PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018
(AUTONOMOUS)
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING
CURRICULUM
REGULATION 2015

SEMESTER III

Course Code	Course Title	L	T	P	C
MA15301	Transforms and Boundary Value Problems	3	2	0	4
EC15301	Electronic Circuits- I	3	0	0	3
EC15302	Digital Electronics	3	0	0	3
EC15303	Signals and Systems	3	0	0	3
IT15304	Data Structures and Object Oriented Programming in C++	3	0	0	3
EC15304	Electrical Machines and Instrumentation	3	0	0	3
EC15305	Electronic Circuits-I Laboratory	0	0	4	2
EC15306	Digital Electronics Laboratory	0	0	4	2
IT15308	Data Structures and Object Oriented Programming Laboratory	0	0	4	2

SEMESTER IV

Course Code	Course Title	L	T	P	C
MA15402	Probability and Random processes	3	2	0	4
EC15401	Electronic Circuits- II	3	0	0	3
EC15402	Communication Theory	3	0	0	3
EC15403	Linear Integrated Circuits	3	0	0	3
EC15404	Control Systems	3	0	0	3
EC15405	Electromagnetic Fields and Waves	3	0	0	3
EC15406	Electronic Circuits II Laboratory	0	0	4	2
EC15407	Linear Integrated Circuits Laboratory	0	0	4	2
EN15401	Business English Course Laboratory	0	0	2	1

SEMESTER III

MA15301 TRANSFORMS AND BOUNDARY VALUE PROBLEMS 3 2 0 4

COURSE OBJECTIVES

- To introduce Fourier series analysis which are common for many engineering applications apart from solving boundary value problems.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes
- To develop Z transform techniques for discrete time systems.

UNIT I FOURIER SERIES 15

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Gibb's Phenomenon – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORMS 15

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 15

Formation of partial differential equations – Lagrange's linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 15

Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 15

Z-transforms – Elementary properties – Inverse Z-transform – Convolution theorem – Formation of difference equations – Solution of difference equations using Z-transform.

TOTAL: 75 PERIODS

COURSE OUTCOMES

At the end of the course the students would

- have gained a well founded knowledge of fourier series, their different possible forms and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data.
- have grasped the concept of expression of a function, under certain conditions, as a double integral leading to identification of transform pair and specialization on fourier transform pair, their properties.

- have obtained capacity to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the fourier series method of solution, solve them and interpret the results.
- be capable of mathematically formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
- have learnt the basics of z – transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of difference equations and solve them using the z – transform technique bringing out the elegance of the procedure involved.

TEXT BOOKS

1. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Narayanan S., Manickavasagam Pillai.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" ,Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.

REFERENCES

1. Larry C. Andrews, Bhimsen K. Shivamoggi, "Integral Transforms for Enginears", SPIE Optical Engineering press, Washington USA (1999).
2. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company limited, New Delhi (2010).
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education (2007).
4. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th edition, Wiley Publications.
5. Ray Wylie C and Barrett.L.C, "Advanced Engineering Mathematics", Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.
6. Datta K.B., "Mathematical Methods of Science and Engineering", Cengage Learning India Pvt Ltd, Delhi, 2013.

WEB LINKS

1. https://www.youtube.com/watch?v=coe-UA5ONI0
2. https://www.youtube.com/watch?v=gZNm7L96pfY
3. https://www.youtube.com/watch?v=4GHY8sRKPaU
4. http://172.16.100.200/NPTEL/displayweb.html?type1=111103021%2F35.pdf
5. http://172.16.100.200/NPTEL/displayweb.html?type1=111104031%2Flectures.pdf%23page%3D101.

EC15301 ELECTRONIC CIRCUITS I 3 0 0 3

COURSE OBJECTIVES

- To introduce the basic concepts of biasing.
- To inculcate a comprehensive understanding of small signal Amplifiers.
- To study the Multistage Amplifiers.
- To understand various types of Large Signal Amplifiers
- To know about rectifiers, filters and power supplies

UNIT I LOAD LINE AND BIAS STABILITY 9

Transistor Biasing, Methods of Transistor Biasing - DC load line, AC load line, Quiescent point variation due to uncertainty in β, Effect of temperature on the Q-point, Stability factor analysis, Bias compensation techniques, Biasing the FET

UNIT II MID-BAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS 9

Two-Port Networks, Analysis of a Transistor Circuit using h-parameters, Simplified CE Hybrid Model, Analysis of CE, CC, and CB Configuration using Approximate Model, BJT Amplifiers, Single Stage Amplifiers, Small Signal Analysis of Single Stage BJT Amplifiers, Miller's Theorem and its Dual, Design of Single Stage RC Coupled Amplifier using BJT, FET Amplifiers, The FET Small-Signal Model, Differential Amplifiers.

UNIT III MULTISTAGE AMPLIFIERS 9

Different Coupling Schemes used in Amplifiers, General Analysis of Cascade Amplifiers, Choice of Transistor Configuration in Cascade Amplifier, Two Stage RC Coupled Amplifier, Transformer Coupled Amplifier, Direct Coupled Amplifiers, Darlington Amplifiers, Cascode Amplifiers

UNIT V HIGH FREQUENCY AND LARGE SIGNAL AMPLIFIERS 9

General Shape of Frequency Response of Amplifiers, High Frequency π Model for a Transistor, Emitter Follower at Higher Frequencies, Large Signal Amplifiers - Introduction, Classification Based on Biasing Condition - Class A, Class B, Class AB, Class C, Class D, Class S Power Amplifiers, MOSFET Power Amplifiers, Thermal Stability and Heat Sink.

UNIT V RECTIFIERS, FILTERS AND POWER SUPPLIES 9

Linear Mode Power Supply - Filters and its types - Voltage Regulators – Rectifiers - Half wave rectifier - Full wave rectifier - Bridge rectifier - Switched Mode Power Supply

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- understand the concept of biasing

- obtain the knowledge about the small signal amplifiers
- know about the various multistage amplifiers
- know about the concept of large signal Amplifiers and power supplies

TEXT BOOKS

1. Donald L.Schilling, Charles belove, "Electronic Circuits", 3rd edition, McGraw Hill, 1989.
2. Salivahanan.S, Sureshkumar.N, "Electronic Devices and Circuits", 3rd edition, McGraw Hill, 2014.

