ESTD: 1980

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (AUTONOMOUS)
(Affiliated to Andhra University, Visakhapatnam), (Recognised by AICTE, New Delhi)
Accredited by NAAC with 'A' Grade
Recognised as Scientific and Industrial Research Organisation
CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204

SCHEME OF INSTRUCTION & EXAMINATION
(Regulation R16)

II/IV B.TECH
(With effect from **2016-2017** Admitted Batch onwards)
Under Choice Based Credit System

ELECTRONICS AND COMMUNICATION ENGINEERING

I-SEMESTER

Code No.	Course	Credits	Lecture Hrs	Tutorial Hrs	Lab Hrs	Total Contact Hrs/Week	Sessional Marks	Exam Marks	Total Marks
B16 ENG 2101	Mathematics - IV	4	3	1	-	4	30	70	100
B16 EE 2104	Circuit Analysis & Synthesis	4	3	1	-	4	30	70	100
B16 EE 2105	Electrical Technology	4	3	1	-	4	30	70	100
B16 EC 2101	Analog Electronic Circuits	4	3	1	-	4	30	70	100
B16 CS 2104	Elementary Data Structures	4	3	1	-	4	30	70	100
B16 EC 2102	Probability Theory & Random Processes	4	3	1	-	4	30	70	100
B16 EE 2107	Network And Machines Lab	2	-	-	3	3	50	50	100
B16 EC 2105	Electronic Devices & Circuits Lab	2	-	-	3	3	50	50	100
B16 ENG 2104	English Proficiency	2	1	1	--	2	50	50	100
B16 ENG 2106	Industry Oriented Training	1	--	--	2	2	50	--	50
	Total	**31**	**19**	**7**	**8**	**34**	**380**	**570**	**950**

Code: B16 ENG 2101

MATHEMATICS – IV
(Common to CIV,ECE,EEE & ME)

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives:

Students learn
1. The concepts of Gradient, Divergence, Curl, Directional derivative, solenoidal and Irrotational fields
2. Green's, Stokes' and Divergence theorems
3. Classification of 2^{nd} order Partial Differential Equations as well as solution of 1-Dimensional Wave equation and 1-Dimensional Heat equation
4. the concept of Analytic function, CR equations
5. Cauchy's Integral Theorem and Integral Formula
6. Taylor and Laurent series, Residues and Residue theorem

Course Outcomes:

Students will be able to
1. Apply the concepts of Gradient, Divergence, Curl, Directional derivative, solenoidal and Irrotational fields
2. Determine scalar potential, circulation and work done
3. Evaluate integrals using Green's, Stokes' and Divergence theorems
4. Obtain the solution of 1-D wave equation and 1-D heat equation
5. Determine the zeroes and poles of functions and residues at poles
6. Evaluate certain real definite integrals that arise in applications by the use of Residue theorem

SYLLABUS

Vector Calculus-1

Definitions of Scalar and Vector point functions, Differentiation of vectors, Vector differential operator del, Del applied to scalar point function – gradient, Del applied to vector point function- divergence and curl, physical interpretation of gradient, divergence and curl(without proof), Del applied twice to a point function, Del applied to product of two functions, Irrotational and Solenoidal Fields, scalar potential

Vector Calculus-2

Integration of vectors, line integral, circulation, work done, surface integral, Flux, Green's, Stokes' and Gauss Divergence Theorems (Without proofs). Introduction to orthogonal curvilinear coordinates, cylindrical polar coordinates and spherical polar coordinates.

Applications Of Partial Differential Equations

Classification of second order partial differential equations, Method of separation of variables, One –dimensional wave equation- vibrations of a stretched string (no derivation)-, one-dimensional heat equation – Heat flow along a long horizontal bar (no derivation) (problems on heat equation involving homogeneous end conditions only), two dimensional Laplace equation in Cartesian coordinates.

Complex Variables-1

Review- Cartesian form and polar form of a complex variable, Real and imaginary parts of z^n , e^z, sin z, sinh z and log z **.**

Limit and continuity of a function of the complex variable, derivative, analytic function, properties of Analytic functions, Cauchy- Riemann equations, Harmonic functions and Orthogonal system, application of analytic function to flow problems, geometric representation of w=f(z), conformal mapping – Bilinear transformation only.

Complex Variables-2

Integration of complex functions, Cauchy's theorem, Cauchy's integral formula (statements only) . Taylor and Laurent series expansions of functions (statement of theorems only), zeros and singularities, Residue, calculation of residues, Cauchy's Residue theorem (without proof), Evaluation of real and definite integrals- integration around a unit circle

Text Book:

1. "Higher Engineering Mathematics", by Dr.B.S.Grewal, 43rd Edition, Khanna Publishers.

Reference Books:

1. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley.
2. A text book of Engineering Mathematics, by N.P.Bali and Dr. Manish Goyal, Lakshmi Publications.
3. Advanced Engineering Mathematics, by H.K.Dass, S.Chand Company.
4. Higher Engineering Mathematics, by B.V.Ramana, Tata Mc Graw Hill Company.
5. Higher Engineering Mathematics, by Dr. M.K.Venkatraman, The National Publishing Company.

Code: B16 EE 2104

CIRCUIT ANALYSIS& SYNTHESIS

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives

1. To learn the concept of network theory and definitions of circuit elements for medelingpractical electric circuits
2. To learn various theorems and techniques in electric circuit analysis and to know their significance and applications
3. To learn phasor concept and apply it to analysis of circuits in sinusoidal steady state.
4. To learn the concept of two-port network analysis and find models using different parameter sets.
5. To learn the concept of Laplace transform and its application to circuit analysis.

Course Outcomes

1. Students will learn circuit conventions and analyze DC circuits using various techniques like mesh analysis, nodal analysis and theorems.
2. Students will learn the significance of energy storing elements (Inductance & Capacitance) in circuits and analysetransient and steady state responses.
3. Students will learn the concepts of single and three-phase balanced circuits and analyze sinusoidal steady-state using phasor concept.
4. Student will learn the concept of network functions and analyze poles, zeros and time domain behavior from pole-zero plots.
5. Student will learn the concept of positive real functions and test whether the given network function is Hurwitz and positive real or not.

