B.Tech - Electronics and Communication Engineering
II Year Course Structure And Syllabus (R20)
Applicable From 2020-21 Admitted Batch

II YEAR I SEMESTER

S. No.	Course Code	Course Name	Course Area	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2030003	Laplace Transforms, Series Solutions and Complex Variables	BS	3	1	0	4	30	70	100
2	2030411	Electronic Devices and Circuits	PC	3	1	0	4	30	70	100
3	2030201	Basic Electrical Engineering	PC	3	0	0	3	30	70	100
4	2030509	Java Programming	ES	2	0	0	2	30	70	100
5	2030412	Signals and Systems	PC	3	1	0	4	30	70	100
6	2030473	Electronic Devices and Circuits Laboratory	PC	0	0	3	1.5	30	70	100
7	2030271	Basic Electrical Engineering Laboratory	PC	0	0	2	1	30	70	100
8	2030570	Java Programming Laboratory	ES	0	0	2	1	30	70	100
9	2030023	Constitution of India	*MC-II	2	0	0	0	100	-	100
TOTAL				**14**	**3**	**7**	**20.5**	**340**	**560**	**900**

II YEAR II SEMESTER

S. No.	Course Code	Course Name	Course Area	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2040401	Analog and Pulse Circuits	PC	3	0	0	3	30	70	100
2	2040413	Analog and Digital Communication	PC	3	1	0	4	30	70	100
3	2040414	Digital System Design	PC	3	1	0	4	30	70	100
4	2040505	Python Programming	ES	2	0	0	2	30	70	100
5	2040415	Electromagnetic Theory and Transmission Lines	PC	3	0	0	3	30	70	100
6	2040471	Analog and Pulse Circuits Laboratory	PC	0	0	3	1.5	30	70	100
7	2040575	Python Programming Laboratory	ES	0	0	2	1	30	70	100
8	2040474	Basic Simulation & Digital System Design Laboratory	PC	0	0	3	1.5	30	70	100
9	2040022	Gender Sensitization	*MC-III	2	0	0	0	100	-	100
TOTAL				**16**	**2**	**8**	**20**	**340**	**560**	**900**

Note: *Internship should be completed before the commencement of III Year B.Tech I Sem and evaluation is carried in III B.Tech – I Sem.*

***MC- Satisfactory/Unsatisfactory**

II — I

2030003: LAPLACE TRANSFORMS, SERIES SOLUTIONS AND COMPLEX VARIABLES

II Year B.Tech. ECE I – Sem. **L T P C**

3 1 0 4

Course Objectives:

- To understand the basic theory of complex functions to express the power series
- To evaluate the contour integration using Cauchy residue theorem
- Solving ordinary differential equations using Laplace transforms techniques

Course Outcomes:

At the end of this course, students will be able to

- Use the Laplace transforms techniques for solving ODE's
- Evaluate Fourier series for discontinuous functions
- Apply the series solution for Ordinary Differential Equations
- Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems
- Understand Taylor's and Laurent's series expansions of complex function

UNIT– I

Laplace Transforms: Laplace Transform of standard functions; first shifting theorem; Laplace transforms of functions when they are multiplied and divided by't'. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Special functions; Laplace transform of periodic functions. Inverse Laplace transform by different methods, convolution theorem (without Proof), solving ODEs by Laplace Transform method.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the concept of transformations.
- Analyze the Laplace transforms of various functions
- Explain the Laplace Transform of periodic functions.
- Evaluate the integrals by Laplace Transforms.
- Apply Laplace Transforms to solve the ordinary differential Equations.

UNIT – II

FOURIER SERIES: Introduction, Periodic functions, Fourier series of Periodic functions, Dirichlet's conditions, Even and Odd Functions, Change of interval, Half range Fourier sine and cosine series.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the concept of algebraic function into trigonometric series.
- Explain the concepts of Periodic functions.
- Apply Fourier series for change of interval.
- Analyse an Even and Odd functions.
- Evaluate the Discontinuity functions in a given period.

UNIT – III

SERIES SOLUTIONS OF ODE: Introduction, Ordinary and singular point of an Equation.Bessel's Differential equation: Bessel function, properties of Bessel function, Recurrence relations of Bessel function, Generating function and Orthogonality of Bessel function, Trigonometric expansions involving Bessel function.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand Bessel's function
- Explain Properties of Bessel's function
- Apply Bessel's function in circuit analysis.
- Analyse the Orthogonality of Bessel function
- Evaluation Recurrence relations of Bessel function.

UNIT – IV

Complex Variables (Differentiation): Limit, Continuity and Differentiation of Complex functions, Analyticity, Cauchy-Riemann equations (without proof), finding harmonic conjugate; Milne-Thomson method for constructing analytic functions.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the basic theory of complex functions
- Explain the concepts of limit, continuity, differentiability, analyticity.
- Apply C-R equations to different complex functions
- Analyse the harmonic functions
- Evaluate the Bilinear Transformation.

UNIT – V

Complex Variables (Integration): Line integral, Cauchy's theorem, Cauchy's Integral formula, Zeros of analytic functions, Singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem, Conformal mappings, Mobius transformations and their properties.(All theorems are without proof)

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the concept of complex integration.
- Explain the Cauchy's integral theorem
- Apply Complex integration over the stream flow functions
- Analyse the contour Integration.
- Evaluation of a line integral along a path.

TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Publishers, 10th Edition, 2014.

2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, 2012.