REFERENCES

1. Jacob Millman, Christos C.Halkias, " Electronic Devices and Circuits", Tata McGraw Hill,1991
2. Donald.A.Neamen, "Electronic Circuit Analysis and Design", 2nd edition, Tata McGraw Hill, 2007.
3. Adel.S.Sedra, Kenneth C.Smith, "Micro Electronic Circuits", 5th edition, Oxford University Press, 2004.

WEB LINKS

1. http://nptel.ac.in/video.php?subjectId=117103063
2. http://www.electronics-tutorials.ws/transistor/tran_8.html
3. http://people.seas.harvard.edu/~jones/es154/lectures/lecture_3/bjt_amps/bjt_amps.html
4. https://www.youtube.com/watch?v=Pkjn18Ekjic
5. http://www.allaboutcircuits.com/textbook/semiconductors/chpt-4/common-emitter-amplifier/

EC15302 DIGITAL ELECTRONICS 3 0 0 3

COURSE OBJECTIVES

- To understand the fundamentals and simplification of digital logic
- To design the various combinational circuits
- To study and design synchronous sequential circuits
- To design and implement asynchronous sequential circuits
- To acquire basic knowledge in memory and HDL programming

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 9

Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality - Boolean functions – Minimization of Boolean functions– Karnaugh map Minimization – Tabulation Method - Don't care conditions. Logic Gates- Implementations of Logic Functions using gates - NAND – NOR implementations - TTL - CMOS - NAND, NOR, NOT –Tristate gates.

UNIT II COMBINATIONAL CIRCUITS 9

Design procedure of Combinational circuits: Adders-Subtractors – Parallel and serial adder/ Subtractor- Carry look ahead adder- BCD adder - 2 bit Magnitude Comparator- Multiplexer/ Demultiplexer- encoder / decoder – parity generator and checker – code converters.

UNIT III SEQUENTIAL CIRCUITS 9

Flip flops – Triggering –Realization of flip flop using other flip flops –Asynchronous and Synchronous counters –Modulo-n counter –Classification of sequential circuits – Moore and Mealy - Design of Synchronous counters – ASM Chart - Shift registers - Ring counters.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table – state assignment – Excitation table – cycles – Race Free State assignment - Hazards: Static –Dynamic – Essential – Hazards elimination.

UNIT V MEMORY DEVICES AND INTRODUCTION TO HDL 9

Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM –EAPROM, RAM – RAM organization – Write operation – Read operation– Memory decoding – memory expansion – Static RAM Cell- Bipolar RAM cell – Dynamic RAM cell. Programmable Logic Devices – PLA – PAL - FPGA - Introduction to HDL –Simple programs Using Verilog HDL.

TOTAL: 45 PERIODS

COURSE OUTCOMES

After Completion of the course, the students will be able to

- understand the realization of boolean functions using many techniques
- design and implement combinational circuits

- design and implement synchronous sequential circuits
- design and study the effect of hazards in asynchronous sequential circuits
- know the concept of Memories and HDL.

TEXT BOOKS

1. M. Morris Mano, "Digital Design", 3.ed., Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003 .
2. H. Charles Roth Jr, "Digital System Design using VHDL", Thomson/ Brookscole, 2005.

REFERENCES

1. S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design", 3rd Edition, Vikas Publishing House Pvt.Ltd, New Delhi, 2007.
2. John .M Yarbrough, "Digital Logic Applications and Design", Thomson Publications, New Delhi,2007.
3. Charles H.Roth, "Fundamentals of Logic Design", Thomson Publication Company, 2003.
4. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 5th edition, Tata Mc-Graw Hill Publishing Company Limited, New Delhi, 2003.
5. Donald D.Givone, "Digital Principles and Design", Tata Mc-Graw Hill Publishing company limited, New Delhi, 2003.

WEB LINKS

1. http://nptel.ac.in/video.php?subjectId=117106086
2. http://www.electronics-tutorials.ws/combination/comb_1.html
3. http://www.allaboutcircuits.com/textbook/digital/chpt-9/combinational-logic-functions/
4. http://www.allaboutcircuits.com/video-lectures/sequential-logic/
5. http://www.electronics-tutorials.ws/sequential/seq_1.html
6. http://electronics-course.com/combinational-logic-design
7. www.ewu.edu/groups/technology/Claudio/ee430/.../AccoladeVHDLref.pdf

EC15303 SIGNALS AND SYSTEMS 3 0 0 3

COURSE OBJECTIVES

- To introduce the basic concepts of continuous time and discrete time signals and systems
- To analyze signals and systems using different transforms
- To know about the analysis and realization of LTI – Continuous Time systems
- To acquire the basic knowledge in Sampling and Z transform
- To know about the analysis and realization of LTI – Discrete Time systems

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 9

Continuous time signals (CT signals) - Discrete time signals (DT signals) – Step, Ramp, Pulse, Impulse, Exponential, basic operation on signals, classification of CT and DT signals –periodic and aperiodic signals, Energy & Power signals - CT systems and DT systems, Basic system properties - LTI system –Discrete time – Convolution Sum – continuous time – Convolution Integral - properties.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS 9

Fourier series definition, properties and analysis - Fourier transform definition, properties - analysis - Laplace Transform definition – ROC -- properties –- Signal Analysis – unilateral - bilateral Laplace Transform.

UNIT III LINEAR TIME INVARIANT – CONTINUOUS TIME SYSTEMS 9

Differential Equation - impulse response, Step response and output response - Fourier and Laplace transforms in Analysis of continuous time systems - Block diagram representation - Direct Form I- Direct Form II - Cascade and Parallel Realization.

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS 9

Sampling Theorem – Reconstruction – Aliasing - DTFT and properties - z-transform - Region of Convergence - properties of ROC - Properties of z-transform - Inverse z-transform using Partial fraction expansion.

