SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (AUTONOMOUS)
(Affiliated to JNTUK, Kakinada), (Recognized by AICTE, New Delhi)
Accredited by NAAC with 'A' Grade, All UG Programmes are Accredited by NBA
CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204
Estd:1980

ELECTRONICS & COMMUNICATION ENGINEERING
(Accredited by NBA)

SCHEME OF INSTRUCTION & EXAMINATION
(Regulation R19)
II/IV B.TECH
I-SEMESTER
(With effect from **2019-2020**Admitted Batch onwards**)**

Subject Code	Name of the Subject	Category	Cr	L	T	P	Internal Marks	External Marks	Total Marks
B19 EC 2101	Electronic Devices and Circuits	PC	3	3	--	--	25	75	100
B19 EC 2102	Switching Theory and Logic Design	PC	3	3	--	--	25	75	100
B19 EC 2103	Signals and Systems	PC	3	3	--	--	25	75	100
B19 EC 2104	Probability Theory and Random Processes	PC	3	3	--	--	25	75	100
B19 EE 2105	Network Analysis	ES	3	3	--	--	25	75	100
B19 CS 2108	Data Structures	ES	3	3	--	--	25	75	100
B19 EC 2105	Electronic Devices and Circuits - Lab (with Simulation)	PC	1.5	--	--	3	20	30	50
B19 EC 2106	Switching Theory and Logic Design - Lab (with Simulation)	PC	1.5	--	--	3	20	30	50
B19 MC 2102	Essence of Indian Traditional Knowledge	MC	0	3	--	--	--	--	--
		TOTAL	**21**	**21**	**--**	**6**	**190**	**510**	**700**

Subject Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2101	PC	3	--	--	3	25	75	3 Hrs.

ELECTRONIC DEVICES AND CIRCUITS

(Common to ECE & EEE)

Course Objectives: Students are expected:

1.	To analyze the modeling, characteristics and electrical parameters of Diode, BJT, JFET and MOSFET.
2.	To illustrate the concepts of biasing in BJT, JFET and MOSFET.
3.	To analyze single stage and multistage amplifier circuits using equivalent circuits.
4.	To illustrate the application of diode in rectifiers and regulated power supply.
5.	To analyze the frequency response of small signal amplifiers.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Analyze the characteristics and operation of Diode, BJT, JFET and MOSFET.	K4
2.	Analyze the biasing circuits of BJT and JFET.	K4
3.	Analyze the performance of small signal BJT and FET single stage amplifiers.	K4
4.	Apply the gained knowledge in the design of simple Electronic circuits.	K3

SYLLABUS

UNIT-I (12 Hrs)	**Semiconductor diode and its applications:** Potential variation in graded semiconductors. Open circuited PN junction, current components in a PN diode, V-I characteristics and its temperature dependence, transition capacitance, charge control description of a diode, diffusion capacitance, junction diode switching times, characteristics of Tunnel diode and Zener diode. Half wave, Full wave and Bridge Rectifiers with and without filters, Ripple factor and regulation characteristics.
UNIT-II (10 Hrs)	**Bipolar junction transistors:** Operation of a transistor and transistor biasing for different operating conditions, transistor current components, transistor amplification factors: α,β,γ relation between α,β and γ early effect or base-width modulation, common base configuration and its input and output characteristics, common emitter configuration and its input and output characteristics, common collector configuration and its input and output characteristics, Comparison of CE, CB and CC Configurations, Break- down in transistors, Photo Transistor..
UNIT-III (09 Hrs)	**Transistor Biasing Circuits:** The operating point, Bias stability, different types of biasing techniques, stabilization against variation in I_{co} , $V_{BE,}$ & β. Bias compensation, thermal runaway, thermal stability.
UNIT-IV (9 Hrs)	**Field Effect transistors:** JFET and its characteristics, pinch off voltage, FET small signal model, MOSFET and its characteristics, Biasing of FETs.

UNIT-V (10 Hrs)	**Transistors at low and High frequencies:** Transistor hybrid model, H-parameters, Analysis of transistor amplifier circuits using h-parameters, comparison of transistor amplifier configurations, analysis of single stage amplifier, effects of bypass and coupling capacitors, frequency response of CE amplifier, Emitter follower, High frequency model of transistor.

Text Books:	
1.	Integrated Electronics: Analog and Digital Circuits and Systems: Jacob Millman, C Halkias, Chetan D Parikh. McGraw – Hill.
2.	Electronic Devices and Circuits: N Salivahanan and Suresh Kumar, Third edition, TMH.

Reference Books:	
1.	Electronic Devices and Circuits Theory, Boylsted, 10th Edition, Pearson.
2.	Electronic Principles: Albert Paul Malvino, McGraw-Hill.

E - Resources:	
1.	**http://www.cs.tut.fi/kurssit/TLT-8016/Chapter3.pdf**
2.	**http://ee.sharif.edu/~faez/Chapter_6.pdf**
3.	**http://aries.ucsd.edu/najmabadi/CLASS/ECE60L/03-W/NOTES/BJT2.pdf**
4.	**http://aries.ucsd.edu/NAJMABADI/CLASS/ECE65/12-W/Slides/ECE65_W12-Amp.pdf**

Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2102	**PC**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

SWITCHING THEORY AND LOGIC DESIGN

Course Objectives: Students are expected:

1.	To provide insights of various number systems, Boolean functions and logic gates.
2.	To introduce different minimization techniques.
3.	To design the various combinational and sequential circuits.
4.	To introduce the design of Synchronous and Asynchronous sequential circuits.