SYLLABUS

Analysis of DC Circuits:
Active elements, Passive elements, Reference directions for current and voltage, Kirchoffs Laws, Voltage and Current Division Nodal Analysis, Mesh analysis, Linearity and superposition, Thevinin's theorem and Norton's theorem, Reciprocity theorem, Z,Y,H,S-parameters.

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.

Sinusoidal Steady State Analysis:
The sinusoidal forcing function, Phasor Concept, Average and Effective value of Voltage and Current, Instantaneous and Average Power, Complex Power, Steady State Analysis using mesh and node analysis, Application of network theorems to AC circuits, resonance, Concept of Duality.

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, Transfer Functions in terms of Y and Z functions, Scaling Network Functions.

Positive Real Functions:
Positive real function and other properties, Herwitz polynomials, Computation of residues, even and Odd functions, Test for Positive Real Functions.

TextBooks:

1. Engineering Circuit Analysis, William H.Hayt Jr. and Jack E. Kemmerley, 5th Edition, McGraw Hill International Edition.
2. Modern Network Synthesis, M. E. Van Valkenburg, Wiley Eastern.

Reference Books:

1. Introduction to modern Network Synthesis : Van Valkenburg; John Wiley
2. Network Analysis: Van Valkenburg; PHI
3. Basic circuit theory:DasoerKuh; McGraw Hill.
4. A Course in Electrical Circuit Analysis by Soni& Gupta; DhanpatRai Publication.
5. Circuit Analysis : G.K. Mithal; Khanna Publication.
6. Networks and Systems :D.RoyChoudhury; New Age International.
7. Network Analysis, M. E. Van Valkenburg, 3rd Edition, PHI.
8. Network Analysis &Synthesis :UmeshSinha; SatyaPrakash Pub.
9. Network Analysis &Synthesis :F.F.Kuo; John Wiley & Sons Inc.

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Code: B16 EE 2105

ELECTRICAL TECHNOLOGY

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives

1. To learn the basic principles of magnetic field theory.
2. To know the Construction and working of D.C Machines and A.C Machines.
3. To learn the characteristics of D.C Machines and A.C Machines.
4. To learn different tests of DC machines and A.C Machines to know its performance.

Course Outcomes

1. Classify the parts of DC Machines, Transformers, Three Phase Induction motors & Three Phase Synchronous machines.(k2)
2. Interpret the operation and working principle of DC Machines, Transformers, Three Phase Induction motors , Three Phase Synchronous machines.(k2)
3. Develop performance characteristics of various machines.(k3)
4. Construct experiments on various machines.(k3)
5. Analyze the application of electrical machines in various fields of engineering.(k4)

SYLLABUS

Magnetic Circuits:
Definitions of magnetic circuit, Reluctance, MMF, Magnetic flux, Hysteresis loss. Faraday's laws of Electromagnetic induction, Induced E.M.F., Dynamically induced E.M.F., Statically induced E.M.F., Self-inductance, Mutual inductance, Lenz's law

DC Machines:
Principle of operation DC Generator - EMF equation - types - DC motor types - torque equation – speed control methods- applications - three point starter-Testing-Load test on D.C Shunt Motor, D.C Series Motor,Swinburne's test.

Transformers:
Principle of operation of single phase transformers - EMF equation - equivalent circuit –losses - efficiency and regulation-Testing- Open circuit and Short circuit tests.

Induction Motors:
Construction - Principle of operation of induction motor - slip - torque characteristics - Power flow diagram.

Synchronous Machines :
Construction-Principle of operation of alternators – EMF equation of alternator- regulation by synchronous impedance method, Principle of operation of synchronous motors, methods of starting, applications.

Text Books:

1. Electrical Machinery by Dr.P.S Bimbhra,Khanna publications.
2. Electrical machines by J.B Gupta, Published by S K Kataria and Sons.
3. A Textbook of Electrical Technology By R.K.Rajput,Laxmi Publications.
4. Principles of Electrical Engineering, V.K mehta, Rohit Mehta, S. Chand Publications.
5. A Textbook Of Electrical Technology B. L. THERAJA (Volume II)

Reference Books:

1. Basic Electrical Engineering, V.K mehta, Rohit Mehta, S. Chand Publications.
2. Basic Electrical Engineering, S.N. Singh, PHI.

Code: B16 EC 2101

ANALOG ELECTRONIC CIRCUITS

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives

The aim of this course is to

1. Understand the concepts of different type of amplifiers and analyze them.
2. Learn the classification of feedback amplifiers and analyze them.
3. Compare the voltage and power amplifiers and analyze them.
4. Understand the principle of oscillator and analyze different types of sinusoidal oscillators.
5. Learn the classification of tuned amplifiers and analyze them.
6. Understand the concept and analyze applications of op-amp.

Course Outcomes

After the completion of the course, students will be able to:

1. Know the equivalent circuit of multistage amplifier and its analysis. [K3]
2. Identify the different feedback topologies and analyze them. [K1]
3. Explain the principle of oscillator and design different types of sinusoidal oscillators.[K3]
4. Define the difference between voltage and power amplifiers and design different
5. classes. [K1, K3]
6. Know that Tuned amplifiers amplify a narrow band of frequencies and will also be able to analyze them.[K2, K3]
7. Identify that Op-amp not amplifies but also perform different operations and analyze some applications.[K1,K2]

SYLLABUS

Multistage Amplifiers

Transistor at high frequencies, CE short circuit current gain and concept of GainBandwidth Product. BJT and FET RC Coupled Amplifiers at low and high frequencies. Frequency Response and calculation of Band Width of Multistage Amplifiers.

Feed Back Amplifiers

Concept of Feed Back 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.

Sinusoidal Oscillators

Condition for oscillations –LC Oscillators – Hartley, Colpitts, Clapp and TunedCollector Oscillators – Frequency and amplitude Stability of Oscillators – CrystalOscillators – RC Oscillators -- RC Phase Shift and Weinbridge Oscillators.

Power Amplifiers

Classification of Power Amplifiers – Class A, Class B and Class AB power Amplifiers. Series Fed, Single Ended Transformer Coupled and Push Pull Class A and Class B Power Amplifiers. Cross-over Distortion in Pure Class B Power Amplifier, Class AB Power Amplifier – Complementary Push Pull Amplifier with trickle Bias, Derating Factor – Heat Sinks.