UNIT V LINEAR TIME INVARIANT – DISCRETE TIME SYSTEMS 9

Difference Equations using Z transform - Impulse response - Analysis of Discrete time systems using DTFT and Z Transform - Block diagram representation -Direct Form I - Direct Form II - Cascade and Parallel Realization.

TOTAL: 45 PERIODS

COURSEOUTCOMES

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

- analyze the basic concepts of solving electronics and communication engineering problems
- demonstrate critical thinking and problem solving capabilities
- solve problems and solutions relating to LTI – continuous time systems
- demonstrate the basic knowledge and competence in the analysis of discrete time systems

- have an in-depth knowledge about LTI – discrete time systems

TEXT BOOKS

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson, Indian Reprint, 2007.
2. B P Lathi, "Linear Systems and Signals", Oxford University Press Inc, Chennai, 2004.
3. Simon Haykins and Barry Van Veen, "Signals and Systems", John Wiley & sons, Inc. 2004.

REFERENCES

1. S.K.Poornachandra, "Signals and Systems, Third edition, Tata McGraw-Hill.
2. K.Krishnaveni, A.Rajeswari, "Signals and Systems", Wiley India Private Limited (2012).
3. H P Hsu, Rakesh Ranjan, "Signals and Systems", Schaum's Outlines, Tata McGraw Hill, Indian Reprint 2007.
4. Edward W. Kamen, Bonnie S. Heck, "Fundamentals of Signals and Systems Using the Web and MATLAB", Pearson, Indian Reprint, 2007.
5. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007.
6. M.J.Roberts, "Signals & Systems, Analysis using Transform methods & MATLAB", Tata McGraw Hill (India), 2007.
7. Roberts Michael J. "Fundamentals of Signals and Systems", Tata McGraw-Hill, New Delhi, 2008.

WEB LINKS

1. http://www.nptelvideos.in/2012/12/signals-and-system.html
2. http://nptel.ac.in/courses/117104074/
3. www.thefouriertransform.com/
4. http://www.sosmath.com/diffeq/laplace/basic/basic.html
5. www.engineering.uco.edu/~mbingabr/...Systems/Ch1_Signals_Systems.p...
6. www.math.ubc.ca/~feldman/m267/ltiz.pdf

IT15304 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING IN C++ 3 0 0 3

COURES OBJECTIVES

- To learn the systematic way of solving problems
- To understand the different methods of organizing large amounts of data
- To introduce linear, non-linear data structures and their applications.
- To efficiently implement the different data structures
- To efficiently implement solutions for specific problems

UNIT I DATA ABSTRACTION AND OVERLOADING 9

Overview of C++ – control Structures –Functions in C++, classes and objects – Constructors – Destructors – Friend Function –Dynamic Memory Allocation – Static Class Members – Container Classes and Integrators – Proxy Classes – Overloading: Function overloading and Operator Overloading.

UNIT II INHERITANCE AND POLYMORPHISM 9

Inheritance – Overriding – Constructors and Destructors in derived Classes – Implicit Derived – Type Conversion – polymorphism – Virtual functions – This Pointer – Abstract Base Classes and Concrete Classes –Virtual Destructors – Dynamic Binding.

UNIT III LINEAR DATA STRUCTURES 9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists –Polynomial Manipulation - Stack ADT – Queue ADT -Evaluating arithmetic expressions

UNIT IV NON-LINEAR DATA STRUCTURES 9

Trees – Binary Trees – Binary tree representation and traversals – Application of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals – Representation of Graphs – Breadth-first search – Depth-first search - Connected components.

UNIT V SORTING AND SEARCHING 9

Sorting algorithms: Insertion sort - Quick sort - Merge sort - Searching: Linear search –Binary Search – Introduction to Algorithm Design Techniques –Greedy algorithm (Minimum Spanning Tree)

TOTAL: 45 PERIODS

COURSE OUTCOMES

After Completion of the course, the students will be able to

- design problem solutions using object oriented techniques.
- apply the concepts of data abstraction, encapsulation and inheritance for problem solutions.
- use the control structures of c++ appropriately.
- critically analyze the various algorithms.

- apply the different data structures to problem solutions.

TEXT BOOKS

1. Deitel and Deitel, “C++, How To Program”, Fifth Edition, Pearson Education, 2005.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Third Edition, Addison-Wesley, 2007.

REFERENCES

1. Bhushan Trivedi, “Programming with ANSI C++, A Step-By-Step approach”, Oxford University Press, 2010.
2. Goodrich, Michael T., Roberto Tamassia, David Mount, “Data Structures and Algorithms in C++”, 7th Edition, Wiley. 2004.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, Mc Graw Hill, 2002.
4. Bjarne Stroustrup, “The C++ Programming Language”, 3rd Edition, Pearson Education, 2007.
5. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, “Fundamentals of Data Structures in C++”, Galgotia Publications, 2007.

WEB LINKS

1. http://www.tutorialspoint.com/cplusplus/cpp_object_oriented.htm
2. https://www3.ntu.edu.sg/home/ehchua/programming/cpp/cp3_OOP.html
3. http://www.nptel.ac.in/
4. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms

EC15304 ELECTRICAL MACHINES AND INSTRUMENTATION 3 0 0 3

COURES OBJECTIVES

- To introduce DC machines.
- To understand concepts in electrical generators, motors and transformers
- To learn the concepts of Electronic measurements
- To gain knowledge of the importance of digital instruments in measurements
- To understand the importance of signal generators and signal analyzers in measurements

UNIT I DC MACHINES 9

Construction of DC machines – Theory of operation of DC generators – Characteristics of DC generators - Operating principle of DC motors – Types of DC motors and their characteristics – Speed control of DC motors - Applications.

UNIT II TRANSFORMER AND AC MACHINES 9

Single phase transformer construction and principle of operation – EMF equation of transformer- Transformer no–load– Transformer on–load –Equivalent circuit of transformer- Transformer losses and efficiency-All day efficiency –auto transformers - Construction of single-phase induction motors – Types of single phase induction motors- Equivalent circuit – Principles of alternator – Construction- Equation of induced EMF- synchronous motors – Torque equation – V curves

UNIT III BASICS OF MEASUREMENT SYSTEM 9

Measurement systems –Static and dynamic characteristics –units and standards of measurements – error :-accuracy and precision, types, statistical analysis –moving coil, moving iron meters – multimeters –Bridge measurements : –Maxwell, Hay, Schering, Anderson and Wien bridge.