REFERENCE BOOKS:

1. Churchill, R.V. and Brown, J.W, "Complex Variables and Applications", Tata Mc Graw-Hill, 8th Edition, 2012.

2. A. K. Kapoor, "Complex Variables Principles and Problem Sessions", World Scientific Publishers, 1st Edition, 2011.

3. Murray Spiegel, John Schiller, "Probability and Statistics", Schaum"s Outline Series, 3rd Edition,2010.

2030411: ELECTRONIC DEVICES AND CIRCUITS

II Year B.Tech. ECE I – Sem. **L T P C**

3 1 0 4

Pre-requisites: Knowledge on Basic Electrical Engineering and Semiconductor Device Physics

Course Objectives:

- To introduce components such as Diodes, BJTs and FETs
- To know the applications of semiconductor devices
- To study special purpose semiconductor devices
- To give understanding of various types of amplifier circuits
- To design and analyze the different small-signal amplifier circuits

Course Outcomes:

At the end of this course, students will be able to

- Understand the characteristics of various semiconductor components
- Understand the utilization of components
- Understand the biasing techniques
- Design and analyze small signal amplifier circuits
- Analyze the BJT and FET amplifiers operation

UNIT– I

Semiconductor Diode and Applications: Basic Structure of the pn Junction with Zero and Reverse Applied Bias, PN Junction Current, Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Parallel and Series diode Configurations, Rectifiers, Rectifiers with Capacitive and Inductive Filters, Clippers, Clampers.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the physics of semiconductor materials
- Learn the basic semiconductor device operation
- Analyze the diode applications

UNIT – II

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing – Fixed-Bias, Self-Bias, Voltage-Divider bias, Bias Stability, Bias Compensation using Diodes.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the operation of BJT
- Understand and analyze the transistor biasing
- Calculate operating point and load line

UNIT – III

Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable resistor. MOSFET operation, MOSFET Characteristics in Enhancement and Depletion mode, MOS as a Capacitor.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the operation and volt-amperes characteristics of a JFET
- Analyze various FET biasing methods
- Understand the V -I characteristics of a various diodes

UNIT – IV

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

Learning Outcomes: At the end of this unit, the student will be able to

- Analyze hybrid parameters for CE, CB and CC configurations
- Understand and analyze CE, CB and CC amplifiers using hybrid parameters
- Analyze the effect of coupling and bypass capacitors on CE amplifier

UNIT – V

FET Amplifiers: FET Small Signal Model**,** Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers; Basic Concepts of MOS Amplifiers,

Special Purpose Devices: Zener diode, Voltage Regulator, SCR, Tunnel diode, UJT, Varactor diode, Photo diode and Solar Cell – Characteristics, Operations and Applications.

Learning Outcomes: At the end of this unit, the student will be able to

- Analyze small signal model of various JFET amplifiers
- Understand the MOSFET characteristics
- Understand the basic concepts of special purpose devices

TEXT BOOKS:

1. Jacob Millman, Christos C. Halkias, and Satyabrata Jit, "Electronic Devices and Circuits", 3rd Edition., Mc-Graw Hill Education, 2010.
2. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuits theory" 11th Edition, Pearson**,** 2013.

REFERENCES:

1. Donald Neamen, Dhrubes Biswas, "Semiconductor Physics and Devices" 4th Edition, McGraw Hill Education, 2017.
2. Steven T. Karris, "Electronic Devices and Amplifier Circuits with MATLAB Applications" Orchard Publications, 3rd Edition 2005.
3. Paul Horowitz, Winfield Hill, "The Art of Electronics" 3rd Edition Cambridge University Press, 1994.

2030201: BASIC ELECTRICAL ENGINEERING
(COMMON to ECE, CSE, CSC, CSD, CSM, CSIT & IT)

II Year B.Tech. ECE I - Sem. **L T P C**

3 0 0 3

Pre-requisites: Nil

Course Objectives:

- To analyze and solve electric circuits.
- To provide an understanding of basics in Electrical circuits.
- To identify the types of electrical machines for a given application.
- To explain the working principles of Electrical Machines and single phase transformers.

Course Outcomes

After completion of this course the student is able to

- Analyse Electrical circuits to compute and measure the parameters of Electrical Energy.
- Comprehend the working principles of Electrical DC Machines.
- Identify and test various electrical switchgear, single phase transformers and assess the ratings needed in given application.
- Comprehend the working principles of electrical AC machines.

UNIT-I

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems.

Learning Outcomes: At the end of this unit, the student will be able to

- Explain the need of circuit elements. (L2)
- Analyse the resistive circuits with independent sources. (L4)
- Solve D.C. circuits by using KVL and KCL. (L3)
- Apply network theorems for solving D.C. circuit problems. (L3)

Unit-II

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power and power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.

Learning Outcomes: At the end of this unit, the student will be able to

- Develop an understanding of the fundamental laws and elements of A.C circuits. (L3)
- Learn the energy properties of electric elements and the techniques to measure voltage and current. (L2)
- Explain the concept of steady state. (L2)

UNIT-III

Transformers: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate knowledge of construction and operating principles of single-phase transformers. (L3)
- Determine losses, efficiency, and voltage regulation of a transformer under specific operating conditions. (L5)
- Identify the connections of a three phase transformer. (L3)
- Illustrate the performance characteristics of different induction motors. (L3)

UNIT-IV

Electrical Machines: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

Learning Outcomes: At the end of this unit, the student will be able to

- Explain construction & working of induction motor - DC motor. (L2)
- Perform speed control of DC Motor. (L3)
- Explain principle and operation of DC Generator & Motor. (L2)

UNIT-V

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Learning Outcomes: At the end of this unit, the student will be able to

- Understand working principles of LT Switchgear components. (L2)
- Perform elementary calculations for energy consumption, power factor improvement and battery backup. (L3)

TEXT BOOKS:

1. Basic Electrical Engineering - By M.S.Naidu and S. Kamakshaiah – TMH.
2. Basic Electrical Engineering –By T.K.Nagasarkar and M.S. Sukhija Oxford University Press.

