PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018

(AUTONOMOUS)

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM

REGULATIONS 2015

SEMESTER III

Course Code	Course Title	L	T	P	C
MA15301	Transforms and Boundary Value Problems	3	2	0	4
EE15301	Electron Devices and Circuits	3	0	0	3
CH15301	Environmental Science and Engineering	3	0	0	3
EE15302	Measurements and Instrumentation	3	0	0	3
EE15303	Electromagnetic Theory	3	0	0	3
IT15305	Object Oriented Programming	3	0	0	3
EE15304	Electronics and Instrumentation Laboratory	0	0	4	2
IT15309	Object Oriented Programming Laboratory	0	0	4	2
EN 15301	Business English Course Laboratory	0	0	2	1

SEMESTER IV

Course Code	Course Title	L	T	P	C
EE15401	Electrical Machines I	3	2	0	4
EE15402	Transmission and Distribution	3	0	0	3
EE15403	Control Systems	3	2	0	4
EE15404	Linear Integrated Circuits and Its Applications	3	0	0	3
EE15405	Digital Logic Circuits	3	2	0	4
EE15406	Communication Engineering	3	0	0	3
EE15407	Electrical Machines I Laboratory	0	0	4	2
EE15408	Control Systems Laboratory	0	0	4	2
EE15409	Linear Integrated and Digital Circuits Laboratory	0	0	4	2

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., ManickavasagamPillai.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

EE15301 ELECTRON DEVICES AND CIRCUITS 3 0 0 3

COURSE OBJECTIVES

- To familiarise the students with VI characteristics of PN junction diode and special diodes.
- To acquaint the students with construction, theory and characteristics of BJT, FET and MOSFET and to analyze their VI characteristics.
- To impart knowledge on amplifier circuits and their performance and to obtain the frequency response
- To impart concepts on different classes of power amplifiers.
- To acquaint the students with the basics of negative feedback amplifiers and to apprise knowledge on oscillators

UNIT I PN JUNCTION DEVICES 9

PN junction diode –structure, operation and V-I characteristics, Diffusion and Transient Capacitance-Varactor Diode – Tunnel Diode.Rectifiers – Half Wave and Full Wave Rectifier,– Display devices- LED, Laser diodes- Zener diode, characteristics-Zener Reverse characteristics – Zener as regulator

UNIT II TRANSISTORS 9

BJT, JFET, MOSFET- structure, operation, characteristics and Biasing UJT, Thyristor and IGBT - Structure and characteristics-Transistor as a switch-Use of a heat sink.

UNIT III AMPLIFIERS 9

BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response –MOSFET small signal model– Analysis of CS and Source follower – Gain and frequency response-High frequency analysis.

UNIT IV MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER 9

Differential amplifier – Common mode and Difference mode analysis –Single tuned amplifiers Transformer coupled class A, B, C and AB power amplifiers, complementary symmetry amplifiers, push pull amplifiers

UNIT V FEEDBACK AMPLIFIERS AND OSCILLATORS 9

Advantages of negative feedback – voltage / current, series, Shunt feedback –positive feedback – Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts, Crystal and UJT relaxation oscillator

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- understand the VI characteristics of PN junction diode and special diodes.
- describe the construction, theory and characteristics of BJT, FET and MOSFET and to analyze their VI characteristics.
- perform analysis of amplifiers and to obtain the frequency response
- explain the operation of multistage and power amplifiers.
- design feedback amplifiers and oscillators.

TEXT BOOKS

1. David.A.Bell, " Electronic Devices and Circuits ",Oxford University Press,2009
2. Millman and C.Halkias, "Electronic Devices and Circuits", Tata McGraw Hill., 2001
3. S.Salivahanan, "Electronic Devices and Circuits", Tata McGraw Hill, 2008.