UNIT IV DIGITAL INSTRUMENTS AND DATA ACQUISITION SYSTEMS 9

Digital Voltmeter – Digital Multimeter – Digital Storage Oscilloscope - Digital frequency meter - Universal counter timer - Digital Data Acquisition System - Overview of PC Based instrumentation.

UNIT V SIGNAL GENERATORS AND ANALYZERS 9

Function generators, Pulse and square wave generators, RF signal generators - Sweep generators - Frequency synthesizer –Wave analyzer – Harmonic distortion analyzer – Spectrum analyzer :- Digital spectrum analyzer, Vector Network Analyzer – Digital L,C,R measurements, Digital RLC meters.

TOTAL: 45 PERIODS

COURES OUTCOMES

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

- understand the concepts in DC machines.
- understand the concepts in transformers and AC machines
- gain knowledge in the basic measurement and instrumentation based devices

- know the relevance of digital instruments in measurements
- know about signal generators and signal analyzers

TEXT BOOKS

1. J Nagarath and Kothari DP, "Electrical Machines", McGraw-Hill Education (India) Pvt Ltd 4th Edition, 2010
2. Thereja .B.L, "Fundamentals of Electrical Engineering and Electronics", S Chand & Co Ltd, 2008
3. A.K.Sawhney, "A Course in Electrical & Electronic Measurements and Instrumentation", Dhanpat Rai and Co, 2004.

REFERENCES

1. Del Toro, "Electrical Engineering Fundamentals" Pearson Education, New Delhi, 2007.
2. W.D.Cooper & A.D.Helfrick, "Modern Electronic Instrumentation and Measurement Techniques", 5th Edition, PHI, 2002.
3. Ernest O. Doebelin, "Measurement Systems-application and Design", TMH, 2007
4. B.C. Nakra and K.K. Choudhry, "Instrumentation, Measurement and Analysis", 2nd Edition, TMH, 2004.

WEB LINKS

1. www.electricaleasy.com/2014/01/basic-working-of-dc-motor.html
2. www.globalspec.com/reference/.../chapter-5-ac-machine-fundamentals
3. www.electricaleasy.com/.../AC-generator-alternator-construction
4. https://www.moresteam.com/toolbox/measurement-system-analysis.cfm
5. www.eolss.net/sample-chapters/c05/E6-39A-04-06.pdf

EC15305 ELECTRONIC CIRCUITS I LABORATORY 0 0 4 2

COURES OBJECTIVES

- To gain the knowledge about frequency response of different types of amplifiers
- To learn about transfer characteristics of Differential amplifiers
- To get the knowledge about large signal amplifiers
- To know about frequency response of multi-stage amplifiers
- To acquire the knowledge about different types of rectifiers

LIST OF EXPERIMENTS

1. Design the biasing methods using BJT
2. Determination of the Frequency response of CE amplifier
3. Determination of the Frequency response of CB amplifier
4. Determination of the Frequency response of CS Amplifiers
5. Design Class A power amplifiers and determination its efficiency
6. Design Class B power amplifiers and determination its efficiency
7. Measurement of CMRR of differential amplifier
8. Determination of the bandwidth of Cascade amplifier
9. Determination of the bandwidth of Cascode amplifier
10. Determination of the efficiency and ripple factor of half wave rectifier
11. Determination of the efficiency and ripple factor of full wave rectifier

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- learn the working condition and frequency response of different types of Amplifiers
- analyze the frequency response of power amplifiers and bandwidth of multi-stage amplifiers
- acquire the knowledge of measurement of CMRR

EC15306 DIGITAL ELECTRONICS LABORATORY 0 0 4 2

COURES OBJECTIVES

- To design and implement the digital circuits.
- To gain expertise in digital systems and simulation of digital circuits with Verilog HDL.

LIST OF EXPERIMENTS

1. Design and implementation of Adders and Subtractors using logic gates.
2. Design and implementation of code converters using logic gates
    i. BCD to excess-3 code and vice versa.
    ii. Binary to gray and vice-versa.
3. Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483.
4. Design and implementation of 2 Bit Magnitude Comparator using logic gates
5. Design and implementation of 4 bit odd/even parity checker generator using IC74180.
6. Design and implementation of Multiplexer and De-multiplexer using basic logic gates and study of IC 74150 and IC 74154.
7. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147.
8. Construction and verification of 4 bit ripple counter and Mod-n Ripple counters.
9. Design and implementation of 3-bit synchronous up (or) down counter.
10. Implementation of 3- bit shift registers using Flip flops.
11. Design and Simulation of Adders, Subtractors, Multiplexer and De-multiplexer, encoder and decoder, 4 bit ripple counter using Verilog HDL.

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- gain knowledge of basic logic gates, boolean theorems and karnaugh map.
- analyze the different categories of combinational & sequential and its applications.
- design the various counters and shift registers in digital circuits.
- gain knowledge of verilog operations and their coding styles.

IT15308 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING LABORATORY **0 0 4 2**

COURSE OBJECTIVES

- Be familiarized with good programming design methods, particularly Top- Down design.
- Getting exposure in implementing the different data structures using C++
- Appreciate recursive algorithms.

LIST OF EXPERIMENTS

1. Basic Programs for C++ Concepts
2. Array implementation of List Abstract Data Type (ADT)
3. Linked list implementation of List ADT
4. Cursor implementation of List ADT
5. Stack ADT - Array and linked list implementations by implementing the following source files
    (a) Program source files for Stack Application
    (b) Array implementation of Stack ADT
    (c) Linked list implementation of Stack ADT
6. Queue ADT – Array and linked list implementations
7. Search Tree ADT - Binary Search Tree
8. Heap Sort
9. Quick Sort
10. Minimum Spanning Trees

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- design and implement C++ programs for manipulating stacks, queues, linked lists, trees, and graphs.
- apply good programming design methods for program development.
- apply the different data structures for implementing solutions to practical problems.
- develop recursive programs using trees and graphs.