REFERENCE BOOKS:

1. Theory and Problems of Basic Electrical Engineering by D.P.Kothari & I.J. Nagrath PHI.
2. Principles of Electrical Engineering by V.K Mehta, S.Chand Publications.
3. Essentials of Electrical and Computer Engineering by David V. Kerns, JR. J. David Irwin Pearson.

2030509: JAVA PROGRAMMING

II Year B.Tech. ECE I - Sem.

L	T	P	C
2	0	0	2

Prerequisites: A course on programming for problem solving

Course Objectives:

- To introduce the object-oriented programming concepts.
- To understand object-oriented programming concepts, and apply them in solving problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes.
- To introduce the implementation of packages and interfaces.
- To introduce the concepts of exception handling and multithreading.
- To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes:

- Able to solve real world problems using OOP techniques.
- Able to understand the use of abstract classes.
- Able to solve problems using java collection framework and I/o classes.
- Able to develop multithreaded applications with synchronization.
- Able to develop applets for web applications.
- Able to design GUI based applications

UNIT-I:

Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, Functions, Recursion, Enumeration. concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT II:

Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring java.io.

UNIT III:

Exception handling and Multithreading—Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. String handling, Exploringjava.util. Differences between multi threading and multitasking, thread life cycle,creating threads, thread priorities, synchronizing threads, interthread communication, thread groups,daemon threads.

UNIT IV:

Event Handling : Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

UNIT V :

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- Japplet, Jframe and Jcomponent, Icons and Labels, text fields, buttons – The Jbutton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables

TEXT BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.

2030412: SIGNALS AND SYSTEMS

II Year B.Tech. ECE I - Sem. **L T P C**

3 1 0 4

Pre-requisites: Basics of Mathematics

Course Objectives:

- Acquire the knowledge of signals and systems
- Understand the behavior of signals in time and frequency domain
- Analyze the characteristics of LTI systems
- Study the concepts of Signals and Systems and its analysis using different Transform techniques
- Obtain the relation between two same signals and two different signals

Course Outcomes:

At the end of this course, students will be able to

- Differentiate various signal functions
- Represent any arbitrary signal in time domain and frequency domain
- Understand the characteristics of linear time invariant systems
- Analyze the signals with different Transform techniques
- Design a system for sampling a signal

UNIT – I

Signal Analysis: Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Classification of signals and systems, operations on signals, Exponential and sinusoidal signals, Concepts of impulse function, Unit step function, Signum function.

Learning Outcomes: At the end of this unit, the students will be able to

- Discuss the similarity between vectors and signals
- Describe different types of signals
- Perform different operations on signals

UNIT – II

Fourier Series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier series and exponential Fourier series, Complex Fourier spectrum.

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signals, Fourier Transform of standard signals, Fourier Transform of periodic signals, Properties of Fourier Transform, Fourier Transforms involving impulse function and signum function, Introduction to Hilbert Transform.

Learning Outcomes: At the end of this unit, the students will be able to

- Illustrate Fourier series and properties of Fourier series
- Demonstrate dirichlet's conditions of Fourier series and Fourier Transform
- Compute Fourier Transform from Fourier series and Transform of different signals.

UNIT – III

Signal Transmission through Linear Systems: Linear system, Impulse response, Response of a linear system, Linear time invariant(LTI) system, Transfer function of a LTI system, Filter characteristics of linear system, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and paley-wiener criterion for physical realization, Relationship between bandwidth and rise time, Convolution and correlation of signals, Concept of convolution in time domain and frequency domain, Graphical representation of convolution

Learning Outcomes: At the end of this unit, the students will be able to

- Analyze the response of a linear system
- Compute transfer function of a LTI system
- Discuss filter characteristics of linear systems

UNIT – IV

Laplace Transforms: Laplace Transforms (L.T), Inverse Laplace Transform, Concept of region of convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis, and it's Applications.

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, and it's Applications.

Learning Outcomes: At the end of this unit, the students will be able to

- Describe Laplace Transform and inverse Laplace Transform with the concept of region of convergence (ROC)
- Examine the constraints on ROC for various classes of signals
- Describe the properties of L.T's, Z.T's and relation between F.T, L.T, and Z.T of a signal

UNIT – V

Sampling Theorem: Graphical and analytical proof for band limited signals, Impulse sampling, Natural and flat top sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to band pass sampling.

Correlation: Cross correlation and auto correlation of functions, Properties of correlation functions, Energy density spectrum, Parsevals theorem, Power density spectrum, Relation between autocorrelation function and energy/power spectral density function, Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

Learning Outcomes: At the end of this unit, the students will be able to

- Illustrate sampling theorem and types of sampling
- Reconstruct the signal from its samples and effect of under sampling
- Demonstrate auto correlation and cross correlation of functions and its properties

TEXT BOOKS:

1. B.P. Lathi, "Signals, Systems & Communications," BSP, 2nd Edition 2001.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, "Signals and Systems," Pearson India 2nd Edition, 1996.

REFERENCES:

1. Simon Haykin and Van Veen, "Signals and Systems," John Wiley 2nd Edition, 2007.
2. A. Anand Kumar, "Signals and Systems," PHI, 3rd Edition, 2013.
3. Michel J. Robert, "Fundamentals of Signals and Systems," MGH International, 2nd Edition, 2008.

2030473: ELECTRONIC DEVICES AND CIRCUITS LABORATORY

II Year B.Tech. ECE I – Sem.