REFERENCES

1. Donald A. Neaman, "Electronic Circuits" Tata McGraw Hill, 2006
2. Mathur.S.P., KulshreshthaD.C. &Chanda.P.R. "Electronic Devices – Applications and Integrated
3. Circuits",Umesh Publications.1999.
4. Allen Mottershed, "Electronic Devices & Circuits, An Introduction", Prentice Hall of India (P) Ltd, 2006.
5. Rashid, "Microelectronic circuits" Thomson Publication, 2011.P.RameshBabu , "Electronic Devices and Circuits", SciTech Publications Pvt Ltd, 2005

WEBLINKS

1. http://ecee.colorado.edu/~bart/book/book/chapter4/ch4_6.htm
2. http://www.electronics-tutorials.ws/
3. http://hyperphysics.phy-astr.gsu.edu/hbase/electronic/feedn.html
   http://onlinevideolecture.com/?course_id=821

CH 15301 ENVIRONMENTAL SCIENCE AND ENGINEERING 3 0 0 3

COURSE OBJECTIVES

At the end of this course the student is expected

- To know the constituents of the environment and the precious resources in the environment.
- To conserve all biological resources.
- To understand the role of human being in maintaining a clean environment and useful environment for the future generations
- To maintain the ecological balance and preserve bio-diversity.
- The role of government and non-government organizations in environment management.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 9

Environment: Definition- scope - importance – need for public awareness. Forest resources: Use –over exploitation- deforestation - case studies- mining - effects on forests and tribal people. Water resources: Use – over utilization of surface and ground water- floods – drought - conflicts over water. Mineral resources: Use – exploitation - environmental effects of extracting and using mineral resources - case studies. Food resources: World food problems - changes caused by agriculture and overgrazing - effects of modern agriculture- fertilizer-pesticide problems - water logging - salinity -case studies. Energy resources: Growing energy needs - renewable and non renewable energy sources. Land resources: Land as resource - land degradation - soil erosion. Role of an individual in conservation of natural resources.

UNIT II ECOSYSTEMS AND BIODIVERSITY 9

Concept of an ecosystem: Structure and function of an ecosystem – producers - consumers -decomposers – energy flow in the ecosystem – ecological succession – food chains - food webs and ecological pyramids. Types of ecosystem: Introduction - characteristic features - forest ecosystem - grassland ecosystem - desert ecosystem - aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity: Introduction– definition (genetic - species –ecosystem) diversity. Value of biodiversity: Consumptive use - productive use – social values – ethical values - aesthetic values. Biodiversity level: Global - national - local levels- India as a mega diversity nation- hotspots of biodiversity. Threats to biodiversity: Habitat loss - poaching of wildlife – man wildlife conflicts – endangered and endemic species of India. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity - field study.

UNIT III POLLUTION 9

Pollution: Definition –air pollution - water pollution - soil pollution - marine pollution - noise pollution - thermal pollution – nuclearhazards. Solid waste management: Causes - effects - control measures of urban and industrial wastes. Role of an individual in prevention of pollution - pollution case studies. Disaster management: Floods – earthquake - cyclone - landslides. Electronic waste-Sources-Causes and its effects.

UNIT IV SOCIAL ISSUES AND ENVIRONMENT 9

Sustainable development: Unsustainable to sustainable development – urban problems related to energy. Water conservation - rain water harvesting - watershed management. Resettlement and rehabilitation of people. Environmental ethics: Issues - possible solutions – climate change - global warming and its effects on flora and fauna - acid rain - ozone layer depletion - nuclear accidents - nuclear holocaust - wasteland reclamation - consumerism and waste products. Environment protection act: Air (Prevention and Control of Pollution) act – water (Prevention and control of Pollution) act – wildlife protection act – forest conservation act – issues involved in enforcement of environmental legislation.

UNIT V HUMAN POPULATION AND ENVIRONMENT 9

Human population: Population growth - variation among nations – population explosion – family welfare programme and family planning – environment and human health – Human rights – value education – HIV / AIDS, Swine flu – women and child welfare. Role of information technology in environment and human health.

TOTAL: 45 PERIODS

COURSE OUTCOMES

At the end of the course the student will be able to

- know the relationship between the human population and environment.
- understand the basic concepts of environment studies and natural resources.
- gaining the knowledge about ecosystem and biodiversity.
- have knowledge about causes, effects and control measures of various types of pollution.
- understand the social issues and various environmental acts.

TEXT BOOKS

1. T.G.Jr. Miller, Environmental Science, 10thEdn, Wadsworth Publishing Co., (2004).
2. Raman Sivakumar, Introduction to Environmental Science and Engineering, 2ndEdn, Tata McGraw Hill Education Private Limited, New Delhi,(2010).
3. Benny Joseph, "Environmental Science and Engineering", Tata McGraw Hill, (2010).

