inputs: Mean and Mean-squared Value of System Response, Autocorrelation Function of Response, Cross-Correlation Functions between Input and Output of the system, Spectral Characteristics of System's Response: Power Density Spectrum of Response, Cross-Power Density Spectra of Input and Output, Band pass, Band-Limited and Narrowband Processes and their Properties, Modeling of Noise Sources: Resistive (Thermal) Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Average Noise Figure, Average Noise Figure of cascaded networks.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S. Unnikrisha, PHI, 4th Edition, 2002.

REFERENCES:

1. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3rd Edition, 2013.
2. Probability, Random Variables, and Random Processes- Hwei Hsu, Schaum's Outline Series, McGraw-Hill, 2004.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester	**L**	**T/P/D**	**C**
	0	**3**	**1.5**

(18PC2EC03) DIGITAL SYSTEM DESIGN LABORATORY

COURSE OBJECTIVES:

- To learn Verilog Hardware Description Language
- To get familiarity with the modelling styles in Verilog HDL for design of digital circuits
- To model, and simulate digital circuits using HDL and CAD tools
- To learn writing test-benches for functional verification of the relatively complex digital system

COURSE OUTCOMES: After completion of the course, the student will be able to

CO-1: Apply hardware description languages for designing and functional verification of combinational circuits

CO-2: Design and verify the functionality of sequential circuits using Verilog HDL

CO-3: Understand the design flow of CAD tools for digital system design

LIST OF EXPERIMENTS:

Design and simulate the following circuits:

1. Logic Gates.
2. Adder and Subtractor.
3. Code converters
4. Multiplexer and De-multiplexer.
5. Encoder and Decoder.
6. 4-BIT Comparator.
7. Parity generator and checker
8. Flip Flops.
9. Asynchronous Counters.
10. Synchronous Counters.
11. Shift Registers.
12. State Machines.

Experiments over and above the curriculum:

1. Design of ALU
2. Design of Memories

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester	**L**	**T/P/D**	**C**
	0	**3**	**1.5**

(18PC2EC04) ANALOG AND DIGITAL COMMUNICATIONS LABORATORY

COURSE PREREQUISITES: Signals and Systems

COURSE OBJECTIVES:

- To introduce the principles of various analog and digital modulation methods and the study of their spectral characteristics
- To introduce practical implementation of discretization process of a continuous and analog signal
- To understand the principles of channel coding

COURSE OUTCOMES: After completion of the course, the student will be able to

CO-1: Generate AM and FM signals and evaluate their performance

CO-2: Perform signal sampling by determining the sampling rates for baseband signals and reconstruct the signals

CO-3: Generate digital modulation signals perform their demodulation

LIST OF EXPERIMENTS:

Hardware Experiments;

1. Amplitude Modulation, Demodulation
2. Frequency Modulation, Demodulation
3. SSB system and synchronous detection
4. Measurement of Radio Receiver Characteristics
5. Sampling of a continuous and analog signal & Reconstruction
6. Generation & Demodulation of PCM/DM
7. Generation & Demodulation of ASK and FSK
8. Generation and Demodulation of BPSK/DPSK

Simulation Experiments;

9. Simulation of costa's receiver and AGC system
10. Simulation of M-ary PSK systems
11. Computation of a channel capacity of binary channels
12. BER comparison of different modulation schemes in AWGN channel

Experiments over and above the curriculum:

Simulation of

1. Modulation and Demodulation of Analog QAM
2. Encoding and Decoding of Linear Block codes.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester	**L**	**T/P/D**	**C**
	0	**3**	**1.5**

(18PC2EC05) ANALOG CIRCUITS LABORATORY

COURSE PREREQUISITES: Electronic Devices and Circuits Lab

COURSE OBJECTIVES:

- To explain the operation, design and Analysis of multistage amplifiers using BJT
- To understand the operation of power amplifiers and its efficiency
- To understand the operation of wave shaping circuits
- To understand the operation of IC 741 and its applications
- To understand the working principle of 555 timer

COURSE OUTCOMES: After completion of the course, the student will be able to

CO-1: Design and analyze multi-stage amplifier circuits

CO-2: Design linear and non-linear wave shaping circuits

CO-3: Analyze and design application specific circuits using Op-Amp IC 741

CO-4: Design the Active filters using Op-Amp

CO-5: Design applications using IC 555 Timer

PART - A

Design and simulation of the following circuits using simulation software and Implementation through hardware.