Course Outcomes: At the end of the course students will be able

S.No	Outcome	Knowledge Level
1.	To convert one number system to another, analyze logic gates and Boolean theorems.	K1, K2
2.	To analyze digital circuits using different minimization techniques.	K3
3.	To design various combinational and sequential circuits along with applications.	K3
4.	To design counters and state machines by applying the knowledge of synchronous and asynchronous sequential circuits.	K2, K3

SYLLABUS

UNIT-I (8 Hrs)	**Number Systems, Codes and Boolean Algebra:** Number Systems, Base Conversion Methods, Complements of Numbers, 4 Bit Codes-BCD, Excess-3, 2421, 8421 codes. Even and Odd parity, Hamming code, Error detecting and Error correcting codes. Fundamentals of Boolean Algebra and Logic Gates, Boolean theorems and proofs.
UNIT-II (8 Hrs)	**Boolean Functions and Minimization:** Boolean SOP and POS functions-Canonical and Standard. Realization with Universal Gates, Simplification of Boolean functions using Karnaugh Map (up to 6 variables) and Quine McClusky methods.
UNIT-III (8 Hrs)	**Combinational Logic Circuits and Design:** Logic Design of Combinational circuits – Binary Adder, Subtractor, Decoders, Encoders, Multiplexers, Demultiplexers, Code Convertors, Priority Encoders, Seven – segment Displays, 4-bit digital Comparators and realization of Boolean functions with PLDs.
UNIT-IV (12 Hrs)	**Sequential Logic Circuits and Design:** RS & SR latches, clocked RS, SR, JK, T & D Flip-flops with pre-set and clear inputs. Race around problem, MS-JK-FF, Excitation tables of all Flip- Flops and conversions from one type to another. Design of Shift Registers with SIPO, SISO, PIPO and PISO modes and universal shift register. Design of Ring counters and Johnson counters.

UNIT-V (10 Hrs)	**Asynchronous and Synchronous Sequential Circuits:** Design of Asynchronous counters (Ripple counters) for any modulus. Design of Synchronous counters using SR, JK, T and D-FFs. Analysis and Design of Synchronous Sequential Circuits with State Diagrams and State Reduction. Design of sequence detectors and generators. Basics of Asynchronous Sequential Circuits.

Text Books:	
1.	Digital Design, Morris Mano, PHI, 3rd Edition, 2001.
2.	Switching and Finite Automata Theory, 2nd Edition, ZviKohavi, Tata McGraw-Hill, 1978.
Reference Books:	
1.	Fundamentals of Digital Circuits by A. ANAND KUMAR, PHI learning Pvt. Ltd.
2.	Fundamentals of Logic Design, Charles H. Roth, Thomson Publications, 5th Edition, 2009.
E - Resources:	
1.	https://www.geeksforgeeks.org/minimization-of-boolean-functions/
2.	https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/#blg
3.	https://www.cs.ou.edu/~fagg/classes/ame3623_s05/lectures/class_sequential.pdf

Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2103	**PC**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

SIGNALS AND SYSTEMS

Course Objectives:

1.	To introduce the fundamental concepts and techniques associated with the understanding of signals and systems.
2.	To familiarize with techniques suitable for analyzing both continuous-time and discrete time LTI systems using transforms.
3.	To familiarize with development of the mathematical skills to solve problems involving convolution, filtering, and sampling.

Course Outcomes

S.No	Outcome	Knowledge Level
1	Outline the basic concepts of signals and systems.	**K2**
2	Analyze the spectral characteristics of Continuous Time and Discrete Time periodic and aperiodic signals using Fourier analysis.	**K4**
3	Analyze system properties based on impulse response and Fourier analysis.	**K4**
4	Apply Laplace- transforms for analyzing Continuous -time signals and systems.	**K3**
5	Apply Z- transforms for analyzing discrete-time signals and systems.	**K3**
6	Outline the process of sampling and the effects of under sampling.	**K2**

SYLLABUS

UNIT-I (10 Hrs)	**Introduction to Continuous –Time and Discrete –Time signals and systems:** Continuous–Time and Discrete–Time signals, Signal Energy and Power, Periodic Signals, Even and odd Signals, Continuous-Time complex Exponential and Sinusoidal Signals, Discrete–Time complex Exponential and Sinusoidal Signals and their Periodicity, The Continuous–Time and Discrete–Time Unit Impulse and Unit step Functions, Continuous–Time and Discrete–Time Systems, Operations on signals, Interconnections of Systems, Basic System Properties, Continuous–Time and Discrete Time LTI Systems: The Graphical interpretation of Convolution Integral and The Convolution Sum, Causal LTI Systems Described by Differential and Difference Equations, Singularity Functions. MATLAB Demos (one or two examples for illustration purpose only)*.
UNIT-II (8 Hrs)	**Fourier Series Representation of Periodic Signals:** Introduction, Fourier Series Representation of continuous time Periodic Signals (Complex Exponential and Trigonometric Fourier Series only), Convergence of the Fourier Series, Properties of continuous time Fourier Series, Fourier Series representation of discrete time periodic signals, Properties of discrete time Fourier Series (Elementary Level on DTFS).

UNIT-III (8 Hrs)	**Continuous and Discrete time Fourier Transform** Introduction, Representation of Aperiodic signals, The continuous time Fourier Transform, The Fourier Transform for periodic signals, Properties of the continuous time Fourier Transform, Systems characterized by linear constant coefficient differential equations, Discrete time Fourier Transform, Properties of the Discrete time Fourier Transform, Systems characterized by linear constant coefficient difference equations (Elementary Level on DTFT). MATLAB Demos(one or two examples for illustration purpose only)*
UNIT-IV (6 Hrs)	**Laplace Transform** Introduction, The Laplace Transform, Region of convergence for Laplace Transforms, The Inverse Laplace Transform, Properties of Laplace Transforms, the Initial and Final value theorems, Analysis and characterization of LTI systems using the Laplace Transforms.
UNIT-V (8 Hrs)	**Sampling Theorem and Z-transform**: Introduction to Sampling Theorem, Statement of Sampling Theorem for Low pass and Band pass signals (Theorem Proof for Low Pass signals only), Reconstruction of a signal from its samples using interpolation, Discussion on Oversampling, Critical sampling and Under sampling (aliasing), The Z-Transform (Bilateral and unilateral), The Inverse Z-Transform, Properties of Z-Transform, Initial and Final Value theorems, Some common Z-transform pairs, Analysis and characterization of LTI discrete systems using the Z-Transforms. MATLAB Demos (one or two examples for illustration purpose only)*.
	**** Note: No questions are to be set on MATLAB demos ****

Text Books:	
1.	Signals Systems and Communication-B. P. Lathi, BS Publication.
2.	Signals and Systems- Alan V. Oppenheim, Alan S. Willsky and Ian T. Young, PHI, 2ndEdn.

Reference Books:	
1.	Signals and Systems – P. Rama Krishna Rao, TMH.
2.	Signals and Systems- A. Ananda Kumar, PHI.