L	T	P	C
0	0	3	1.5

Course Objectives:

- To know the characteristics of PN junction diode
- To measure the efficiency of half wave and full wave rectifiers
- To study the BJT operation
- To know the switching characteristics of SCR
- To design the clipper and clamper circuits

Course Outcomes:

At the end of the laboratory work, students will be able to

- Identify the two terminal and three terminal devices like diode and Transistor
- Understand the PN Junction diode characteristics in forward and reverse bias
- Analyses the transistor characteristics in different configurations
- Measure the h-parameters from the transistor configuration
- Design the characteristics of clipper and clamper with and without reference voltages

List of Experiments:

Experiments marked with * has to be designed, simulated and verify in hardware laboratory.

1. PN Junction and Zener diode characteristics **(*)**
2. Half and Full Wave Rectifier with & without filters **(*)**
3. Clippers at different reference voltages **(*)**
4. Clampers at different reference voltages**(*)**
5. Input and output characteristics of BJT in CE, CB, CC Configuration **(*)**
6. Verify the SCR Characteristics
7. CE and CC amplifier characteristics **(*)**
8. Calculate the resistance and capacitance values for different biases in CE
9. Verify the Common Source amplifier characteristics
10. Input and output characteristics of FET in CS Configuration
11. Test the powered backup system using diode
12. Logic gates using BJT **(*)**
13. Voltage level indicator **(*)**
14. Transistor as a switch to control the on–off states of a bulb **(*)**

NOTE: Minimum of 12 experiments to be conducted.

2030271: BASIC ELECTRICAL ENGINEERING LABORATORY

II Year B.Tech. ECE I – Sem.

L	T	P	C
0	0	2	1

Course Objectives:

- To analyze a given network by applying various electrical laws and network theorems
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes:

- Get an exposure to basic electrical laws.
- Understand the response of different types of electrical circuits to different excitations.
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the basic characteristics of transformers and electrical machines.

List of Experiments:

1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Verification of superposition theorem.
4. Verification of Thevenin's and Norton's theorem.
5. Resonance in series RLC circuit.
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer.
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit.
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
13. Performance Characteristics of a Three-phase Induction Motor.
14. Torque-Speed Characteristics of a Three-phase Induction Motor.
15. No-Load Characteristics of a Three-phase Alternator.

2030570: JAVA PROGRAMMING LABORATORY

II Year B.Tech. ECE I – Sem. **L T P C**

0 0 2 1

Course Objectives:

- To write programs using abstract classes.
- To write programs for solving real world problems using java collection frame work.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.
- To impart hands on experience with java programming.

Course Outcomes:

- Able to write programs for solving real world problems using java collection frame work.
- Able to write programs using abstract classes.
- Able to write multithreaded programs.
- Able to write GUI programs using swing controls in Java.

1. a) Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
   b) Write a java program that prints all real solutions to the quadratic equation ax2 +bx+c=0. Read in a, b, c and use the quadratic formula.
   c) Write a java program to implement Fibonacci series.

2. a) Write a java program to implement method overloading and constructors overloading.
   b).Write a java program to implement method overriding.

3. a) Write a java program to check whether a given string is palindrome.
   b) Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

4. a) Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
   b) Write a java program to create user defined exception class and test this class.

5. a) Write a Java program to list all the files in a directory including the files present in all its subdirectories.
   b) Write a java program that displays the number of characters, lines and words in a text file.

6. a) Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
   b) Write a Java program that correctly implements the producer – consumer problem using the concept of interthread communication.

6. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.

8. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

9. a)Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

b) Write a java program to demonstrate the key event handlers.

10. a) Develop an applet in Java that displays a simple message.

b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.

11. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

12. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “Stop” or “Ready” or “Go” should appear above the buttons in selected color. Initially, there is no message shown.

13. Develop Swing application which uses JList, JTree, JTable, JTabbedPane and JScrollPane.

14. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order

15. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.

203023: CONSTITUTION OF INDIA
(MANDATORY COURSE-II)

II Year B.Tech. ECE I – Sem. **L T P C**

2 0 0 2

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

II - II

2040401: ANALOG AND PULSE CIRCUITS

II Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Pre-requisite: Knowledge on Electronic Devices and Circuits.

Course Objectives:

- To understand the design concepts of multistage amplifiers
- To study the design concepts of transistor amplifiers at high frequency
- To know the concepts of feedback in amplifier circuits
- To design various multi-vibrators using transistors and sweep circuits
- To analyze different types of Oscillators and Large Signal Amplifiers

Course Outcomes:

At the end of this course, students will be able to

- Analyze the different types of amplifiers, operation and its characteristics
- Understand the concepts of feedback in amplifier circuits
- Study different classes of power amplifiers and tuned amplifiers
- Design the concepts of transistor amplifiers at high frequency
- Know about multivibrators for various applications using transistors and sweep circuits

UNIT – I

Multistage Amplifiers: Classification of Amplifiers, BJT AND MOSFET Amplifiers, Differential Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascade amplifier, Darlington pair. Transistor at High Frequency: Hybrid – π model of Common Emitter transistor model, f_α, β and Unity gain bandwidth, and Gain bandwidth product.

Learning Outcomes: At the end of this unit, the student will be able to

- Analyze different types of multistage amplifiers like cascade amplifiers, Darlington Pair and their operation
- Conclude the use of different coupling schemes in multistage amplifiers
- Design the small signal high frequency amplifiers using hybrid model

UNIT – II

Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations.

Learning Outcomes: At the end of this unit, the student will be able to

- Find the difference between types of feedback amplifiers
- Understand the characteristics of the negative feedback amplifiers
- Acquire knowledge on different types of feedback configurations

UNIT – III

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

Learning Outcomes: At the end of this unit, the student will be able to

- Understand the concept of oscillations
- Explain the working operation of different types of oscillators and calculate their resonant frequency
- Identify the difference between types of Oscillators

UNIT – IV

Large Signal Amplifiers: Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class C Amplifiers.