1. Common Emitter Amplifier
2. MOSFET- CS amplifier
3. Two stage RC coupled BJT Amplifier
4. Darlington amplifier.
5. Class B Complementary Symmetry Amplifier.

PART – B: Implement the following

1. Linear Waves shaping - RC high pass and low Pass circuits
2. Non-linear wave shaping –Clippers
3. Non-linear wave shaping –Clampers
4. Adder, Subtractor, Comparator, Integrator and Differentiator using IC 741 OP-AMP.
5. Square Wave Generator and Triangular Wave Generator using OP-AMP.
6. R-2R ladder D-A Converter
7. Monostable and Astable Multivibrator.using 555 timer
8. Schmitt Trigger circuits using IC 741 & IC 555.

Experiments over and above the curriculum:

1. Sweep generator
2. Active first order LPF, HPF using OP-AMP

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

(18PC2CS04) PYTHON PROGRAMMING PRACTICE
(Common to ECE and EIE)

COURSE OBJECTIVES:
- Install and run the Python interpreter
- Learn control structures
- To understand lists, dictionaries in Python
- To handle strings and files in Python

COURSE OUTCOMES: After completion of the course, the student will be able to
CO-1: Develop the application specific codes using Python
CO-2: Understand strings, lists, tuples and dictionaries in Python
CO-3: Verify programs using modular approach, file I/O, Python standard library
CO-4: Implement digital systems using Python

Exercise - 1 Basics
a) Running instructions in Interactive interpreter and a Python Script
b) Write a program to purposefully raise Indentation Error and correct it

Exercise - 2 Operations
a) Write a program to compute GCD of two numbers by taking input from the user
b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow
a) Write a Program for checking whether the given number is even number or not.
b) Write a program using for loop that loops over a sequence.
c) Python Program to Print the Fibonacci sequence using while loop
d) Python program to print all prime numbers in a given interval (use break)

Exercise – 4 Lists
a) Find mean, median, mode for the given set of numbers in a list.
b) Write a program to convert a list and tuple into arrays.
c) Write a program to find common values between two arrays.

Exercise – 5 Dictionary
a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure
b) Write a program combine_lists into a dictionary.

Exercise – 6 Strings
a) Write a program to check whether a string starts with specified characters.
b) Write a program to check whether a string is palindrome or not

Exercise -7 Strings Continued
a) Python program to split and join a string
b) Python Program to Sort Words in Alphabetic Order

Exercise - 8 Files
a) Write a program to print each line of a file in reverse order.
b) Write a program to compute the number of characters, words and lines in a file.
c) Write a program to count frequency of characters in a given file.

Exercise - 9 Functions
a) Simple Calculator program by making use of functions
b) Find the factorial of a number using recursion
c) Write a function "dups" to find all duplicates in the list.
d) Write a function "unique" to find all the unique elements of a list.

Exercise - 10 Functions - Problem Solving
a) Write a function "cumulative_product" to compute cumulative product of a list of numbers.
b) Write a function "reverse" to print the given list in the reverse order.
c) Write function to compute GCD, LCM of two numbers

Exercise 11 - Multi-D Lists
a) Write a program that defines a matrix and prints
b) Write a program to perform addition of two square matrices
c) Write a program to perform multiplication of two square matrices

Exercise - 12 Modules
a) Install NumPypackage with pip and explore it.

Exercise - 13
a) Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
b) Write a program to implement Half Adder, Full Adder, and Parallel Adder

Exercise - 14
a) Write a program to implement Code Conversions – BCD to Gray, Gray to Binary.
b) Write a program to implement Digital Multiplexer, Decoder, Encoder and Counter.

Week-15
Assignment: Develop web application using python base frame work.

TEXT BOOKS:
1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Learning Python, Mark Lutz, Orielly

REFERENCES:
1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W. Chun, Pearson
3. Introduction to Python, Kenneth A. Lambert, Cengage Learning