E- Resources:	
1.	https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/video-lectures/
2.	https://swayam.gov.in/nd1_noc20_ee06/preview

Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2104	**PC**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

PROBABILITY THEORY AND RANDOM PROCESSES

Course Objectives:

1.	To introduce the fundamental concepts and theorems of probability theory.
2.	To introduce fundamental concepts of random variables and their statistical descriptions.
3.	To discuss various types of random processes, their properties, spectral representation and applications.
4.	To understand the difference between time averages and statistical averages, Stationary and Ergodicity.
5.	To apply elements of stochastic processes for solving problems in real life and identify the concept of Noise as applicable to linear Systems.

Course Outcomes :

S.No	Outcome	Knowledge Level
1	Demonstrate the axiomatic formulation of modern probability theory.	K2
2	Characterize Probability Models and functions of Random variables based on single and multiple random variables.	K3
3	Evaluate and apply moments and characteristic functions and acquire the concept of inequalities and probabilistic limits.	K5
4	Assimilate the concept of Random process and determine covariance and spectral density of stationary random processes.	K2
5	Identify specific applications to Poisson and Gaussian processes, and Analyze the response of random inputs to linear time invariant systems.	K4

SYLLABUS

UNIT-I (8 Hrs)	**Probability Theory:** Definitions of Probability, Axioms of Probability, Probability Spaces, Properties of Probabilities, Joint and Conditional Probabilities, Independent Events.
UNIT-II (8 Hrs)	**Random Variables:** Probability Distribution Function, Probability Density Function, Joint Distribution of Two Variables, Conditional Probability Distribution and Density, Independent Random Variables, Normal Distribution, Cauchy's distribution, Exponential Distribution, Binomial Distribution, Poisson distribution, Functions of Random Variables.
UNIT-III (8 Hrs)	**Statistical Averages:** Random Vectors, Statistical Averages, Characteristic Function of Random Variables, Inequalities of Chebyshev's and Schwartz, Convergence Concepts, Central Limit Theorem.

UNIT-IV (8 Hrs)	**Random Processes:** Introduction, Definitions, Stationary, Ergodicity, Covariance Function and their Properties, Spectral Representation, Weiner-Kinchine Theorem.
UNIT-V (8 Hrs)	**Linear Systems and Random Noise Processes:** Classification of Linear systems, Response of Linear Systems to Random signals, Spectral characteristics of system Response, Gaussian processes, Poisson Processes, Low-pass and Band pass Noise Representation.

Text Books:	
1.	Probability Theory and Random Signal Principles, Peebles, Tata McGrew Hill Publishers.
2.	Probability Theory and Random Processes, S. P. Eugene Xavier, S. Chand and Co. New Delhi, 1998 (2nd Edition).

Reference Books:	
1.	B.P. Lathi, "Signals, Systems & Communications", B.S. Publications, 2003.
2.	Signal Analysis, Papoulis, McGraw Hill N. Y., 1977.

E- Resources:	
1.	**https://nptel.ac.in/courses/111/102/111102111/**
2.	**https://nptel.ac.in/courses/117/105/117105085/**

Code	Category	L	T	P	C	I.M	E.M	Exam
B19EE2105	**ES**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

NETWORK ANALYSIS

Course Objectives:

1.	To learn the network theorems to solve DC electrical circuits.
2.	To know the steady state and transients state behavior of RLC circuits.
3.	To learn the network theorems to solve AC circuits and calculate resonance parameters.
4.	To understand the two port network parameters.
5.	To learn the concept of network functions and stability of electrical circuits.

Course Outcomes

S. No	Outcome	Knowledge Level - PO
1	**Apply** network theorems to solve the DC electrical circuits.	**K3-PO1**
2	**Analyze** the transient behavior of circuits by **applying** first and second order Differential equations.	**K3, K4, -PO1, PO2**
3	**Apply** network theorems to solve AC circuits and calculate resonance parameters.	**K3-PO1**
4	**Calculate** two port network parameters for the given network.	**K3-PO1**
5	**Determine** the network functions for Ladder and General Networks and analyze Stability of electric circuits using Routh's Hurwitz criterion.	**K3, K4, -PO1, PO2**

SYLLABUS

UNIT-I (9 Hrs)	**Network Theorems:** Review of Dc circuits, Superposition, Thevenin's, Norton's, Reciprocity, Max Power Transfer theorems.
UNIT-II (12 Hrs)	**DC transients:** Inductor, Capacitor, source free RL, RC and RLC response, Evaluation of Initial conditions, Application of unit-step function to RL, RC and RLC circuits, concepts of Natural, Forced and Complete response.
UNIT-III (10 Hrs)	**Analysis of AC Networks:** Review of ac circuits, Node and mesh analysis, Superposition, Thevenin's, Max Power Transfer theorems. **Resonance:** Series and parallel resonance, selectivity, band width and Quality factor, locus diagram.
UNIT-IV (10 Hrs)	**Two-port Networks :** Introduction, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Relationship between various parameters, series, parallel & cascade connection of two port networks.

UNIT-V (10 Hrs)	**Network Functions**: Network functions for single port and two port, Calculation of Network functions for Ladder and General Networks, Poles and Zeroes, Restriction of Poles and Zeroes for Driving point and Transfer functions, Time Domain Behavior from Pole-Zero plot, Routh-Hurwitz criterion of stability of network function.

Text Books:	
1.	Engineering Circuit Analysis, William H.Hayt Jr. and Jack E. Kemmerley, 5th Edition, McGraw Hill International Edition.
2.	Network Analysis, M. E. Van Valkenburg, 3rd Edition, PHI.
3.	Fundamentals of Electric circuits 5th edition Charles K. Alexander and Matthew Sadiku.
4.	Electric Circuit Analysis, K. S. Suresh Kumar, 1st Edition, Pearson.
Reference Books:	
1.	Circuit Theory Analysis and Synthesis. Edition 2014 Abhijit Chakrabarthi, DhanpatRai &Co.
2.	Network Analysis & Synthesis, Franklin F. Kuo; 2nd edition John Wiley & Sons Inc.
3.	Theory and Problems of Electric Circuits 4th Edition, MahmoodNahvi, JosephA. Edminister, Schaum‟s Outline Series Mcgraw-Hill.
4.	Network Analysis, 3rd Ed, A Sudhakar Shyammohan. SPalli Tata McGraw Hill Education Pvt Ltd.
E- Resources:	
1.	https://easyengineering.net/electrical-networks-books/

Code	Category	L	T	P	C	I.M	E.M	Exam
B19 CS 2108	**ES**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

DATA STRUCTURES

(Common to ECE & EEE)

Course Objectives:

1.	To be familiar with basic techniques handling problems with Data structures
2.	Solve problems using data structures such as linear lists, stacks, queues, hash tables
3.	Create and traverse different types of trees and graphs.
4.	To practice different searching algorithms.