Tuned Amplifiers: Single Tuned Amplifiers – Q-factor, Frequency response of tuned amplifiers, Concept of stagger tuning and synchronous tuning.

Learning Outcomes: At the end of this unit, the student will be able to

- Design the different types of large signal amplifiers
- Understand the working operation of different types of power amplifiers and their output waveforms
- Analyze the frequency response of single tuned amplifier

UNIT – V

Multivibrators: Introduction to Multivibrators, Types of Triggering, Analysis and Design of Bistable, Monostable, A stable Multivibrators and Schmitt trigger using Transistors. Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, and Methods of Linearity improvement.

Learning Outcomes: At the end of this unit, the student will be able to

- Analyze and design the different types of multi vibrators using transistors
- Apply the methods of generating time base waveforms
- Understand the operation of different types of time base generators

TEXT BOOKS:

1. Millman J., Halkias C.C. and Satyabrata Jit, Electronic Devices and Circuits, 3rd edition, Tata McGraw-Hill, 2011.
2. Jacob Millmann and Herbert Taub, “Pulse, Digital and Switching waveforms”, 2nd Edition, Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 2007

REFERENCES:

1. Salivahanan, Suresh Kumar and Vallavaraj, “Electronic Devices and Circuits,” 2nd edition, Tata McGraw-Hill, 2010.
2. Ramakanth A. Gayakwad, “Op-amps and Linear Integrated Circuits”, 3rd Edition, Prentice-Hall of India private Limited, New Delhi, 1995.
3. David A.Bell, “Solid State pulse circuits”, 4th Edition, Prentice-Hall of India Private Limited, New Delhi, 2000.

2040413: ANALOG AND DIGITAL COMMUNICATIONS

II Year B.Tech. ECE II – Sem. **L T P C**

3 1 0 4

Pre-requisite: Knowledge on Signals and Fourier Transforms.

Course Objective:

- Develop ability to analyze system requirements of analog and digital communication systems
- Design the generation and detection of various analog and digital modulation techniques
- Acquire theoretical knowledge of each block in AM/FM transmitters and receivers
- Understand the concepts of baseband transmissions and various source & channel coding techniques
- Study of various noise sources and SNR/Figure of Merit calculations

Course Outcome:

At the end of this course, the students will be able to

- Understand the basic knowledge of AM Transmission & Reception
- Acquire the basic knowledge of FM Transmission & Reception
- Analyze the error performance of digital modulation techniques
- Conceptually develop the baseband signal & system transmission model
- Design of typical conventional telecommunication system that consists of basic and essential building blocks

UNIT– I

Amplitude Modulation: Significance of modulation, Amplitude Modulation - Time and frequency domain description, power relations in AM waves, Generation of AM waves -Switching modulator, Detection of AM signal - Envelope detector, Generation of DSBSC signal - Balanced Modulators, Detection of DSB-SC Modulated signal, SSB modulation, Frequency discrimination and Phase discrimination methods, Demodulation of SSB signal, Vestigial side band modulation. AM receivers- tuned radio frequency and super heterodyne receivers.

Learning Outcomes: At the end of this unit, the students will be able to

- Demonstrate the all AM-SC systems: generation and detection techniques
- Design of AM transmitters & receivers
- Plot the Spectrum of all AM Systems and calculate its bandwidth

UNIT – II

Angle Modulation: Introduction to Angle Modulation, Frequency Modulation - Narrow band FM and Wide band FM, bandwidth calculations, constant average power, FM signal generation- Armstrong method, Detection of FM Signal- balanced slope detector, Phase locked loop, Concepts of phase modulation, Comparison of AM, FM and PM, Pre-emphasis and de-emphasis. FM receiver, Comparison of TDM and FDM.

Learning Outcomes: At the end of this unit, the students will be able to

- Design of FM transmitters & receivers
- Plot the Spectrum of FM and calculate its transmission bandwidth
- Design of Pre-emphasis and de-emphasis networks

UNIT – III

Introduction to Digital Communications: Block diagram of digital communication system, advantages of digital communication systems, digital representation of analog signals.

Baseband Data Transmission: Introduction**,** sampling process, PAM, PWM, PPM, pulse code modulation, differential pulse code modulation, delta modulation, ADM, noise considerations in PCM and DM. Inter symbol Interference, Nyquist criterion for zero ISI, eye diagrams, probability of error, optimum receiver, matched filter receiver.

Learning Outcomes: At the end of this unit, the students will be able to

- Design of Baseband PAM transmission model
- Demonstrate the generation and reconstruction of various pulse modulation systems
- Plot the Spectrum of PAM, PWM and calculate its transmission bandwidth

UNIT– IV

Passband Data Transmission: Amplitude shift keying, Frequency shift keying, and Phase shift keying, ASK generation and detection, FSK generation and detection, PSK generation and detection, DPSK generation and detection, M-ary schemes- QAM and QPSK. Probability of error of ASK, FSK, and PSK.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand the difference between analog and digital modulation techniques
- Demonstrate the generation and detection of various modulation techniques
- Plot the Spectrum of ASK, FSK and PSK and also calculate its transmission bandwidth

UNIT– V

Noise, Information Theory and Coding: Types of noise, Gaussian and white noise characteristics, resistive/thermal noise, narrow band noise- In-phase and quadrature representation and its properties. noise in AM and FM systems, SNR and figure of merit calculations.

Information Theory and Coding: Entropy, mutual information, channel capacity theorem, trade of between bandwidth and SNR, source coding: Shannon fano coding and Huffman coding, channel coding – linear block code and hamming codes, fundamentals of error detection and correction codes.