SEMESTER IV

MA15402 PROBABILITY AND RANDOM PROCESSES 3 2 0 4

COURES OBJECTIVES

- To acquire knowledge of the random variable and manipulate.
- To understand the concepts of some standard distributions.
- To analysis the relationship between the two random variables.
- To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems etc in communication engineering.
- To enable students to understand the topics such as signals & systems, pattern recognition, voice and image processing and filtering theory.

UNIT I RANDOM VARIABLES 15

Axioms of probability – Conditional probability – Total probability – Baye‟s theorem Random variable-Probability mass function – Probability density function – Properties - Moments –Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTION 15

Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions and their properties – Functions of a random variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 15

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables.

UNIT IV RANDOM PROCESS AND MARKOV CHAIN 15

Classification - Stationary process - Poisson process-Markov Chain- Transition probabilities-Limiting Distributions.

UNIT V CORRELATION AND SPECTRAL DENSITIES 15

Auto correlation functions – Cross correlation functions – Properties – Power spectral density – Cross spectral density – Properties. Linear time invariant system – System transfer function – Linear systems with random inputs – Autocorrelation and Cross correlation functions of input and output.

TOTAL: 75 PERIODS

COURSE OUTCOMES

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

- have a fundamental knowledge of the basic probability concepts.
- have a well – founded knowledge of standard distributions which can describe real life phenomena.
- acquire skills in handling situations involving more than one random variable and functions of

random variables.

- understand and characterize phenomena which evolve with respect to time in a probabilistic manner.
- be able to analyze the response of random inputs to linear time invariant systems.

TEXT BOOKS

1. T.Veerarajan, “Probability, Statistics and Random Processes”, 2nd ed., Tata McGraw- Hill, New Delhi, 2008.
2. Ibe.O.C., “Fundamentals of Applied Probability and Random Processes", Elsevier,2nd Indian Reprint, 2010.
3. Peebles. P.Z., "Probability, Random Variables and Random Signal Principles", Tata McGraw Hill, 4th Edition, New Delhi, 2008.

REFERENCES

1. Yates. R.D. and Goodman. D.J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.
2. Cooper. G.R., McGillem. C.D., "Probabilistic Methods of Signal and System Analysis", 3rd Indian Edition, Oxford University Press, New Delhi, 2012.
3. Hsu and Hwei, “Schaum‟s Outline of Theory and Problems of Probability, Random variables and Random Processes,” Tata McGraw –Hill, New Delhi, 2008.
4. Leon-Garcia, Albert, “Probability and Random Processes for Electrical Engineering,”2nd ed., PearsonEducation, 2008.
5. Venkatachalam.G, “Probability and Random Process”,Hitech Publishing Company Pvt.Ltd.,Chennai,3rd Edition, 2012.

EC15401 ELECTRONIC CIRCUITS II 3 0 0 3

COURES OBJECTIVES

- To analyze about the feedback amplifiers
- To learn about tuned amplifiers
- To study the concepts of oscillator
- To study the wave shaping and multivibrator circuits
- To acquire the basics of blocking oscillators

UNIT I FEEDBACK AMPLIFIERS 9

Classification of Basic Amplifiers, Basic Concept of Feedback, Transfer Gain with Feedback, General Characteristics of Negative feedback Amplifiers, Effect of Negative Feedback on Input Resistance and Output Resistance, Method of Identifying Feedback Topology, Voltage-Series Feedback, Current-Series Feedback, Current-Shunt Feedback, Voltage-Shunt Feedback, Stability of Feedback Amplifiers.

UNIT II TUNED AMPLIFIERS 9

Small Signal Tuned Amplifiers, Effect of Cascading Single Tuned Amplifiers on Bandwidth, Effect of Cascading Double Tuned Amplifier on Bandwidth, Stagger Tuned Amplifiers, Comparison of Tuned Amplifiers, Large Signal Class - CTuned Amplifiers – Stability of Tuned Amplifiers, Neutralization.

UNIT III OSCILLATORS 9

Classification of Oscillators, Conditions for Oscillation, General form of an LC Oscillator - Hartley Oscillator, Colpitts Oscillator, Clapp Oscillator, RC Phase Shift Oscillators, Wien-Bridge Oscillator, Twin-T Oscillator, Crystal Oscillators.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 9

Waveform Shaping Circuits - Diode clippers – Clampers – Multivibrators - Triggering Methods for Bistable Multivibrators- Schmitt Trigger.

UNIT V BLOCKING OSCILLATORS AND TIME BASE GENERATORS 9

UJT Relaxation Oscillator - Pulse Transformers - Blocking Oscillator - Triggered Blocking Oscillator –Voltage and Current Time Base Circuits.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- understand the concept of feedback amplifiers
- understand the concept of tuned amplifiers
- obtain the knowledge about oscillators

- know about multivibrators
- understand the blocking oscillators

TEXT BOOKS

1. Donald L.Schilling, Charles Belove, "Electronic Circuits", 3rd edition, McGraw Hill, 1989.
2. Salivahanan.S, Sureshkumar.N, "Electronic Devices and Circuits", 3rd edition, McGraw Hill, 2014.
3. Adel.S.Sedra, Kenneth C.Smith, "Micro Electronic Circuits", 5th edition, Oxford University Press, 2004.

REFERENCES

1. JacobMillman, Christos C.Halkias, "Electronic Devices and Circuits", Tata McGraw Hill, 1991.
2. F.Bogart Jr., "Electronic Devices and Circuits", 6th edition, Pearson Education, 2007.
3. Donald.A.Neamen, "Electronic Circuit Analysis and Design", 2nd edition, Tata McGraw Hill, 2007.

WEB LINKS

1. http://nptel.ac.in/courses/117106030/2
2. http://nptel.ac.in/courses/122106025/35
3. https://www.youtube.com/watch?v=VW3BajesMAw
4. http://seminarprojects.org/c/nptel-video-lecture-on-multivibrator
5. http://nptel.ac.in/courses/117103063/4

EC15402 COMMUNICATION THEORY 3 0 0 3

COYRES OBJECTIVES

- To know the basics of communication
- To offer various Amplitude modulation and demodulation systems
- To provide various Angle modulation and demodulation systems
- To make the students familiar with the working of transmitters and receivers.
- To understand the effect of noise on communication systems.