Tuned Voltage Amplifiers

Single Tuned and Stagger Tuned Amplifiers – Analysis – Double Tuned Amplifier – Bandwidth Calculation.

Operational Amplifiers

Concept of Direct Coupled Amplifiers. Ideal Characteristics of an operational Amplifier – Differential Amplifier - Calculation of common mode Rejection ratio – Differential Amplifier supplied with a constant current – Normalized TransferCharacteristics of a differential Amplifier – Applications of OP-Amp as an Inverting and Non-Inverting Amplifier,Integrator, Differentiator Summing and Subtracting Amplifier and Logarithmic Amplifier. Parameters of an Op-Amp, Measurement of OP-Amp Parameters.

Text Books:

1. Millman's Integrated Electronics by Jacob Millman, Christos Halkias, Chetan Parikh.
2. Electronic Devices and Circuits by Salivahanan

References:

1. Electronic Devices and Circuits by G.S.N.Raju.
2. Electronic devices and circuits-Mottershead
3. Op-amps and Linear Integrated Circuits – Gayakwad

Code: B16 CS 2104

ELEMENTARY DATA STRUCTURES

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives:

The aim of this course is to

1. Student will learn about data structures and the algorithms for manipulating them, and how to analyse the time and memory requirements of them.
2. Student will master some complex searching and sorting algorithms and their data structures, advanced types of trees,and graph representations and graph algorithms.
3. Student will learn when and how to use techniques for developing algorithms.
4. Student will also become skilled in algorithmic analysis and algorithm development using the latest techniques.

Course Outcomes:

After the completion of the course, students will be able to:

1. Be able to write programs and class libraries given a specification;
2. Implement various data structures.
3. Implement and analyse various sorting algorithms.
4. Understand abstract data types and how they are implemented in C.

SYLLABUS

Revision of C language:overview

Arrays and Functions:
Organization and use of one Dimensional , Two dimensional and Multi dimensional Arrays, Handling of character strings, string operations, Concept of function, Parameter passing , Recursion.

Structures, Pointers and Files:
Definition of structure and Union, Programming examples, Pointers , Pointer Expressions, Programming examples, Dynamic Memory Allocation, Preprocessor Directives

Linear Data structures:
Stack -Representation, Operations, Queue- representation, Operations, Circular Queue, Linked List- Representation, Operations, Double Linked List and Circular List.

Non-linear Data Structures:
Trees, Binary Tree Representation, Tree Traversals, Conversion of a General Tree to Binary Tree.

Graphs

Representation of Graphs, Linked Representation of Graphs, Graph Traversals and Spanning Trees**.**

Searching & Sorting:

Basic search Techniques- Linear and Binary searching, Tree searching, Sorting-Insertion, Selection, Bubble, Quick and Merge Sorting.

Text Books:

1. Programming With C, by Schaum's Outlines, Byron Gottifried.
2. Fundamentals of Data Structures in C, by Sahni- Horowitz, Second Edition.

Reference Books:

1. An Introduction To Data Structures With Applications, Trembly and Sorenson.
2. The C-Programming Language, Kerningham and others.

Code: B16 EC 2102

PROBABILITY THEORY & RANDOM PROCESSES

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

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 about various types of random processes, their properties,spectral representation and applications.
4. To understand the difference between time averages and statistical averages, Stationarity and Ergodicity.
5. To apply elements of stochastic processes for problems in real life.
6. To understand the concept of Noise as applicable to linear Systems.

Course Outcomes:

On completion of the course the student will be able to

1. Understand the axiomatic formulation of modern probability theory.
2. Characterize Probability Models and functions of Random variables based on single and multiple random variables.
3. Evaluate and apply moments and characteristic functions and understand the concept of Inequalities and probabilistic limits.
4. Understand the concept of Random process and determine covariance and spectral density of stationary random processes.
5. Demonstrate the specific applications to Poisson and Gaussian process and representation of low pass and band pass noise models.
6. Analyze the response of random inputs to linear time invariant systems.

SYLLABUS

Probability Theory
Definitions of Probability, Axioms of Probability, Probability Spaces, Properties of Probabilities, Joint and Conditional Probabilities, Independent Events

Random Variables
Probability Distribution Functions, Probability Density Functions, Joint Distribution of Two Variables, Conditional Probability Distribution and Density, Independent Random Variables.

Statistical Averages
Functions of Random Variables and Random Vectors, Statistical Averages, Characteristic Function of Random Variables, Inequalities of Chebyshev and Schwartz, Convergence Concepts, Central Limit Theorem.

Random Processes
Stationarity, Ergodicity, Covariance Function and their Properties, Spectral Representation, Weiner-Kinchine Theorem.

Linear Systems and Random Noise Processes
Linear operations, Gaussian processes, Poisson Processes**,** Low-pass and Band-pass Noise Representation.

Text Books:

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

Reference Books:

1. Signal Analysis, Papoulis, McGraw Hill N. Y., 1977.
2. Introduction to Random Signals and Noise, Davenport W. B. Jrs. and W. I.Root, McGraw Hill N.Y., 1954.
3. B.P. Lathi, "Signals, Systems & Communications", B.S. Publications, 2003.
4. Probability, Random Variables & Random Signal Principles, STARK et al, Pearson, 2002

Code: B16 EE 2107

NETWORKS AND MACHINES LAB

Lab	**: 3 Periods**	**Sessionals**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Objectives:

1. To learn to make simple electric circuits by using different sources, loads and components and verify basic laws.
2. To experimentally verify various theorems of circuit analysis.
3. To learn to find circuit models for two-terminal devices and two-port networks.
4. Conducting experiments on characteristics of generators & motors
5. Load tests on series,shunt,compound motors and compound generators-swinburne's, Hopkinson's test.
6. OC & SC tests on single phase transformers, Sumpner's test.

Course Outcomes

1. Students will gain the skill to make and experiment with practical electric circuits.
2. Students will be able to measure voltage, current, power in practical electric circuits.
3. Students will know the significance of various theorems and their applications.
4. Students will be able to model devices for circuit analysis.
5. Students will be able to assess the behavior of different electrical machines.
6. Students will be able to predetermine the efficiency and regulation of different machines.