Learning Outcomes: At the end of this unit, the students will be able to

- Design of AM and FM receiver model for noise calculations
- Understand the significance and effects of noise on transmitted signals
- Analyzes the performance of communication system over noise

TEXT BOOKS:

1. Simon Haykin, “Analog and digital communications,” John Wiley, 4th edition 2005.
2. Sudakshina Kundu, “Analog and digital communications,” Pearson India, 1st edition 2010.

REFERENCES:

1. Herbert Taub, Donald L Schiling, Goutam Saha, “Principles of communication systems,” Mcgraw-Hill, 3rd edition, 2008.
2. Dennis Roddy and John Coolean, “Electronic communications,” PEA, 4th Edition, 2004.
3. Wayne Tomasi, “Electronics communication systems,” PHI, 5th edition, 2009.

2040414: DIGITAL SYSTEM DESIGN

II Year B.Tech. ECE II – Sem. **L T P C**

3 1 0 4

Pre-requisite: Nil

Course Objectives:

- Understand the number systems in logic circuits
- Learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems
- Implement simple logical operations using combinational logic circuits and design of sequential logic circuits
- Analyze sequential circuits systems in terms of state machines
- Analyze the concepts of programmable logic devices

Course Outcomes:

At the end of this course, the students will be able to:

- Introduce the numerical information in different forms and Boolean Algebra theorems
- Implement the Boolean algebra and to minimize combinational functions
- Design and analyze small combinational circuits and to use standard Combinational functions to build larger more complex circuits
- Implement small sequential circuits and devices and to use standard sequential Function blocks to build larger more complex circuits
- Understand the operation of PLD & PLA

UNIT – I

Number Systems: Number systems, Complements of numbers, Codes- weighted and Non-weighted codes and its properties, Parity check code and Hamming code.

Boolean Algebra: Basic theorems and properties, Switching functions- Canonical and standard form, Algebraic simplification, Digital logic gates, EX-OR gates, Universal gates, Multilevel NAND/NOR realizations, and their applications.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand the concept of various number systems and its importance in digital circuits
- Know the negative numbers in binary number systems
- Realization of the minimization of logic expressions using Boolean laws and logic gates and their operation with their truth tables

UNIT – II

Minimization of Boolean Functions: Karnaugh Map method - Up to five variables, Don't Care map entries, Quine Mc Cluskey, and Tabular method.

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

Learning Outcomes: At the end of this unit, the students will be able to

- Understand the minimization of logic expressions using k-map & Tabular Method.
- Design combinational circuits and to use standard combinational functions to build larger more complex circuits
- Realization of code converters & designing of Hazard Free circuits.

UNIT – III

Sequential Circuits Fundamentals: Basic architectural distinctions between combinational and sequential circuits, SR latch, flip flops: SR, JK, JK master slave, D and T type flip flops, Excitation table of all flip flops, Timing and triggering consideration, Conversion from one type of flip-flop to another.

Registers and Counters: Shift registers – left, right and bidirectional Shift Registers, Applications of shift registers - Design and operation of ring and twisted ring counter, Operation of asynchronous and synchronous counters.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand about memory element and its applications in digital circuits
- Convert one flip-flop to another flip-flop
- Design various shift registers & Counter Real Time Applications

UNIT – IV

Sequential Machines: 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.

Learning Outcomes: At the end of this unit, the students will be able to

- Understand synchronous and asynchronous counters
- Realization of pattern generators and modulo-N counters
- Design serial adders and sequence detectors using flip-flops

UNIT – V

Programmable Logic Devices, **Threshold Logic**: Basic PLD's-ROM, PROM, PLA, and PLD Realization of Switching functions using PLD's. Capabilities and limitations of threshold gate, Synthesis of threshold functions, Multigate Synthesis.

Learning Outcomes: At the end of this unit, the students will be able to

- Design the circuits using programmable logic models
- Understand the operation of Threshold and multi gates
- Know the basics about field programmable devices

TEXT BOOKS:

1. Zvi Kohavi & Niraj K. Jha, "Switching and finite automata theory," 3rd edition, Cambridge, 2010.
2. M.Morris Mano, Michael D. Ciletti, "Digital design," Pearson, 4th edition, 2012.

REFERENCES:

1. R. P. Jain, "Modern digital electronics," Tata McGraw-Hill, 3rd edition, 2007.
2. Charles H. Roth, "Fundamentals of logic design," Cengage Learning, 5th edition, 2004.
3. A. Anand Kumar, "Switching theory and logic design," PHI, 2nd edition, 2013.

2030505: PYTHON PROGRAMMING

II Year B.Tech. ECE II – Sem. **L T P C**

2 0 0 2

Course Objectives:

- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular expressions in Python.
- Understand FILES, Multithread programming in Python.

Course Outcomes:

- Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
- Demonstrate proficiency in handling Strings and File Systems.
- Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.

UNIT - I

Python Introduction, History & Installing of Python, Python basics, Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions. Control structures.

UNIT - II

Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types. Iterators, List comprehensions, Generator Expressions

UNIT-III

FILES: File Objects, File Built-in Functions, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules

UNIT-IV

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions, Exceptions and the sys Module, Modules and Files, Namespaces, Importing Modules, Importing Module Attributes,

Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT – V

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python

TEXT BOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCE BOOKS:

1. Think Python, Allen Downey, Green Tea Press
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Python Programming: A Modern Approach, VamsiKurama, Pearson

2040415: ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

II Year B.Tech. ECE II – Sem. **L T P C**

3 0 0 3

Pre-requisite: Knowledge on Vector calculus

Course Objectives:

- Familiarize about 3D vector co-ordinate systems and electromagnetic field concepts
- Have skills in selecting appropriate Maxwell's equations in electromagnetic theory for a given application and analyze the problem
- Investigate the propagation characteristics of electromagnetic waves at boundary of different media
- Demonstrate the ability to compute various parameters for transmission lines using smith chart and classical theory
- To calculate various line parameters by conventional and graphical methods