UNIT I AMPLITUDE MODULATION 9

Elements of an Electrical communication system-Communication channel and their characteristics-Need for modulation- Amplitude Modulation – Definition- single tone modulation-Phasor representations- power relations in AM waves- Generation of AM waves- Detection of AM Waves-DSB MODULATION : Double side band suppressed carrier modulators- time domain and frequency domain description-Generation of SSB AM Modulated Wave - Demodulation of SSB Waves-principles of Vestigial Side Band modulation, comparison of AM system.

UNIT II ANGLE MODULATION 9

Basic concepts-Frequency Modulation & Phase Modulation: Single tone frequency modulation-Spectrum Analysis of Sinusoidal FM Wave- Narrow band FM-Phasor representation -Wide band FM-Constant Average Power- Transmission bandwidth of FM Wave - Generation of FM Waves: Direct and Indirect FM-Detection of FM Waves: Balanced Slope detector- Foster Seeley discriminator-Ratio detector- Phase locked loop method of FM detection- Comparison of FM and AM.

UNIT III RADIO TRANSMITTERS AND RECEIVERS 9

Radio Transmitter - Classification of Transmitter: 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-Amplitude limiting- Comparison with AM Receiver.

UNIT IV NOISE 9

Noise sources and types -Noise figure- Calculation of noise figure- noise bandwidth- Equivalent noise resistance - Noise figure of cascaded stages-noise figure measurement- Noise temperature- Available Noise Power Noise in Analog communication System- Noise in DSB, SSB, AM and FM Systems - Threshold effect in FM System- Pre-emphasis & De-Emphasis in FM.

UNIT V INFORMATION THEORY 9

Entropy - Discrete Memory less channels - Channel Capacity -Hartley - Shannon law - Source coding theorem - Huffman & Shannon - Fano codes.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- learn the basics of am communication systems
- design angle modulated communication systems
- understand the transmission and receiving concept of communication system
- analyze the noise performance of am and fm systems
- acquire the knowledge on discrete memory less channels

TEXT BOOKS

1. Proakis and Salehi, "Fundamentals of Communication Systems", Pearson Education, 2006.
2. Wayne Tomasi, "Electronic Communication Systems Fundamentals through Advanced", 5th Edition, Pearson Education Inc, 2004.
3. Michael P. Fitz, "Fundamentals of Communication Systems" Tata McGraw-Hill, Edition-2008.

REFERENCES

1. H Taub & D.Schilling, GautamSahe, "Principles of Communication Systems", Tata McGraw Hill, 3rd Edition, 2007.
2. Simon Haykin, "Communication Systems", John Wiley, 5th Edition, 2009.
3. B.P.Lathi, "Communication Systems", BS Publication, 2006.
4. George Kennedy and Bernard Davis, "Electronics & Communication System", Tata McGraw Hill, 2004.

WEB LINKS

1. http://nptel.ac.in/video.php?subjectId=117102059
2. https://www.youtube.com/watch?v=GqBSyLRHDeE
3. https://www.youtube.com/watch?v=Z-Hw3CpPVj0

EC15403 LINEAR INTEGRATED CIRCUITS 3 0 0 3

COURES OBJECTIVES

- To introduce the basic of operational amplifier
- To learn linear and nonlinear applications of operational amplifier
- To study the applications of analog multiplier and PLL
- To introduce theory of analog and digital conversion
- To acquire the basic knowledge of special function IC's

UNIT I INTEFRATED CIRCUIT FABRICATION AND BASICS OF OPERATIONAL AMPLIFIER 9

Integrated Circuit classification, Fundamentals of Monolithic IC Technology, Basic Fabrication process Fabrication of a typical circuit – Active and passive components of ICs - Operational amplifier – Basic information of Op-Amps – Ideal Op-Amp –operational amplifier Internal circuit– Examples of IC Op-Amps - DC, AC Characteristics of Op-Amp -virtual ground, frequency compensation techniques - slew rate.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Basic Op-Amp applications (sign changer, scale changer, voltage follower, adder and subtractor) – Instrumentation amplifier – Voltage-to-Current and Current-to-Voltage converter – Logarithmic amplifier - Anti-logarithmic amplifiers – Differentiator - Integrator - Comparator – Schmitt trigger – Active filters – Design of Low pass, high pass and band pass filters – Op-Amp circuits using Diodes.

UNIT III ANALOG MULTIPLIER AND PLL 9

Analog multiplier IC – applications - Analysis of four quadrant and variable Trans-conductance multipliers –PLL: Basic principles-Phase Detector/Comparator- Voltage controlled Oscillator – Monolithic PLL - PLL applications – Frequency multiplier - AM, FM and FSK demodulators - Frequency synthesizers – Frequency translation.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTORS 9

Introduction - basic DAC techniques: Binary weighted resistor type – R-2R ladder type – sample and hold circuits – Analog-to-Digital converters: Flash type ADC – Counter type ADC –Successive approximation register type ADC- Dual slope ADC – DAC / ADC Specifications.

UNIT V SPECIAL FUNCTION ICS 9

Waveform generators – Basic principles of sine wave oscillators – Astable and monostable multivibrators using Op-Amp - ICL8038 Function Generator – 555 timer: description of functional diagram – Astable, monostable operation – 723 general purpose voltage regulator – switching regulator – Switched capacitor filter – LM380 audio amplifier – Opto-couplers and fiber optic ICs.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- learn the basic concepts of operational amplifier
- understand the working and applications of operational amplifier
- learn about PLL applications in modulator circuits
- study about working of analog and digital communication circuits
- know the basic function of special function IC

TEXT BOOKS

1. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., Fourth edition 2010.
2. Sergio Franco, "Design with operational amplifiers and analog integrated circuits", McGraw Hill, 3rd edition 2007

REFERENCES

1. William D.Stanely, "Operational Amplifiers with Linear Integrated Circuits", Pearson Education, 2004.
2. David L.Terrell, "Op Amps-Design, Application, and Troubleshooting", Elsevier publications 2005.
3. Ramakant A. Gayakwad, "OP - AMP and Linear IC's", Prentice Hall, 1994.
4. Botkar K.R., "Integrated Circuits", Khanna Publishers, 1996.
5. Taub and Schilling, "Digital Integrated Electronics", McGraw Hill, 1977.
6. Michael Jacob J., "Applications and Design with Analog Integrated Circuits", PHI, 1996.