Course Outcomes:

S.No	Outcome	KL	PO'S
1.	**Apply** advanced data structure strategies for exploring complex data structures and implement data structures like stacks, queues	K3	PO1
2.	**Implement** & perform operations on dynamic linear data structures like linked lists.	K3	PO1
3.	**Apply** different operations on trees and graphs.	K3	PO1
4.	**Implement** & analyze various searching &sorting algorithms	K3, k4	PO1, PO2

SYLLABUS

UNIT-I (10 Hrs)	**Linear Data Structures: Arrays, Stacks and Queues** Data Structures -Operations-Abstract Data Types-Complexity of Algorithms-Time and Space Arrays-Representation of Arrays-Linear Arrays-Insertion–Deletion and Traversal of a Linear Array-Array as an Abstract Data Type-Multi-Dimensional arrays-Strings-String Operations Storing Strings-String as an Abstract Data Type Stack -Array Representation of Stack-Stack Abstract Data Type-Applications of Stacks: Prefix Infix and Postfix Arithmetic Expressions-Conversion-Evaluation of Postfix Expressions Recursion-Towers of Hanoi-Queues-Definition-Array Representation of Queue-The QueueAbstract Data Type-Circular Queues-Dequeues-Priority Queues.
UNIT-II (10 Hrs)	**Linked Lists** Pointers-Pointer Arrays-Linked Lists-Node Representation-Single Linked List-Traversing and Searching a Single Linked List-Insertion into and Deletion from a Single Linked List-Header Linked Lists-Circularly Linked Lists-Doubly Linked Lists-Linked Stacks and Queues Polynomials-Polynomial Representation-Sparse Matrices.
UNIT-III (10 Hrs)	**Trees** Terminology-Representation of Trees-Binary Trees-Properties of Binary Trees-Binary Tree Representations-Binary Tree Traversal-Preorder-Inorder and Postorder Traversal-Threads Thread Binary Trees-Balanced Binary Trees-Heaps-Max Heap-Insertion into and Deletion from a Max Heap-Binary Search Trees-Searching-Insertion and Deletion from a Binary Search Tree Height of Binary Search Tree, m-way Search Trees, B-Trees.
UNIT-IV (08 Hrs)	**Graphs** Graph Theory Terminology-Graph Representation-Graph Operations-Depth First Search-BreadthFirst Search-Connected Components-Spanning Trees-Biconnected Components-

	Minimum Cost Spanning Trees-Kruskal's Algorithm-Prism's Algorithm-Shortest Paths-Transitive Closure-All Pairs Shortest Path-Warshall's Algorithm
UNIT-V (12 Hrs)	**Searching and Sorting** Searching -Linear Search-Binary Search-Fibonacci Search-Hashing-Sorting-Definition-Bubble Sort-Insertion sort-Selection Sort-Quick Sort-Merging-Merge Sort-Iterative and Recursive Merge Sort-Shell Sort-Radix Sort-Heap Sort.

Text Books:	
1.	Fundamentals of Data Structures in C, 2nd Edition, E.Horowitz, S.Sahni and Susan Anderson Freed, Universities Press Pvt. Ltd.
2.	Data Structures With C, Seymour Lipschutz, Schaum's Outlines, Tata McGraw Hill.
Reference Books:	
1.	Data Structures using C by Aaron M. Tenenbaum,Y. Langsam and M.J. Augenstein, Pearson Education, 2009.
2.	Data Structures using C by R. KrishnaMoorthy G. Indirani Kumaravel, TMH, New Delhi,2008.

Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2105	**PC**	**--**	**--**	**3**	**1.5**	**20**	**30**	**3 Hrs.**

ELECTRONIC DEVICES & CIRCUITS - LAB (WITH SIMULATION)

(**Common to ECE & EEE**)

Course Objectives:

1.	To analyze the modeling, characteristics and electrical parameters of Diode, BJT, JFET and MOSFET.
2.	To illustrate the concepts of biasing in BJT, JFET and MOSFET.
3.	To illustrate the application of diode in rectifiers and regulated power supply.
4.	To analyze single stage amplifier circuits using equivalent circuits.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Apply the concepts of different electronic devices to verify their characteristics and measure the important parameters.	**K3**
2.	Analyze the performance of rectifier circuits with and without filters.	**K4**
3.	Analyze the performance of BJT and FET amplifier circuits.	**K4**
4.	Simulation and Design of small electronic circuits using BJT and FET.	**K4**

LIST OF EXPERIMENTS

1.	Study and Analyze V-I Characteristics of Semiconductor Diode (Ge & Si), LED and Zener Diode.
2.	Determination of Ripple Factor and Regulation Characteristics of Half Wave and Full Wave Rectifier With and Without Filter.
3.	Study and Analyze The Characteristics of BJT in CE Configuration and determination of h-parameters.
4.	Study and Analyze The JFET Characteristics.
5.	Design of Biasing Circuits for BJT and FET.
6.	Design of simple amplifier circuits using BJT.
7.	Design of electronic circuits using FET.

LIST OF SIMULATION EXPERIMENTS

1.	Simulation of V-I Characteristics of Semiconductor Diode, LED and Zener Diode.
2.	Simulation of Regulation Characteristics of Zener Diode.
3.	Simulation of CC Amplifier.
4.	Simulation of JFET Characteristics.
5.	Simulation of BJT Characteristics in CB Configuration.
6.	Simulation of JFET Amplifier.
7.	Simulation of Characteristics of Tunnel Diode.

Reference Books:

1.	Lab manual

Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2106	**PC**	**--**	**--**	**3**	**1.5**	**20**	**30**	**3 Hrs.**

SWITCHING THEORY AND LOGIC DESIGN - LAB (WITH SIMULATION)

Course Objectives:

1.	To outline the basics of Digital electronics, Boolean algebra, and be able to design the simple logic circuits and verify the functionality.
2.	Design combinational and sequential logic circuits using digital ICs.
3.	This laboratory course enables students to get practical experience in design, assembly and evaluation of switching theory and logic design. Students use a digital trainer kit and Viva do simulator to test their electronic designs.