Course Outcomes:

At the end of this course, the students are able to

- Understand the characteristics of electrostatics and magnetostatics for wave propagation
- Study time varying Maxwell's equations and their applications in electromagnetic problems
- Demonstrate the reflection and refraction of EM waves at boundaries
- Analyze basic transmission line parameters at various conditions
- Show how waves propagate in dielectrics and lossy media

UNIT – I

Electrostatics: Coulomb's law, Electric field intensity, Fields due to different charge distributions; Electric flux density, Gauss law and its applications; Scalar electric potential; Energy density, Illustrative problems; Conductors and dielectrics-characterization; Convection and conduction currents; Dielectric constant, isotropic and homogeneous dielectrics; Continuity equation and relaxation time, conductivity, power absorbed in conductor, Poisson's and Laplace's equations; Capacitance: Parallel plate, Co axial, Spherical capacitors; Illustrative problems

Learning Outcomes: At the end of this unit, the students will be able to

- Solve problems on E fields using Maxwell's equations
- Illustrate the importance of continuity equation and Gauss's law
- Learn about different types of capacitors

UNIT – II

Magnetostatics: Biot-savart law; Ampere's circuital law and applications; Magnetic flux density; Magnetic scalar and vector potentials; Forces due to magnetic fields; Ampere's force law; Boundary conditions: Dielectric- dielectric, Dielectric conductor interfaces; Inductances and magnetic energy; Illustrative problems; Maxwell's equations (Time varying fields): Faraday's law; Inconsistency of ampere's law for time varying fields and definition for displacement current density; Maxwell's equations in differential form, Integral form and word statements

Learning Outcomes: At the end of this unit, the students will be able to

- Illustrate the importance of Ampere's Circuit's law and its applications
- Distinguish between magnetic scalar and vector potentials
- Analyze the concept of displacement current density

UNIT – III

Uniform Plane Waves: Wave equations for conducting and perfect dielectric media; Relation between E and H; Wave propagation in lossless and conducting media, Loss tangent, Intrinsic impedance; Skin depth; Polarization, Illustrative problems

Reflection/Refraction of Plane Waves: Reflection and refraction at normal incidence, Reflection and refraction at oblique incidence; Standing waves; Brewster angle, Critical angle, Total internal reflection, Surface impedance; Poynting vector and poynting theorem-applications; Power loss in plane conductor; Illustrative problems

Learning Outcomes: At the end of this unit, the students will be able to

- Analyze the electromagnetic waves at different interfaces
- Interpret the concept of polarization
- Estimate the power using poynting theorem

UNIT – IV

Transmission Lines Characteristics: Transmission line characteristics: Types; Transmission line parameters; Transmission line equations; Characteristic impedance, propagation constant; Phase and group velocities; Infinite line concepts, Loss less /low loss transmission line characterization; Condition for distortion less and minimum attenuation in transmission lines; Loading: Types of loading; Illustrative problems

Learning Outcomes: At the end of this unit, the students will be able to

- Compute primary secondary constants, of transmission line
- Compare distortion less and lossless lines
- Understand the concept of loading of transmission lines

UNIT – V

UHF Transmission Lines and Applications: Input impedance relations; SC and OC lines; Reflection coefficient, VSWR; UHF lines as circuit elements, λ/4, λ/2 and λ/8 lines, impedance transformations, significance of Z_{min} and Z_{max}; Smith chart: Configuration and applications, Illustrative problems.

Learning Outcomes: At the end of this unit, the students will be able to

- Compute input impedance of Transmission line
- Analyze λ/4, λ2, λ/8 Lines for impedance transformation
- Understand the applications of smith chart in transmission lines

TEXT BOOKS:

1. E.C. Jordan, K.G. Balmain, “Electromagnetic waves and Radiating Systems,” PHI 2nd Edition, 2000.
2. Matthew N.O. Sadiku, “Elements of Electromagnetics,” Oxford University Press, 4th Edition, 2009.

REFERENCES:

1. William H. Hayt Jr., John A. Buck, “Engineering electromagnetic,” Tata McGraw Hill, 7th Edition, 2006.
2. Nathan Ida, “Engineering Electromagnetic,’’ Springer (India) Pvt. Ltd, 2nd Edition, 2005
3. G. Sashibushana Rao, “Electromagnetic field theory and Transmission lines,’’ Wiley (India) 1st Edition, 2013.

2040471: ANALOG AND PULSE CIRCUITS LABORATORY

II Year B.Tech. ECE II – Sem.

L	T	P	C
0	0	3	1.5

Course Objectives:

- Analyze single stage and multi stage amplifiers
- Design the feedback amplifiers and oscillators through simulation.
- Find the frequency response of Power Amplifiers
- Implementation of circuits for linear and nonlinear wave shaping
- Measure the characteristics of different multivibrators

Course Outcomes:

At the end of the laboratory work, students will be able to

- Determine the frequency of oscillations – Hartley oscillator and Colpitts oscillator RC phase shift oscillator and Wein Bridge Oscillator
- Calculate the bandwidth of power amplifiers
- Design and analyze all multivibrator circuits
- Design and analyze Schmitt trigger
- Demonstrate about the output waveforms of Miller Sweep Circuit and Bootstrap Time Base Generator

LIST OF EXPERIMENTS:

Experiments marked with * has to be designed, simulated and verify in hardware laboratory.