LIST OF EXPERIMENTS

1. Maximum Power Transfer Theorem
2. Superposition Theorem
3. Thevinin's Theorem
4. Series Resonance
5. Ohm's Law And Characteristics Of Filament Lamp
6. Parameters Of Iron Cored Inductor
7. Swinburne's Test
8. Load Test on Dc Shunt Motor
9. Load Test on Dc Series Motor
10. Load Test on 3 Phase Slip ring Induction Motor
11. OC and SC Test on Single Phase Transformer
12. Voltage Regulation of An Alternator by Synchronous Impedance Method
13. Speed Control of Dc Shunt Motor

Reference: Lab Manual

Code: B16 EC 2105

ELECTRONIC DEVICES & CIRCUITS LAB
(Common to ECE & EEE)

Lab	**: 3 Periods**	**Sessionals**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Objectives:

1. To familiarize the student with test and measuring equipment like CROs, Multimeters, Ammeters, Voltmeters etc. and also to prepare the student to use signal generators, bread boards and to make the student identify the terminals of basic electronic devices like diodes, transistors and JFETs.
2. To familiarize the student with features of Multisim and to prepare the student to construct and simulate various electronic circuits using Multisim.
3. To make the student study experimentally the characteristics of basic electronic devices like ordinary pn diodes, LEDs, Zener diodes, BJTS, JFETs and rectifiers with and without filters.
4. To make the student to conduct experiments to analyze various parameters of BJT amplifiers and FET amplifiers.

Course Outcomes:

After the successful completion of the lab course, the students will be able

1. To understand the role of basic electronic devices like ordinary Pn diodes, Zener diodes, LEDs, BJTS and JFETs in achieving various functionalities like rectification, voltage regulation, amplification, switching action etc. in various electronic circuits.
2. To construct and simulate different electronic circuits using Multisim.
3. To have the hardware skills and software skills required in the design of electronic systems for various applications.

LIST OF EXPERIMENTS

1. V-I characteristics of semiconductor diode, LED and Zener diode.
2. Half wave and full wave rectifier with and without filters.
3. Input and output characteristics of transistor in CE configuration.
4. Transistor biasing circuits and transistor as a switch.
5. CE amplifier.
6. JFET common source amplifier.

LIST OF SIMULATION EXPERIMENTS

7. V-I characteristics of semiconductor diode, LED and Zener diode.
8. Regulation characteristics of Zener diode.
9. Input and output characteristics of transistor in CB configuration
10. JFET Characteristics.
11. CC amplifier
12. JFET common source amplifier

Reference: Lab Manual

Code: B16 ENG 2104

ENGLISH PROFICIENCY
(Common to All Branches)

Theory	**: 1 Period**	**Sessionals**	**: 50**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 50**
Exam	**: 3 Hrs.**	**Credits**	**: 2**

AIM:

Enriching the communicative competency of the students by adopting the activity-based as well as the class-oriented instruction with a view to facilitate and enable them to enhance their language proficiency skills.

Course Objectives:

Students be able to
1. Understand the importance of professional communication.
2. Learn language skills and vocabulary in order to improve their language competency.
3. Know and perform well in real life contexts.
4. Identify and examine their self-attributes which require improvementand motivation.
5. Build their confidence and overcome their inhibitions.
6. Improve their strategies in reading skills.

Course Outcomes:

1. Students enhance their vocabulary and use it in the relevant contexts .
2. They improve speaking skills.
3. They learn and practice the skills of composition writing.
4. They enhance their reading and understanding of different texts.
5. They enrich their communication both in formal and informalcontexts.
6. They strengthen their confidence in presentation skills.

SYLLABUS

Speaking Skills
PPT
Describing event/place/thing
Picture Description
Extempore
Debate
Telephonic Skills
Analyzing Proverbs

Vocabulary
Affixes
Pairs of Words

Reading Skills
Reading Comprehension
Reading/Summarizing News Paper Artic

Writing Skills
Designing Posters
Essay writing
Resume Writing

Reference Books:

1. Interchange (4th edition) Student's books 1&2 by Jack C. Richards, CUP.
2. Fundamentals of Technical Communication by Meenakshiraman, Sangeta Sharma of OUP
3. English and Communication Skills for Students of Science and Engineering, by S.P.
4. Dhanavel, Orient Blackswan Ltd. 2009
5. Enriching Speaking and Writing Skills, Orient Blackswan Publishers
6. The Oxford Guide to Writing and Speaking by John Seely OUP

(***Note: Sessional Marks will be evaluated based on Continuous Comprehensive Evaluation of the students' Performance - 40M, Attendance – 10M and External Marks will be evaluated based on Presentation Skills – 30M, Project 20M)

Code: B16 ENG 2106

INDUSTRY ORIENTED TRAINING
(Common to ECE & EEE)

Lab : 2 Periods	**Sessionals : 50**
Exam : 3 Hrs.	**Credits : 1**

Course Objectives:

1. Be familiar with basic Data structures.
2. Master the implementation of linear data structures.
3. Master the implementation of non linear data structures.
4. Be familiar with Object Oriented Concepts.

Course Outcomes:

1. Application using implementation of Data structures.
2. Application using implementation of Linear and non linear Data structures in view of industry.
3. Applications using Object Oriented Concepts in view of industry.

Syllabus: Industry Oriented Applications on following topics.

BASIC CONCEPTS

System Life Cycle, Algorithm Specification, Recursive Algorithms, Data Abstraction, Performance Analysis, Space Complexity, Time Complexity, Asymptotic Notation, Comparing Time Complexities

IMPLEMENTATION (Using C)
Arrays
Stacks
Queues
Linked List
Double linked lists
Trees
Graphs

Applications of linear and nonlinear data structures and solving simple to complex problems in perspective of industry requirements.

Basic Concepts of OOP
Procedural Paradigms, Object Oriented Paradigm, OOP Principles and Terminology, OOP benefits, Procedure and Object Oriented programming languages, advantages and disadvantages, creating class, defining objects in C++ and JAVA.

Applications using OOP in solving simple to complex problems in perspective of industry requirements.