Course Outcomes:

S.No	Outcome	Knowledge Level
1	Analyze and design basic combinational logic circuits using Digital IC's and HDL Programming.	K4
2	Implement basic sequential logic circuits using Digital IC's and HDL Programming.	K3

LIST OF EXPERIMENTS

1.	Verify the operation of the following using basic logic gate ICs. a. Full adder. b. Full subtractor.
2.	Verify the logic functions of 8:1 Multiplexer using IC 74151 and 1:16 Demultiplexer using IC 74154. a. Implement the given function using 8:1Multiplexer. b. Convert 1:16 Demultiplexer into a 4:16 Decoder and implement the given function.
3.	Verify the given code convertors using digital trainer kit a. Implement BCD to Seven segment decoder driver using IC 74147 and Seven segment Display. b. 8 to 3 Priority encoder using IC 74148.
4.	Verify the operation of following flip-flops using Digital Trainer Kit a. SR-latch & RS-latch. b. JK- flip flop using IC 7476 along with direct inputs. c. D- flip flop. d. T- flip flop.
5.	Design and verify the following counters using Digital Trainer Kit a. Mod-16 Ripple counter using IC7493. b. Mod-8 Synchronous counter using 7476 and 7408 ICs. c. Decade (Mod-10) counter using IC7493.
6.	Verify the functioning of 5 bit shift register IC7496 using Digital Trainer Kit.

	SOFTWARE:
7.	Verify the operation of following digital components using Vivado Simulator a. Full adder b. Full subtractor.
8.	Verify the operation of 8:1multiplexer and 8:3 priority encoder using Vivado Simulator.
9.	Design 4-bit ALU and verify some arithmetic and logical operations using Vivado Simulator.
10.	Design Mod-16 ripple and Mod-8 synchronous counters using Vivado Simulator.
Reference Books:	
1.	Digital ICs Lab Manual.

Code	Category	L	T	P	C	I.M	E.M	Exam
B19MC2102	**MC**	**3**	**--**	**--**	**--**	**--**	**--**	**--**

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

(Common to ECE & EEE)

Course Objectives:

1.	To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the importance of knowledge system.
2.	To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act 2003.
3.	To focus on traditional knowledge and intellectual property mechanism of traditional knowledge and protection.
4.	To know the student traditional knowledge in different sector.

Course Outcomes: At the end of the semester/course, the student will be able to have a clear knowledge on the following:

1.	Understand the concept of Traditional knowledge and its importance.
2.	Know the need and importance of protecting traditional knowledge.
3.	Know the various enactments related to the protection of traditional knowledge.
4.	Understand the concepts of Intellectual property to protect the traditional knowledge .

SYLLABUS

UNIT-I (8 Hrs)	**Introduction to traditional knowledge:** Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.
UNIT-II (8 Hrs)	**Protection of traditional knowledge:** Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.
UNIT-III (8 Hrs)	**Legal frame work and TK:** A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.
UNIT-IV (8 Hrs)	**Traditional knowledge and intellectual property:** Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT-V (8 Hrs)	**Traditional knowledge in different sectors:** Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Textbooks:	
1.	Traditional Knowledge System in India, by Amit Jha, 2009.
2.	Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
References:	
1.	Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.
2.	"Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino.

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE
(AUTONOMOUS)
(Affiliated to JNTUK, Kakinada), (Recognized by AICTE, New Delhi)
Accredited by NAAC with 'A' Grade, All UG Programmes are Accredited by NBA
CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204
Estd:1980

ELECTRONICS & COMMUNICATION ENGINEERING
(Accredited by NBA)

SCHEME OF INSTRUCTION & EXAMINATION
(Regulation R19)
II/IV B.TECH
II-SEMESTER
(With effect from **2019-2020**Admitted Batch onwards**)**

Subject Code	Name of the Subject	Category	Cr	L	T	P	Internal Marks	External Marks	Total Marks
B19 EC 2201	Electronic Circuit Analysis	PC	3	3	--	--	25	75	100
B19 EC 2202	Electromagnetic Waves and Transmission Lines	PC	3	3	--	--	25	75	100
B19 EC 2203	Analog Communications	PC	3	3	--	--	25	75	100
B19 EC 2204	Computer Architecture and Organization	PC	3	3	--	--	25	75	100
B19 CS 2209	OOPs through JAVA	ES	3	3	--	--	25	75	100
B19 HS 2201	Management and Organizational Behavior	HS	3	3	--	--	25	75	100
B19 EC 2205	Electronic Circuit Analysis - Lab (with Simulation)	PC	1.5	--	--	3	20	30	50
B19 EC 2206	Analog Communications - Lab (with Simulation)	PC	1.5	--	--	3	20	30	50
		TOTAL	**21**	**18**	**0**	**6**	**190**	**510**	**700**

Subject Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2201	**PC**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

ELECTRONIC CIRCUIT ANALYSIS

Course Objectives: Students are expected to

1.	Apply the concept of multistage amplifiers and analyze them.
2.	Illustrate the analysis and design of feedback amplifiers, power amplifiers and tuned amplifiers.
3.	Illustrate the principle of oscillator and analyze different types of sinusoidal oscillators.
4.	Illustrate the concept and analyze applications of op-amp.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Outline the concepts of multistage amplifiers, feedback amplifiers, power amplifiers, tuned amplifiers, operational amplifiers and oscillators.	K2
2.	Apply the concepts in the realization of practical circuits.	K3
3.	Analyze and design practical electronic circuits using amplifiers, oscillators and Operational amplifiers.	K4

SYLLABUS

UNIT-I (10 Hrs)	**Multistage Amplifiers:** Transistor at high frequencies, CE short circuit current gain and concept of Gain Bandwidth product. BJT and FET RC coupled amplifiers at low and high frequencies. Frequency response and calculation of Bandwidth of Multistage Amplifiers.
UNIT-II (10 Hrs)	**Feedback Amplifiers:** Concept of Feedback Amplifiers - Effect of Negative Feedback on the amplifier characteristics. Four feedback topologies, Method of analysis of Voltage Series, Current Series, Voltage Shunt and Current Shunt feedback Amplifiers.
UNIT-III (8 Hrs)	**Sinusoidal Oscillators:** Condition for oscillations and types of Oscillators – RC Oscillators: RC Phase Shift and Wien bridge Oscillators. LC Oscillators: Hartley, Colpitts, Clapp, Tuned Collector and Crystal Oscillators.
UNIT-IV (10 Hrs)	**Power Amplifiers:** Classification of Power Amplifiers. Series fed, Transformer coupled class-A and class-B power amplifiers. Push Pull Class-A, Class-B and Class-AB Power Amplifiers. Cross-over Distortion in Pure Class-B Power Amplifier and Class-AB Power Amplifier- Trickle Bias, Derating Factor and Heat Sinks – Complementary Push Pull Amplifier. **Tuned Voltage Amplifiers:** Analysis of Single tuned, Double tuned and Stagger Tuned Amplifiers with gain and Bandwidth Calculations.