1. Two Stage RC Coupled Amplifier **(*)**.
2. Cascade Amplifier circuit / Darlington Pair circuit **(*)**.
3. Current Shunt Feedback Amplifier **(*)**.
4. Voltage Series Feedback Amplifier **(*)**.
5. RC Phase Shift Oscillator using Transistors **(*)**.
6. Hartley and Colpitts's Oscillator circuit **(*)**.
7. Class A Power Amplifier (Transformer less) **(*)**.
8. Class B Complementary Symmetry Amplifier **(*)**.
9. Single Tuned Amplifier circuit **(*)**.
10. Monostable Multivibrator **(*)**.
11. Bistable Multivibrator **(*).**
12. Astable Multivibrator **(*)**.
13. Schmitt Trigger using transistor **(*)**.
14. Verify the output characteristics of Miller Sweep Circuit.
15. Verify the output characteristics of Bootstrap Time Base Generator.

NOTE: Minimum of 12 experiments to be conducted.

2040575: PYTHON PROGRAMMING LABORATORY

II Year B.Tech. ECE II – Sem. **L T P C**

0 0 2 1

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 distance between two points taking input from the user (Pythagorean Theorem)
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 a even number or not.
b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10
c) Write a program using a for loop that loops over a sequence. What is sequence?
d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow -Continued

a) Find the sum of all the primes below two million.
Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:
1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...
b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise – 5 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.

Exercise - 6 Functions

a) Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.
Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius
If (distance between two balls centers) <= (sum of their radii) then (they are colliding)
b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 7 Functions - Continued

a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
b) Write a function dups to find all duplicates in the list.
c) Write a function unique to find all the unique elements of a list.

Exercise - 8 - Functions - Problem Solving

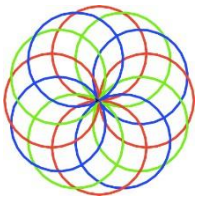
a) Write a function cumulative_ product to compute cumulative product of a list of numbers.
b) Write a function reverse to reverse a list. Without using the reverse function.
c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

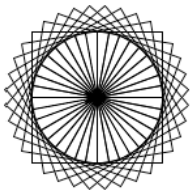
Exercise 9 - Multi-D Lists

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 - 10 GUI, Graphics

a) Write a GUI for an Expression Calculator usingtk
b) Write a program to implement the following figures using turtle





2030474: BASIC SIMULATION & DIGITAL SYSTEM DESIGN LABORATORY

II Year B.Tech. ECE II – Sem.

L	T	P	C
0	0	3	1.5

Course Objectives:

- To introduce MATLAB and use it as a computation and visualization tool
- To expose the applications of signal analysis and system design
- To acquire the basic knowledge of digital logic levels and to design and verify basic digital electronics circuits
- To introduce to the students the topics that include combinational and sequential circuit analysis and design
- To design optimization methods using random logic gates, multiplexers, decoders, registers, counters

Course Outcomes:

At the end of the laboratory work, students will be able to

- Generate various signals and will be able to perform various operations on signals and also classify the random process characteristics
- Apply Laplace and Fourier transforms of a signal and also analyze its frequency response
- Implements algebraic expressions using logic gates
- Understand the combinational circuits like adder, subtractor, mux, decoder, and encoder
- Design of flip flops & sequential circuits using flip flops

List of Experiments:

- **Basic Simulation Lab:**
  1. Generation of Various Signals and Sequences (Periodic and Aperiodic).
  2. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
  3. Convolution and for Correlation (ACF and CCF) Signals and sequences.
  4. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
  5. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system.
  6. Gibbs Phenomenon Simulation.
  7. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
  8. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
  9. Verification of Sampling Theorem.
  10. Checking a Random Process for Stationary in Wide sense.

- **Digital System Design Lab:**
  1. Realization of Boolean expressions using gates.
  2. Generation of clock using NAND / NOR gates.
  3. Design a 4 – bit adder/subtractor.
  4. Design and realization of a 4-bit gray to binary and binary to gray Converter.
  5. Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
  6. Design and realization of a synchronous and asynchronous counter using flip-flops.
  7. Design and realization of 8x1 MUX using 2x1 MUX.
  8. Design and realization of 4-bit comparator.
  9. Design a Ring counter and Twisted ring counter using a 4-bit shift register
  10. Design and Realization of a sequence detector-a finite state machine.

Note:

- All the Basic Simulation Lab experiments are to be simulated using MATLAB/SCI LAB or equivalent software.
- Minimum of 14 experiments (7 from Basic Simulation and 7 from Digital System Design Lab) are to be completed.

2040022: GENDER SENSITIZATION
(Mandatory Course – III)

II Year B.Tech. ECE II – Sem.

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Course Objectives:

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

Course Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.

UNIT – I

UNDERSTANDING GENDER

Gender: Why Should We Study It? (*Towards a World of Equals:* Unit -1)
Socialization: Making Women, Making Men (*Towards a World of Equals:* Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT - II
GENDER AND BIOLOGY

Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals:* Unit -4) Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (*Towards a World of Equals:* Unit -10) Two or Many? Struggles with Discrimination.

UNIT - III
GENDER AND LABOUR

Housework: the Invisible Labour (*Towards a World of Equals:* Unit -3) "My Mother doesn't Work." "Share the Load."
Women's Work: Its Politics and Economics (*Towards a World of Equals:* Unit -7) Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT - IV
ISSUES OF VIOLENCE

Sexual Harassment:
Say No! (*Towards a World of Equals:* Unit -6), Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".
Domestic Violence: Speaking Out (*Towards a World of Equals:* Unit -8) Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice.
Thinking about Sexual Violence (*Towards a World of Equals:* Unit -11) Blaming the Victim-"I Fought for my Life…." - Additional Reading: The Caste Face of Violence.

UNIT – V
GENDER: CO – EXISTENCE
Just Relationships:
Being Together as Equals (*Towards a World of Equals:* Unit -12) Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

TEXTBOOKS:

1. *A Bilingual Textbook on Gender*" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.

REFERENCE BOOKS:

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. 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/