WEB LINKS

1. http://www.ee.iisc.ernet.in/new/people/faculty/prasantg/downloads/opamp_circuits.pdf
2. http://cc.ee.ntu.edu.tw/~lhlu/eecourses/Electronics1/Electronics_Ch2.pdf
3. http://www.electronics.dit.ie/staff/ypanarin/Lecture%20Notes/DT0214/7AnalogMultipliers%284p%29.pdf
4. http://astro.temple.edu/~silage/Chapter8MS.pdf
5. http://www.nptel.ac.in/courses/108105057/Pdf/Lesson-18.pdf

EC15404 CONTROL SYSTEMS 3 0 0 3

COURSE OBJECTIVES

- To gain knowledge on system modeling and time response of a system
- To understand the concept of time and frequency domain design of control systems
- To study methods to analyze the stability of control systems
- To carryout analysis using MATLAB
- To know the concept of state variable analysis in control systems

UNIT I CONTROL SYSTEM MODELING 9

Basic Elements of Control System – Open loop and Closed loop systems - Differential equation - Transfer function concept- Modeling of Electric systems, Translational and rotational mechanical systems - Block diagram reduction Techniques – Signal flow graph – Mason's gain formula.

UNIT II TIME RESPONSE ANALYSIS 9

Standard Test Signals - Time response analysis - First Order Systems - Impulse and Step Response analysis of second order systems - Steady state errors – P, PI, PD and PID Compensation, Analysis using MATLAB.

UNIT III FREQUENCY RESPONSE ANALYSIS 9

Frequency Response - Bode Plot, Polar Plot, Nyquist Plot - Frequency Domain specifications from the plots - Constant M and N Circles - Nichol's Chart - Nichol's Chart in Control System Analysis - Series, Parallel, series-parallel Compensators - Analysis using MATLAB.

UNIT IV STABILITY ANALYSIS 9

Stability-Location of roots in S plane for stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, Nyquist Stability Criterion, Analysis using MATLAB.

UNIT V STATE VARIABLE ANALYSIS 9

State space representation of Continuous Time systems – State equations- Transfer function from state Variable representation – Solutions of the state equations- Concepts of Controllability and Observability

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- determine the models of control systems and their representation
- learn time and frequency domain techniques to design a control system
- identify the major causes that affect the stability of a control system
- understand the basic matlab commands related to control systems
- able to know the concept of state variable analysis of control systems

TEXT BOOKS

1. J.Nagrath and M.Gopal, “Control System Engineering”, New Age International Publishers, 5th Edition, 2007.
2. Katsuhiko Ogata, “Modern Control Engineering”, second edition, Prentice Hall of India Private Limited, New Delhi, 1995.

REFERENCES

1. Benjamin.C.Kuo, “Automatic control systems”, Prentice Hall of India, 7th Edition, 1995.
2. M.Gopal, “Control System – Principles and Design”, Tata McGraw Hill, 2nd Edition, 2002.
3. Schaum’s Outline Series, “Feedback and Control Systems”, Tata McGraw-Hill, 2007.
4. John J.D’azzo& Constantine H.Houpis, “Linear control system analysis and design”, Tata McGraw-Hill Inc., 1995.
5. Richard C. Dorf& Robert H. Bishop, “Modern Control Systems”, Addidon –Wesley, 1999.

WEB LINKS

1. http://nptel.ac.in/courses/108101037/7
2. http://www.bisonacademy.com/ECE311/Lectures/12_Transfer_Functions.pdf
3. http://www.msubbu.in/sp/ctrl/BD-Rules.htm

EC15405 ELECTROMAGNETIC FIELDS AND WAVES 3 0 0 3

COURSE OBJECTIVES

- To analyze fields and potentials due to static charges
- To evaluate static magnetic fields
- To realize how materials affect electric and magnetic fields
- To identify the relation between the fields under time varying situations
- To understand principles of propagation of uniform plane waves

UNIT I ELECTRICSTATIC FIELDS 9

Co-ordinate systems, Vector differential operators, Coulombs law, Divergence theorem, Stokes theorem, Electric field intensity – charge distribution, electric flux density –Applications of Gauss's law, Electric potential, Electric dipole, Energy and Energy density.

UNIT II ELECRIC FIELDS IN MATERIAL SPACE 9

Conductors – Polarization in dielectrics, Dielectric constant and strength, Uniqueness theorem - continuity equation, Boundary conditions, Poisson's and Laplace's equation – General procedure for solving Poisson's and Laplace's equation– Resistance and Capacitance, Method of images.

UNIT III MAGNETOSTATIC FIELDS 9

Biot – Savart's law, Ampere's circuit law - Magnetic flux Density and Field intensity – applications of Ampere's Law –Magnetic scalar and vector potentials -Force due to magnetic fields -Magnetic Torque and moment, Magnetization in materials, magnetic boundary conditions, Inductors and Inductances – magnetic Energy – magnetic circuits.

UNIT IV TIME VARYING FIELDS AND MAXWELL'S EQUATIONS 9

Faradays law, Transformer and motional electromotive forces, The equation of continuity for time varying fields – Inconsistency of Ampere's Law - Maxwell's equation, Displacement current, time varying potentials – time harmonic fields – Electromagnetic spectrum.

UNIT V ELECTROMAGNETIC WAVE PROPAGATION 9

Wave propagation in lossy dielectric – plane waves in lossless dielectrics-plane waves in free space-plane waves in good conductors-power and the Poynting vector-Reflection of plane waves at normal incidence-Reflection of plane wave at oblique incidence- Transmission line analogy-Application Note- microwaves.