(Note: Total Marks will be evaluated based on Continuous Evaluation - 25 Marks, Coding Contest- 25 Marks)

SCHEME OF INSTRUCTION & EXAMINATION
(Regulation R16)

II/IV B.TECH
(With effect from **2016-2017** Admitted Batch onwards)
Under Choice Based Credit System

ELECTRONICS AND COMMUNICATION ENGINEERING

II-SEMESTER

Code No.	Course	Credits	Lecture Hrs	Tutorial Hrs	Lab Hrs	Total Contact Hrs/Week	Sessional Marks	Exam Marks	Total Marks
B16 EC 2201	Switching Theory and Logic Design	4	3	1	--	4	30	70	100
B16 EC 2202	Electromagnetic Field theory & Transmission Lines	4	3	1	--	4	30	70	100
B16 EC 2203	Pulse and Digital Circuits	4	3	1	--	4	30	70	100
B16 EC 2204	Analog Communications	4	3	1	--	4	30	70	100
B16 EC 2205	Signals & Systems	4	3	1	--	4	30	70	100
B16 ENG 2201	Environmental Studies	2	3	1	--	4	30	70	100
B16 EC 2207	Analog Communications Lab	2	--	--	3	3	50	50	100
B16 EC 2208	Analog Electronic Circuits Lab with Simulation	2	--	--	3	3	50	50	100
B16 EC 2209	Industry oriented Technology Lab	1	--	--	2	2	50	--	50
B16 ENG 2204	Industry Oriented Training	1	--	--	2	2	50	--	50
	Total	**28**	**18**	**6**	**10**	**34**	**380**	**520**	**900**

Code: B16 EC 2201

SWITCHING THEORY AND LOGIC DESIGN

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives

1. To provide insight of number systems and minimization of Boolean functions
2. To introduce the design of various combinational and sequential circuits
3. To introduce the design of Finite State Machines and Asynchronous Machines

Course Outcomes

By the end of the course the learners (students) will be able to

1. Able to understand various basic number system conversion and simplification of Boolean expressions
2. Design and analyze combinational and sequential circuits using logic gates, latches and flip-flops.
3. Analyze and design Finite State Machines
4. Analyze and design Asynchronous Machines

SYLLABUS

Number Systems And Codes

Number Systems, Base Conversion Methods, Complements of Numbers, Codes, Error detecting and Error Correcting Codes.

Logic Gates And Minimization Of Boolean Functions

Symbols and Truth Tables of Gates – AND, OR, NOT, NAND, NOR and XOR. Proof of Boolean theorems and functions– Karnaugh Map (up to 6 variables) and QuineMcClusky methods.

Combinational Logic Circuits And Design

Logic Design of Combinational circuits – Binary addition, Subtraction, Multiplexers, Demutiplexers, Decoders, Encoders, Code Conversion, Priority Encoders, Seven – segment Displays, Comparators and PLDs.

Sequential Logic Circuits And Design

The Flip-flops – SR, RS, JK, MSJK, T and D-Flip-flops. Design of Clocked Flip-flops, Flip-Flop conversion from one type to another.Design of Shift Registers and Counters.

Traditional Approaches to Sequential Analysis and Design

Analysis and Design of Finite State Machines, State Reduction.

Asynchronous Finite State Machines

Analysis and Design of Asynchronous Machines, Cycles, Races and Hazards.

Text Books:

1. Switching and Finite Automata Theory, 2nd Edition, ZviKohavi, Tata McGraw-Hill, 1978.
2. Fundamentals of Digital Circuits-A.Anand Kumar-2nd Edition-PHI Learning Private Limited.

Reference Books:

1. Introduction to Switching Theory and Logical Design, 3rd Edition, Frederick J. Hill and Gerald R. Peterson, John Wiley and Sons, 1981.
2. An Engineering Approach to Digital Design, William I. Fletcher, PHI.

Code: B16 EC 2202

ELECTRO MAGNETIC FIELD THEORY & TRANSMISSION LINES

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives:

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.
4. To study the propagation of energy in practical transmission lines and wave guides.

Course Outcomes:

After the completion of the course, Students should have the

1. Ability to apply the knowledge of mathematics, Science and engineering to the analysisand design of systems involving electric and magnetic fields as well as electromagnetic Waves.
2. Ability to identify, formulate and solve engineering problems in the area of electric and Magnetic fieldsand waves.
3. Ability to use Maxwell's equations to solve electromagnetic field problems.
4. Ability to apply the knowledge of electromagnetic fields in practical transmission linesand waveguides.

SYLLABUS

Electrostatics:
Introduction, Coulomb's law and electric field intensity, electric field due to different types of charge distributions, 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, different capacitance configurations, Boundary conditions on $\vec{E}$ &$\vec{D}$at the interface between two media, Related Problems.

Magneto statics:
Introduction, Biot-savart's law, Ampere's circuital law, applications 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, inductance, boundary conditions on $\vec{H}$ &$\vec{B}$ at the interface between two media, energy stored in steady magnetic field, Related problems.

Time varying fields and Maxwell's equations:
Introduction, Faraday's law of electromagnetic induction, Transformer emf and motional emf, Maxwell's equations in integral and differential forms, word statements, Maxwell's equations using phasor notation, Boundary conditions an $\vec{E}, \vec{D}$,$\vec{H}$ &$\vec{B}$ at the interface between two media, Related problems.

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 and Oblique incidences, Reflection of plane waves by a perfect dielectric for normal and Oblique incidences, Brewster angle and critical angle, Poynting's theorem, Related Problems.

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, impedance transformation with $\frac{\lambda}{8}$, $\frac{\lambda}{4} and \frac{\lambda}{2}$ 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. Electromagnetic field theory and Transmission Lines – G.SasibhusanaRao,Wiley India Pvt.Ltd.

Reference Books:

1. EM Waves and Radiating Systems – E.C.Jordan, Printice Hall India.
2. Electromagnetics with applications – Kraus and Fleisch, McGraw Hill.
3. Electromagnetic field theory and Transmission lines – G.S.N.Raju, Pearson Education Pvt.Ltd.
4. Engineering Electromagnetics – W.A.Hayt and JABuck, Tata McGraw Hill.

Code: B16 EC 2203

PULSE AND DIGITAL CIRCUITS

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives:

Students should learn

1. Applications of integrator, differentiator, clippers and clamper circuits.
2. Design of various multivibrators for various applications.
3. Design various Time base generators.
4. Synchronization techniques for sweep circuits.
5. Different logic families, realize logic gates using diodes and transistors.