UNIT-V (10 Hrs)	**Operational Amplifiers:** Concept of Differential Amplifier. Differential Amplifier supplied with a constant current source. Calculation of common mode rejection ratio. Block diagram and Ideal characteristics of an Op-Amp. Applications of Op-Amp: Inverting and Non-Inverting amplifiers, Integrator, Differentiator, Summing, Subtracting and Logarithmic Amplifiers. Definition and Measurement of OP-Amp Parameters.

Text Books:	
1.	Integrated electronics-Jacob Millman and Christos C. Halkias.
2.	Electronic Devices and Circuits – Robert L Boylstead & Lewis Nashalsky, 2009, 10th edition, Pearson publications.
3.	Op-amps and Linear Integrated Circuits – Gayakwad.
Reference Books:	
1.	Electronic Devices and Circuits by Salivahanan. Tata McGraw-Hill publication.
2.	Electronic Devices and Circuits by Sanjeev Gupta, 3rd Edition, Dhanpat Rai publications.
E - Resources:	
1.	https://www.electronics-tutorials.ws/oscillator/oscillators.html
2.	https://www.electronics-tutorials.ws/systems/negative-feedback.html
3.	https://www.uotechnology.edu.iq/depeee/lectures/3rd/Electronic/Analog%20electronic/part2. pdf
4.	https://www.electronics-tutorials.ws/opamp/opamp_1.html

Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2202	**PC**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

ELECTROMAGNETIC WAVES & TRANSMISSION LINES

Course Objectives: The students are expected

1.	To introduce the concepts of static electric field, steady magnetic field and time varying Electromagnetic fields in real time applications.
2.	To introduce Maxwell's equations and their applications in practical situations.
3.	To introduce the fundamental theory of electromagnetic wave propagation in bounded and Unbounded media.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Illustrate the behaviour of static electric and magnetic fields in different media for different charge and current distributions.	K3
2.	Apply Maxwell's equations to describe the behaviour of time varying electromagnetic fields.	K3
3.	Apply Maxwell's equations to describe the EM wave propagation in free space and across different media.	K3
4.	Compute different transmission line and waveguide parameters.	K3

SYLLABUS

UNIT-I (15 Hrs)	**Electrostatics:** Introduction, Coulomb's law and electric field intensity, electric field due to different types of charge distributions, Field due to infinite line charge and finite line charge, Field due to infinite sheet charge, Electric flux density, Gauss's law and applications, Energy and potential, Electric field in terms of potential gradient, Electric dipole, Stored energy in static electric field and Energy density, Convection and Conduction currents, Continuity equation, conductors in electric field, Relaxation time, Dielectrics in electric field, Laplace's and Poisson's equations, Uniqueness theorem, Boundary conditions on E & D at the interface between two media, Related Problems.
UNIT-II (8 Hrs)	**Magnetostatics:** Introduction, Biot-savar's law, Ampere's circuital law, Applications of Ampere's circuital law, Point form of Ampere's circuital law, Magnetic flux density, Gauss's law for magnetic fields, scalar and vector magnetic potentials, Forces due to magnetic fields, Magnetization in materials, Boundary conditions on H &B at the interface between two media, Related problems.
UNIT-III (6 Hrs)	**Time varying fields and Maxwell's equations:** Introduction, Faraday's law of electromagnetic induction, Maxwell's equations in integral and differential forms, Maxwell's equations using phasor notation, Boundary conditions on E, D, H &B at the interface between two media, Retarded Potentials, Related problems.

UNIT-IV (10 Hrs)	**Electromagnetic Waves:** Introduction, Wave equations for free space and for a conductive medium, uniform plane waves, Properties of uniform plane waves, Relation between E and H in uniform plane wave, Wave propagation in lossless and lossy media, Propagation in good conductors and good dielectrics, Depth of penetration, Polarization, Reflection of plane waves by a perfect conductor for normal incidences, Reflection of plane waves by a perfect dielectric for normal incidences, Brewster angle and critical angle, Poyntin's theorem, Related Problems.
UNIT-V (10 Hrs)	**Transmission lines and Rectangular Waveguides:** Transmission lines - Introduction, types of transmission lines, Equivalent circuit of transmission line, Primary and secondary constants of the line, Transmission line equations, Characteristic impedance and expression for characteristic impedance, Reflection coefficient, Standing wave ratio, Lossless line, Distortion less line, Input impedance of transmission line, shorted and open circuited lines, Construction of smith chart, applications of smith chart, Single stub matching, Related problems. **Rectangular Waveguides** - Introduction, TM modes in rectangular waveguides, TE modes in rectangular waveguides, Impossibility of TEM mode in waveguides, Characteristics of TE and TM modes, Cutoff frequency, Cutoff wavelength, Phase and group velocities, Characteristic wave impedance, Dominant mode, Related problems.

Text Books:	
1.	Principles of Electromagnetics - N.O.Sadiku, Oxford University Press,4th edition.
2.	EM Waves and Radiating Systems – E.C.Jordan and K.G.Balmain, Printice Hall India
Reference Books:	
1.	Engineering Electromagnetics – W.A.Hayt and JABuck, Tata McGraw Hill.
2.	Electromagnetic Field Theory and Transmission Lines - Gottapu Sasibhushana Rao - Wiley
E - Resources:	
1.	https://nptel.ac.in/courses/108/104/108104087/
2.	https://www.youtube.com/watch?v=xrxO1FhUaWg&list=PLs5_Rtf2P2r5AJvc-EuBEwdur_dUVojW-

Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2203	**PC**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

ANALOG COMMUNICATIONS

Course Objectives:

1.	Familiarize with the fundamental concepts of communication systems and various techniques of Analog modulation and demodulation of signals.
2.	To provide a good understanding of the behavior of analog communications in the presence of noise.
3.	To classify and discuss different types of transmitters and receivers as applicable to analog communication systems
4.	Familiarize with basic techniques of generating and demodulating Pulse modulated signals.