TOTAL: 45 PERIODS

COURSE OUTCOMES

After completion of the course, the students would be able to

- examine the field potentials due to static changes
- study the effect of field on materials

- evaluate the field intensity due to static magnetic fields
- analyze the relation between the fields under time varying situations
- discuss the principles of propagation of uniform plane waves

TEXT BOOKS

1. Mathew. N.O.Sadiku, "Principles of Electromagnetics", Oxford University Press, 2011.
2. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", Printice-hall of India/PHI, 2nd edition, 2007.
3. Kraus, Fleisch, "Electromagnetics with Applications", McGraw-Hill, 2005.
4. David .K.Cheng, "Field and wave Electromagnetics", 2nd edition, Pearson education, 2004.

REFERENCES

1. Karl E.Longman and Sava V.Savov, "Fundamentals of Electro-Magnetics", Prentice Hall of India, 2006.
2. W.H.Hayt and A.Buck, "Engineering ElectroMagnetics", 7th Edition, McGraw Hill, 2006.
3. AshutoshPramanik, "Electro Magnetism", Prentice Hall of India, 2006.
4. Ramo, Whinnery and Van Duzer, "Fields and Waves in Communications Electronics", John Wiley & Sons, 3rd edition 2003.

WEB LINKS

1. web.uni-miskolc.hu/~www_fiz/palasthy/.../Static_Electric_Field.pdf
2. www.greenfacts.org › Home › Static Fields › Level 2
3. www.springer.com/cda/content/.../cda.../9782817803623-c2.pdf?...0.

EC15406 ELECTRONIC CIRCUITS – II LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To gain hands on experience in designing feedback amplifiers
- To acquire knowledge about the design of oscillators
- To learn the simulation software used for circuit design
- To understand the concepts of Multivibrators

LIST OF EXPERIMENTS

1. Design of Feedback amplifier circuits
2. Frequency response of class C tuned amplifier
3. Design of integrator and differentiator
4. Design of RC oscillators (RC Phase shift / Wien bridge)
5. Design of LC oscillators (Hartley /Colpitts /Clapp)
6. Design of multivibrators (Astable / monostable / bistable)
7. Design of clippers and clampers
8. Spice simulation of differential amplifiers
9. Spice simulation of Multivibrators
10. Spice simulation of integrator and differentiator

TOTAL: 60 PERIODS

COURSE OUTCOMES

After the completion of this lab course, the students will be able to

- analyze feedback amplifiers
- analyze differential and power amplifiers
- design of oscillators and multivibrators for the given specifications
- analyze electronic circuits through simulation

EC15407 LINEAR INTEGRATED CIRCUITS LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To study the application of operational amplifier
- To know the design of multivibrators using operational amplifier and 555 timer
- To design oscillators and active filtersin various applications.
- To simulate the Op-Amp application circuits using PSPICE software

LIST OF EXPERIMENTS

Design and testing of

1. Inverting, Non inverting amplifier and differential amplifier
2. Instrumentation amplifier
3. Integrator and Differentiator
4. Active low pass, High pass and band pass filters.
5. Astable, Monostable Multivibrators and Schmitt trigger (using IC 741)
6. Phase shift Oscillator and Wien bridge oscillators (using IC 741)
7. Astable and monostable Multivibrators using NE555 Timer
8. Frequency multiplier using PLL IC
9. Voltage regulation using LM317 and LM723

Simulation Experiments

10. Simulation of (i) Instrumentation amplifier,(ii) Integrator and Differentiator,(iii) Active low pass, High pass and band pass filters, (iv) Astable, Monostable Multivibrators and Schmitt trigger (using IC 741), (v) Phase shift Oscillator and Wien bridge oscillators (using IC 741), (vi) Astable and monostable Multivibrators using NE555 Timer, (vii) Frequency multiplier using PLL IC using PSPICE

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- design and test the op-amp applications
- understand the working and applications of filters
- design oscillators and multivibrators for various applications
- analyze the working of power supply

EN15401 BUSINESS ENGLISH COURSE LABORATORY 0 0 2 1

COURSE OBJECTIVES

- To develop the reading skills of the students and make them familiarized in skimming and scanning.
- To instill the communication concepts to enhance the students' conversational skills through various practice sessions and to familiarize them with a variety of business correspondence.
- To inculcate the receptive skills i.e. Listening and Reading and to make the students well versed in the Productive skills and to assist them in improving their vocabulary and comprehension of grammar.

UNIT I READING & VOCABULARY

Understanding short, real notices, messages - detailed comprehension of factual material- skimming & scanning skills - interpreting visual information - reading for detailed factual information - reading for gist and specific information - reading for grammatical accuracy and understanding of text structure - reading and information transfer.

UNIT II WRITING

Re-arranging appointments - asking for permission - giving instructions - apologizing and offering compensation - making or altering reservations - dealing with requests - giving information about a product.

UNIT III LISTENING

Listening to short telephonic conversation - Listening to short conversation or monologue - Listening to specific information - Listening to conversation- interview, discussion.

UNIT IV SPEAKING

Conversation between the interlocutor and the candidate - general interaction and social language - A mini presentation by each candidate on a business theme - organising a larger unit of discourse - giving information and expressing opinions - two way conversation between candidates followed by further prompting from the interlocutor- Expressing opinions- agreeing and disagreeing

TOTAL: 30 PERIODS

COURSE OUTCOMES

Upon the completion of the course, students will be able to

- enrich the vocabulary through reading and to develop their pronunciation skills.
- speak effectively in English in all occasions.
- prepare flawless reports and proposals.

TEXT BOOKS

1. Cambridge BEC Preliminary, Self-Study Edition, Cambridge University Press, New York, 2012.

2. Whitby, Norman,"Business Benchmark, Pre-intermediate to intermediate, Business Preliminary", Shree MaitreyPrintech Pvt. Ltd., Noida, 2014.

REFERENCES

1. Raman, Meenakshi&Sangeetha Sharma. Technical Communication: Principles and Practice.
2. Oxford University Press, New Delhi. 2011.
3. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005
4. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi. 2001.

WEB LINKS

1. http://www.cambridge.org/us/cambridgeenglish/catalog/cambridge-english-exams-ielts/business-benchmark