Course Outcomes:

Students will be able to

1. Understand the applications of integrator, differentiator, clippers and clamper circuits.
2. Design different multivibrators for various applications.
3. Design different time base generators.
4. Analyze synchronization techniques for sweep circuits.
5. Understand different logic families & realize logic gates using diodes and transistors.

SYLLABUS

Linear Wave Shaping:

High pass and Low pass RC circuits, Response of High pass and Low pass RC circuits to sinusoidal, step, pulse, square, exponential and Ramp inputs, High pass RC circuit as a differentiator, Low pass RC circuit as an integrator. Attenuators and its application as CRO probe, RL and RLC Circuits and their response for step input, Ringing Circuit.

Nonlinear Wave Shaping:

Diode clippers, Transistor Clippers, Clipping at two independent levels, Comparator, Applications of voltage Comparators, Diode Comparator, Clamping Operation, Clamping Circuits using Diode with Different Inputs, Clamping Circuit Theorem, Practical Clamping circuits, Effect of diode Characteristics on Clamping Voltage.

BistableMultivibrators:

Transistor as a switch, Switching times of a transistor, Design and Analysis of Fixed-bias and self-bias transistor binary, Commutating capacitors, Triggering schemes of Binary, Transistor Schmitt trigger and its applications.

Monostable And AstableMultivibrators:

Design and analysis of Collector coupled Monostable Multivibrator, Expression for the gate width and its waveforms. Design and analysis of Collector coupled Astable Multivibrator, expression for the Time period and its waveforms, The Astable Multivibrator as a voltage to frequency convertor.

Time Base Generators:

General features of a time-base signal, Methods of Generating time base waveform, Exponential voltage sweep circuit, Basic principles of Miller and Bootstrap time base generators, transistor Miller sweep generator, transistor Bootstrap sweep generator, Current Sweep circuit, Linearity correction through adjustment of driving Waveform.

Synchronization And Frequency Division:

Principles of Synchronization, Frequency division in sweep circuit, Synchronization of AstableMultivibrators, Synchronization of a sweep circuit with symmetrical signals, Sine wave frequency division with a sweep circuit.

Logic Families:

Realization of gates using diodes and Transistors, RTL, DTL.

TEXT BOOKS:

1. Pulse Digital and Switching Waveforms, J. Millman ,H. Taub, andM.S.PrakashRao McGraw-Hill, Second Edition .
2. Pulse and Digital Circuits, A. Anand Kumar, PHI, Second Edition, 2005.

Reference Books:

1. Pulse and Digital Circuits, K.VenkatRao, Pearson Education India, 2nd Edition, 2010.
2. Pulse Digital and Switching Waveforms, J. Millman and H. Taub, McGraw-Hill, 2nd Edition 1991.
3. Pulse Switching and Digital Circuits – David A.Bell, PHI,5thEdn., Oxford University Press.

Code: B16 EC 2204

ANALOG COMMUNICATIONS

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives:

1. To understand the fundamental concepts of communication systems.
2. To familiarize with the concepts of linear or amplitude modulation (AM, DSB-SC, SSB and VSB) and demodulation techniques.
3. To familiarize with the concepts of angular or non-linear modulation (FM and PM) and demodulation techniques.
4. To understand and compare different analog modulation schemes.
5. To familiarize with techniques for generating and demodulating narrow-band and wide-band frequency and phase modulated signals.
6. To provide a good understanding of the behavior of analog communications in the presence of noise.
7. To develop a clear insight into the relations between the input and output signals in various stages of a transmitter and a receiver of AM & FM systems.
8. To classify and discuss different types of transmitters and receivers as applicable to analog communication systems.

Course Outcomes:

Upon successful completion of this course the student will be able to

1. Understand the need for modulation and learn about the basic elements of communication system.
2. Understand the concepts of Analog Modulation and Demodulation techniques.
3. Evaluate various parameters of analog modulated waveform in Time and Frequency domain.
4. Analyze and compare the performance of various analog modulation techniques in the presence of noise.
5. Analyze different characteristics of transmitters.
6. Analyze different characteristics of receivers.

SYLLABUS

Linear Modulation Systems:
Need for Modulation, Frequency Translation, Method of Frequency Translation, Amplitude Modulation, Modulation Index, Spectrum of AM Signal, Modulators and Demodulators (Diode detector), DSB-SC Signal and its Spectrum, Balanced Modulator, Synchronous Detectors, SSB Signal, SSB Generation Methods, Power Calculations in AM Systems, Application of AM Systems.

Angle Modulation Systems:
Angle Modulation, Phase and Frequency Modulation and their Relationship, Phase and Frequency Deviation, Spectrum of an FM Signal, Bandwidth of Sinusoidally Modulated FM Signal, Effect of the Modulation Index on Bandwidth, Spectrum of Constant Bandwidth FM, Phasor Diagram for FM Signals.FM Generation**:** Parameter variation method, Indirect method of Frequency Modulation (Armstrong Method), Frequency Multiplication, PLL FM Demodulator, Pre – emphasis and De – emphasis, Comparison of FM and AM.

Noise In AM and FM Systems:
Sources of Noise, Resistor Noise, Shot Noise, Noise in AM Systems, Noise in Angle Modulation Systems, Comparison between AM and FM with respect to Noise, Threshold in Frequency Modulation

Radio Transmitters:
Classification of Radio Transmitters, AM and FM Transmitters, Radio Telegraph and Telephone Transmitters, SSB Transmitters

Radio Receivers:
Radio receiver Types, AM Receivers – RF Section, Frequency Changing and Tracking, Intermediate Frequency and IF Amplifiers, Automatic Gain Control (AGC); FM Receivers – Amplitude Limiting, FM Demodulators, Ratio Detectors, ISB Receiver, Comparison with AM Receivers. Communication Receivers: Extensions of the Super-heterodyne Principles, Additional Circuits.

Text Books:

1. Principles of Communication Systems, H. Taub and D. L. Schilling, McGraw Hill, 1971.
2. Electronic Communications System : Fundamentals Through Advanced by Wayne Tomasi.