Course Outcomes

S.No	Outcome	Knowledge Level
1	Differentiate various Analog modulation and demodulation schemes.	**K2**
2	Analyze the concepts of analog modulation techniques in time and frequency domains.	**K4**
3	Identify the functional blocks of transmitters and receivers.	**K3**
4	Analyze and compare the performance of various analog modulation techniques in the presence of noise.	**K4**
5	Differentiate various Pulse modulation and demodulation techniques.	**K2**

SYLLABUS

UNIT-I (8 Hrs)	**AMPLITUDE MODULATION:** Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, Single tone modulation, Power relations in AM waves, Generation of AM waves, Square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.
UNIT-II (8 Hrs)	**DSB & SSB MODULATION:** Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSB-SC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop. Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial sideband modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems, FDM.

UNIT-III (8 Hrs)	**ANGLE MODULATION:** Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop. Comparison of FM & AM.
UNIT-IV (8 Hrs)	**TRANSMITTERS & RECEIVERS:** Radio Transmitter - Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter. Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting. Communication Receivers, extensions of super heterodyne principle and additional circuits.
UNIT-V (8 Hrs)	**NOISE:** Review of noise and noise sources, noise figure, Noise in Analog communication Systems Noise in DSB & SSB System, Noise in AM System, Noise in Angle Modulation Systems, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis. **PULSE MODULATION:** Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, Time Division Multiplexing, TDM Vs FDM.

Text Books:

1.	Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 3rd Edition, 2007.
2.	Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Edition,2007.

Reference Books:

1.	Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
2.	Modern Digital and Analog Communication Systems –B.P.Lathi, Zhi Ding, Hari Mohan Gupta, Oxford University Press,4th Edition,2017

E- Resources:

1.	https://nptel.ac.in/courses/117/105/117105143/
2.	https://nptel.ac.in/courses/117/101/117101106/

Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2204	**PC**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

COMPUTER ARCHITECTURE AND ORGANIZATION

Course Objectives:

1.	Outline Basic building blocks of a Digital Computer.
2.	Apply the knowledge of microprogramming while designing CPU.
3.	Analyze the concept of interfacing of peripheral devices.
4.	Outline the concept of Memories and design of Main memory.

Course Outcomes

S. No	Outcome	Knowledge Level
1.	Analyze how computers represent and manipulates data.	**K2**
2.	Develop the general architecture design of a digital computer.	**K3**
3.	Acquiring the knowledge of designing microprograms for few basic instructions	**K4**
4.	Develop independent learning skills to interface main memory & I/O.	**K3**

SYLLABUS

UNIT-I (10 Hrs)	**Register Transfer and Micro operations:** Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logical Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit.
UNIT-II (10 Hrs)	**Basic Computer Organization:** Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input - Output and Interrupt, Complete Computer Description.
UNIT-III (12 Hrs)	**Micro programmed Control & CPU Organization:** Micro programmed Control: Control Memory, Address Sequencing, Microinstruction Formats, Micro program Example, Design of Control Unit. CPU Organization: Introduction, General Register Organization, Stack Organization Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).
UNIT-IV (10 Hrs)	**Input – Output Organization:** Peripheral Devices, Input - Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input- Output processor, CPU-IOP communication.
UNIT-V (8 Hrs)	**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Text Books:	
1.	Computer System Architecture, M. Morris Mano, PHI Publications, (3rd Edition May 1996).
2.	Computer Architecture and Organization. John P.Hayes. McGraw Hill International, (3rd Edition).
Reference Books:	
1.	Computer Organization, V. Carl Hamacher, Zvonko G. Vranesic and Safwat G. Zaky, McGraw Hill International, (4th Edition).
2.	Digital Computer Fundamentals, Thomas C. Bartee.
E - Resources:	
1.	https://nptel.ac.in/content/storage2/courses/106103068/pdf/coa.pdf
2.	https://nptel.ac.in/courses/106/103/106103068/

Code	Category	L	T	P	C	I.M	E.M	Exam
B19CS2209	**ES**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

OOPS THROUGH JAVA

(Common to ECE & EEE)

Course Objectives:

1.	Understanding the OOPS concepts, classes and objects, threads, files, applets, swings and act.
2.	This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
3.	Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using Java for network level programming and middleware development

Course Outcomes:

S.No	Outcome	KL	PO'S
1.	**Apply** object-oriented programming principles and various java programming constructs and develop java programs.	K2	PO1,PO2
2.	**Apply** the concepts of Inheritance, Polymorphism and String handling methods in developing java programs	K3	PO1,PO2 ,PO3
3.	**Apply** the concepts like interfaces, packages, exception handling and multithreading in programming to develop error free programs.	K3	PO1,PO2 ,PO3
4.	**Develop** the GUI applications for the end users using applets with event handling.	K4	PO1,PO2 ,PO3

SYLLABUS

UNIT-I (10 Hrs)	**INTRODUCTION TO JAVA:** Introduction to OOP, procedural programming language and object-oriented language, Principles of OOP, Applications of OOP, History of java, java features, JVM, Program structure. Variables, Primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.
UNIT-II (10 Hrs)	**OBJECTS AND CLASSES:** Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.
UNIT-III (10 Hrs)	**INHERITANCE:** Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java. Lang package. Exception handling, importance of try, catch, throw, throws and finally block, user defined exceptions, Assertions.
UNIT-IV (10 Hrs)	**MULTITHREADING:** Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

UNIT-V (10 Hrs)	**APPLETS AND AWT CLASSES:** Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes. AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

Text Books:	
1.	The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2.	Programming in JAVA, Sachin Malhotra, Saurabh Choudary, Oxford.
Reference Books:	
1.	Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in
2.	Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

Code	Category	L	T	P	C	I.M	E.M	Exam
B19HS2201	**HS**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

MANAGEMENT AND ORGANIZATIONAL BEHAVIOUR

(Common to ECE & EEE)

Course Objectives:

1.	To familiarize with the concept of management, functions and principles.
2.	To provide conceptual knowledge on functional management that is on Human resource management and Marketing management.
3.	To provide basic insight into contemporary management practices and Strategic Management.
4.	To learn theories of motivation and also deals with individual behavior, their attitude and perception of individuals.
5.	To understand about organizations groups that affect the climate of an entire organizations which helps employees in stress management