Reference Books:

1. Modern Digital and Analog Communication Systems, B. P. Lathi (2nd Edition).
2. Electronic Communications Modulation and Transmission, Robert J. Schoenbeck, PHI N. Delhi, 1999.
3. Communication systems, R.P.Singh and S.D.Sapre 2nd edition TMH 2008.
4. Communication Systems, Simon Haykins (2nd Edition).
5. Electronic Communication Systems, G. Kennedy, McGraw Hill, 1977 (2nd Edition)

Code: B16 EC 2205

SIGNALS AND SYSTEMS

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

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:

After completion of the course the student will be able to

1. Understand the basic concepts of signals and systems.
2. Analyze the spectral characteristics of Continuous Time and Discrete Time periodic and aperiodic signals using Fourier analysis.
3. Analyze system properties based on impulse response and Fourier analysis
4. Classify systems based on their properties and determine the response of LTI systems using convolution and also understand the concept of correlation between signals.
5. Apply Z- transforms for analyzing discrete-time signals and systems
6. Understand the process of sampling and the effects of under sampling.

SYLLABUS

Introduction to signals and linear time Invariant 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, Periodicity of Continuous – Time and Discrete –Time Complex Exponentials, Continuous-Time Unit impulse and Unit step Signals, Discrete- Time Unit Impulse and Unit Step Sequences, Continuous –Time and Discrete –Time Systems, Interconnections of Systems, Basic System Properties of Continuous –Time and Discrete –Time Systems, Introduction of continuous–Time LTI Systems and Discrete –Time LTI Systems, Casual LTI Systems Described by Differential and Difference Equations, Singularity Functions.

Fourier Series Representation of Periodic Signals

Introduction, Fourier Series Representation of continuous time Periodic Signals, 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.

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, Fourier Transform for periodic signals, Properties of the Discrete time Fourier Transform, Systems characterized by linear constant co-efficient Difference equations.

Convolution of signals
Introduction of convolution integral and convolution sum, Graphical interpretation of Convolution,System analysis by Convolution,Convolution as a superposition of impulse resp onse,Convolution of a function with a unit impulse,Convolution relationships, Signal comparison.

Correlation of signals
Introduction of Correlation of signals, properties of correlation functions, Introduction of Energy Density Spectrum(ESD) and Power Density Spectrum(PSD), Relation between Autocorrelation function and ESD/PSD, Relation between Convolution and Correlation. Correlation functions for nonfinite energy signals.(8 Periods)

Sampling Theorem and Z-transform
Introduction to signal reconstruction from its samples using interpolation, the effect of under sampling: aliasing, Discrete time processing of continuous time signals, sampling of Discrete time signals. The Z-Transform, The Inverse Z-Transform, Properties of Z-Transform, The initial and final value theorems, some common Z-transform pairs, Analysis and characterization of LTI systems using the Z-Transforms, System function algebra and block diagram representation.(10 Periods)

Text Books:

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

Reference Books:

1. Signals and Systems – P.RamakrishnaRao, TMH.
2. Signals and Systems- A.AnandaKumar,PHI.
3. Signals and Systems – P.RameshBabu,SciTech Publication.
4. Signals and Systems-K. Raja Rajeswari and B. V. Rao, Prentice Hall of India

Code: B16 ENG 2201

ENVIRONMENTAL STUDIES
(Common to ECE,EEE & ME)

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 2**

Course Objectives:

Students learn

1. To develop an awareness and sensitivity to the total environment and its related problems.
2. To participate actively participation in environmental protection and improvement.
3. To develop skills for active identification and development of solutions to environmental problems
4. To evaluate environment programmes in terms of social, economic, ecological and aesthetic factors.
5. To Create a "CONCERN AND RESPECT FOR THE ENVIRONMENT"

Course Outcomes:

Students will be able to

1. Get awareness among the students about the nature and natural ecosystems.
2. Learn sustainable utilization of natural resources like water, land, minerals, air.
3. Learn resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radioactive pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation.
4. Safe guard against industrial accidents particularly nuclear accidents.
5. Learn Constitutional provisions for the protection of natural resources.

SYLLABUS

Global Environmental Crisis:

Environmental Studies - Definition, Scope and importance, Need for public awareness. Global Environmental Crisis

Ecosystems:

Basic concepts, Forest Ecosystems, Grassland Ecosystems and Desert Ecosystems, Aquatic Ecosystems

Biodiversity:

Introduction to Biodiversity**,** Value of Bio-diversity, Bio-geographical classification of India, India as a Mega-diversity habitat, Threats to biodiversity, Conservation of Biodiversity: In-situ and Ex-situ conservation of bio-diversity.

Environmental and Natural Resources Management:

Land Resources: Land degradation, soil erosion and desertification, Effects of modern agriculture **Forest Resources:** Use and over exploitation-Mining and Dams-their effects on forest and tribal people, **Water resources**: Use and over utilization of surface and ground water, Floods, droughts, conflict over water, water logging and salinity, dams – benefits and problems
Energy Resources: Renewable and non-renewable energy sources, use of alternate energy sources-impact of energy use on environment.

Environmental Pollution:

Causes, Effects and Control measures of - Air pollution, Water pollution, Soil pollution, Marine Pollution, Thermal pollution, Noise pollution, Nuclear Hazards; Climate change and global warming, acid rain and Ozone layer depletion.

Environmental Problems in India:

Drinking water, Sanitation and Public health, population growth and environment; Water Scarcity and Ground Water Depletion; Rain water harvesting, Cloud seeding and Watershed management.

Text Books:

1. Environmental Studies (From Crisis to Cure) by R. Rajagopalan, Oxford university Press, 2008
2. Environmental Studies by Anubha Kaushik & C.P. Kauskik, New Age International (P) Ltd, New Delhi, 2006

Reference Books:

1. Environmental Sciences by G.Tyler Miller, JR,10^{th} ed, Thomson publishers, 2004

Code: B16 EC 2207

ANALOG COMMUNICATION LAB

Lab	**: 3 Periods**	**Sessionals**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Objectives:

1. The purpose of this course is to provide the student with a practical perspective of various Analog communication modules.
2. This course also helps the student to implement various analog modulation and demodulation schemes using discrete components.
3. To be familiar with the design of various parameters of LPF , BPF and HPF
4. To design IF and RF amplifiers and plot their frequency response.
5. To be familiar with different types of experiments like pre-emphasis, de-emphasis and DSB-SC waveform generators.

Course Out Comes:

1. Design and implement modulation and demodulation circuits for amplitude modulation technique.
2. Design and implement modulation and demodulation circuits for frequency modulation technique.
3. Design second order passive and active filters for various frequency bands.
4. Construct the circuit and study the characteristics of different transmitter and receiver circuits such as Harmonic generator, RF Amplifier, IF Amplifier, pre-emphasis and -emphasis.

SYLLABUS

1. Generation of AM Signal and measurement of Modulation Index.
2. Diode Detector for AM Signals.
3. Generation of FM Signal.
4. FM Detector.
5. Receiver Measurements.
6. Balanced Modulator.
7. Passive Filters (LPF, HPF, BPF).
8. Active Filters.
9. Attenuator.
10. Equalizer and Twin-T-Network.
11. Frequency Multiplier/Limiter.
12. SSB Generation and Detection.
13. Pre-emphasis and De-emphasis.
14. PLL.
15. IF Amplifier.

Reference : Lab Manuals.

Code: B16 EC 2208

ANALOG ELECTRONIC CIRCUITS LAB WITH SIMULATION
(Common to ECE & EEE)

Lab	**: 3 Periods**	**Sessionals**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Objectives:

1. This laboratory course enables students to get practical experience in design, assembly and evaluation of analog electronic circuits. They will use Multisim to test their electronic designs.

Course Outcomes:

Students will be able to:

1. Acquire a basic knowledge on simple applications of operational amplifier.
2. Observe the amplitude and frequency responses of negative feedback amplifier and two stage RC coupled amplifier.
3. Design and test sinusoidal oscillators.
4. Design and test a power amplifier.
5. Design,construct,and take measurement of the analog electronic circuits tocompare experimental results in the laboratory with theoretical analysis.
6. Use Multisim to test their electronic design.

LIST OF EXPERIMENTS

1. Design of LC Oscillators (Hartley Oscillator,Colpitts Oscillator)
2. Design of RC Oscillators (Wien Bridge Oscillator,RC phase Shift Oscillator)
3. Design of Basic Applications of Operational Amplifier.
4. Frequency response of Two Stage RC Coupled Amplifier.
5. Frequency response ofCurrent Series Feedback Amplifier(with and without feedback)
6. Measurement of resonant frequency, bandwidth and quality factor of single Tuned Voltage Amplifier.
7. Calculation of Collector Circuit efficiency of Class B Push Pull Power Amplifier.

LIST OF EXPERIMENTS
(Simulation)

8. Design of LC Oscillators (Hartley Oscillator,Colpitts Oscillator)
9. Design of RC Oscillators (Wien Bridge Oscillator,RC phase Shift Oscillator)
10. Design of Basic Applications of Operational Amplifier.
11. Frequency response of Two Stage RC Coupled Amplifier.
12. Frequency response ofCurrent Series Feedback Amplifier(with and without feedback)
13. Measurement of resonant frequency, bandwidth and quality factor of single Tuned Voltage Amplifier.
14. Calculation of Collector Circuit efficiency of Class B Push Pull Power Amplifier.

Reference : Lab Manuals

Code: B16 EC 2209

INDUSTRY ORIENTED TECHNOLOGY LAB

Lab	**: 2 Periods**	**Sessionals**	**: 50**
Exam	**: 3 Hrs.**	**Credits**	**: 1**

Course Objectives:

This laboratory course enables students to get practical experience in design, interfacing of different sensors and motors with the microcontrollers like Aurdino and Single Board Computer like Raspberry Pi.

Experiments:

1. Familiarization with Aurdino microcontroller and raspberry pi, different sensors, drivers and motors.
2. Control of conducting and non-conducting periods of LED using Aurdino microcontroller.
3. Interfacing humidity and temperature sensor (DHT11) with Aurdino microcontroller.
4. Interfacing ultrasonic sensor, PIR sensor with Aurdino microcontroller.
5. Interfacing DC motor with Aurdino microcontroller using L298 motor driver.
6. Interfacing and control of servo motor with Aurdino microcontroller.
7. Introduction to Raspberry Pi and interfacing different sensors and motors to it.
8. Interfacing camera with Raspberry Pi and performing different operations using open CV (Computer Vision).
9. Controlling DC motor based on DHT11 sensor output using Raspberry Pi.
10. Controlling of DC motor based on ultrasonic sensor output using Raspberry Pi.
11. Image capturing based on PIR sensor output using Raspberry Pi.
12. Introduction to GSM/GPS module and interfacing them with Aurdino and Raspberry Pi.

(Note: Total Marks will be evaluated based on Continuous Evaluation - 25 Marks, Record/Report-10 Marks, Exam-10 Marks and Attedndance-5 Marks)

Code: B16 ENG 2204

INDUSTRY ORIENTED TRAINING
(Common to ECE & EEE)

Lab : 2 Periods	**Sessionals : 50**
Exam : 3 Hrs.	**Credits : 1**

Course Objectives:

1. Be familiar with core JAVA.
2. Master the implementation of Applet programming.
3. Master the implementation of Networking concepts in core JAVA.
4. Be familiar with CORBA , J2EE, RMI concepts..

Course Outcomes:

1. Application using implementation of core JAVA concepts.
2. Application using implementation of AWT, Applets
3. Applications using Networking concepts in view of industry.

Syllabus: Industry Oriented Applications on following topics.

BASIC CONCEPTS

Fundamentals: HTML, OOP Concepts, Comparing JAVA with C & C++,JAVA Programming language Syntax, Variables, Data types, statements and expressions.

Control Statements: If else, for, while, and do while loops, Switch statements.

Arrays & Structures: One Dimensional & Two Dimensional Arrays, Named Structures.

Functions: Parameter Passing, Static Modifier.

IMPLEMENTATION (Using JAVA)
Classes and Interfaces
Threads and multithreaded programming
packages.

Applications of AWT, Applets and Networking concepts and solving simple to complex problems in perspective of industry requirements.

(Note: Total Marks will be evaluated based on Continuous Evaluation - 25 Marks, Coding Contest- 25 Marks)