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Explain management functions and principles.	**K2**
2.	Will be able to describe the concepts of functional management that is HRM and Marketing functions.	**K2**
3.	Will be able to get discuss about vision, mission, goal, objective and a strategy based on which the corporate planning depends.	**K2**
4.	The learner is able to recognize strategically contemporary management practices and describe corporate planning process.	**K2**
5.	The learner can discuss about individual behavior and motivational theories.	**K2**
6.	The student can explain about ways in managing conflicts and stress.	**K2**

SYLLABUS

UNIT-I (10 Hrs)	**Introduction to Management:** **Management:** Concept, Nature and importance of Management, Functions of management, Evolution of Management thought, Taylor's Scientific Management, Fayol's principles of Management, Social Responsibility of Business.
UNIT-II (10 Hrs)	**Functional Management:** **Human Resource Management (HRM)**: Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Compensation & Performance Appraisal. **Marketing Management:** Concept, Functions of marketing; Marketing Mix - Product, Price, Place & Promotion; Marketing strategies based on Product life cycle, Channels of distribution.

UNIT-III (12 Hrs)	**Strategic Management:** Vision, Mission, Goal, Objective, Policy, Strategy. Elements of Corporate planning process; Environmental scanning; SWOT analysis; steps in Strategy formulation, implementation, evaluation & control; Bench Marking; Balanced Score Card.
UNIT-IV (10 Hrs)	**Organizational Behavior:** Individual Behavior: Perception-Perceptual process; Attitude- Attitudinal change, Organizational Change, Factors Influencing Change, Types of Change. **Motivation**: Meaning, Theories of Motivation - Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation.
UNIT-V (8 Hrs)	**Group Dynamics:** Types of Groups, Stages of Group development; **Organizational conflicts** -Reasons for Conflicts, Consequences of Conflicts in Organization, Types of Conflicts, Strategies for Managing Conflicts, Stress - Causes and effects, coping strategies of stress.

Text Books:	
1.	Subba Rao.P Management & Organizational Behaviour, Himalaya Publishing House. Mumbai
2.	A.R Aryasri - Management Science Mcgraw Hill Pvt Ltd, New Delhi
Reference Books:	
1.	Fred Luthans Organizational Behaviour, TMH, New Delhi
2.	Robins, Stephen P., Fundamentals of Management, Pearson, India

Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2205	**PC**	**--**	**--**	**3**	**1.5**	**20**	**30**	**3 Hrs.**

ELECTRONIC CIRCUIT ANALYSIS LAB(WITH SIMULATION)

Course Objectives:

1.	To prepare students to perform the analysis of any Analog electronics circuit.
2.	To empower students to understand the design and working of BJT / FET amplifiers, oscillators and Operational Amplifiers.
3.	To evaluate the use of computer based analysis tools to review performance of semiconductor device circuits.
4.	Model the electronic circuits using tools such as PSPICE and Multisim.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Apply the concepts of amplifier analysis to verify their characteristics and measure the important parameters.	**K3**
2.	Analyze the performance of power amplifiers.	**K4**
3.	Analyze the frequency response and characteristics of operational amplifiers.	**K4**
4.	Simulation and Design of different amplifiers and oscillator circuits.	**K4**

LIST OF EXPERIMENTS (HARDWARE)

1.	Frequency Response of RC Coupled Amplifier.
2.	Frequency Response of Negative Feedback Amplifier.
3.	Colpitts Oscillator.
4.	RC Phase Shift Oscillator.
5.	Wein Bridge Oscillator.
6.	Hartley Oscillator.
7.	Basic Applications of Operational Amplifier.
8.	Tuned Voltage Amplifier.

SOFTWARE:

1.	Frequency Response of RC Coupled Amplifier.
2.	Frequency Response of Negative Feedback Amplifier.
3.	Colpitts Oscillator.
4.	RC Phase Shift Oscillator.
5.	Wein Bridge Oscillator.
6.	Hartley Oscillator.
7.	Basic Applications of Operational Amplifier.
8.	Tuned Voltage Amplifier.

Reference Books:

1.	Lab manual.

E – Resources:	
1.	https://www.orcad.com/resources/orcad-tutorials
2.	https://www.ni.com/en-Support/downloads/softwareproducts/download.multisim.html#312060

Code	Category	L	T	P	C	I.M	E.M	Exam
B19EC2206	**PC**	**--**	**--**	**3**	**1.5**	**20**	**30**	**3 Hrs.**

ANALOG COMMUNICATIONS - LAB (WITH SIMULATION)

Course Objectives:

1.	To implement various analog modulation and demodulation methods.
2.	To be familiar with the design of various parameters of LPF , BPF and HPF.
3.	To design IF and RF amplifiers and plot their frequency response.
4.	To be familiar with different types of experiments like pre-emphasis, de-emphasis and DSB-SC waveform generators.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Design and implement modulation and demodulation circuits for amplitude modulation and frequency modulation techniques.	**K4**
2.	Design second order active filters for various frequency bands.	**K4**
3.	Construct the circuit and study the characteristics of different transmitter and receiver circuits such as Harmonic generator, RF Amplifier, pre-emphasis and de-emphasis.	**K4**

LIST OF EXPERIMENTS

1.	Amplitude Modulation and Demodulation. (Hardware implementation, MATLAB simulation)
2.	Frequency Modulation and Demodulation. (MATLAB and Multisim simulation)
3.	Balanced Modulator. (Hardware implementation, MATLAB simulation)
4.	Harmonic Generator. (Hardware implementation)
5.	Pre-Emphasis and De-Emphasis. (Hardware implementation)
6.	RF Amplifier. (Hardware implementation)
7.	Design Of Active Low Pass and High Pass Filter. (Hardware implementation)
8.	Design Of Twin-T Network. (Hardware implementation)
9.	Pulse Modulation Techniques. (Hardware implementation, MATLAB simulation)
10.	Spectrum Analysis of AM & FM Signals. (MATLAB simulation)
11.	Frequency Division Multiplexing. (MATLAB simulation)

12.	Simulation of AWGN Channel. (MATLAB simulation)
Reference Books:	
1.	Lab manual.
E – Resources:	
1.	https://nptel.ac.in/courses/117/105/117105143/
2.	https://nptel.ac.in/courses/117/101/117101106/