REFERENCES

1. Bharucha Erach, the Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India, 2010.

2. S. Divan, Environmental Law and Policy in India, Oxford University Press, New Delhi, 2001.
3. K.D. Wager, Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998.
4. W.P. Cunningham, Environmental Encyclopedia, JaicoPublising House, Mumbai, 2004.
5. Clair Nathan Sawyer, Perry L. McCarty, Gene F. Parkin, "Chemistry for Environmental Engineering and Science", McGraw Hill Science, 2010.

WEB RESOURCES

1. www.chegg.com
2. www.vidhyarathiplus.com

EE15302 MEASUREMENTS AND INSTRUMENTATION 3 0 0 3

COURSE OBJECTIVES

- To familiarize the basic functional elements of instrument and bridges
- To learn the use of different types of meters for measuring electrical quantities such as current, voltage, power, energy, power factor and frequency
- To learn the working principle and applications of CRO and other electronic measuring devices
- To familiarize the instrumentation equipment's such as Signal generators and analyzer.
- To introduce various types of transducers.

UNIT I BASIC MEASUREMENT CONCEPTS AND BRIDGES 9

Functional elements of an instrument – Static and dynamic characteristics –Standards and Calibration of measurements - Errors in measurement – Statistical evaluation of measurement data –Wheatstone bridge, Kelvin double bridge ,Maxwell's bridge, Anderson bridge ,Schering bridge, Wien bridge and Hay's Bridge.

UNIT II ELECTRICAL INSTRUMENTS 9

Principle and types of analog and digital voltmeters, ammeters, multimeters – Moving iron instruments – Moving coil instruments -Single and three phase wattmeters and energy meters – Magnetic measurements – Determination of B-H curve and measurements of iron loss – Instrument transformers – Instruments for measurement of frequency and phase.

UNIT III ELECTRONIC MEASUREMENTS 9

Cathode ray oscilloscopes – block schematic – applications – Analog and digital storage oscilloscope, sampling oscilloscope –Digital plotters and printers- Q Meters-Vector Meters – RF Voltage and Power Measurements – True RMS Meters.

UNIT IV TRANSDUCERS 9

Introduction of transducers – Classifications Selection of transducers – Resistive transducer – Potentiometer - Strain gauge –Inductive transducer - LVDT – Capacitive transducer - Piezo-electric transducers – Optical transducer - Encoders –Measurement of pressure and flow –Smart sensors.

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 – Digital L,C,R Measurements and Digital RLC Meters.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- understand the basic quantities in measurements using bridges.
- analyze various measuring techniques for both electrical and non-electrical quantities.
- provide a comparative study among the various types of oscilloscope.
- understand the basic fundamentals of signal generators and analyzer.
- understand the different types of transducers.

TEXT BOOKS

1. Albert D.Helfrick and William D.Cooper," Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall of India, 2007.
2. Ernest O. Doebelin, "Measurement Systems- Application and Design", TMH, 2007.
3. Sawhney A K, "A Course in Electrical and Electronic Measurement and Instrumentation", DhanpatRai& Sons, 2012

REFERENCES

1. S.Ramabhadran, "Electronic Measurements and Instruments", Khanna Publishers, 2003.
2. Kalsi H.S, "Electronic Instrumentation", McGraw Hill Education, 2010.
3. D. V. S. Moorthy, "Transducers and Instrumentation", Prentice Hall of India, 2003.
4. J.B.Gupta, "A Course in electronic and Electrical Measurement",S.K.Kataria& Sons,2003.
5. Martin Reissland, "Electrical Mesaurements", New Age International (P)Ltd,2001

WEB LINKS

1. www.virtins.com
2. www.digital-instruments.com

EE15303 ELECTROMAGNETIC THEORY 3 0 0 3

COURSE OBJECTIVES

- To examine the electric force on stationary charged particles.
- To impart knowledge on the concepts of conductors, dielectrics and capacitance.
- To examine the magnetic force on steadily moving charged particles.
- To impart knowledge on the concepts of force between various elements and inductance.
- To impart knowledge on the concepts of field equations and electromagnetic waves.

UNIT I STATIC ELECTRIC FIELDS 9

Coulomb's law – Electric field intensity – Field due to different types of charges Electric flux density – Gauss law– Concept of divergence and curl – electric potential – Potential field due to different types of charges – Potential gradient – the dipole – field due to dipole – Energy density in electrostatic field.

UNIT II CONDUCTORS, DIELECTRICS AND CAPACITANCE 9

Current and current density – continuity of current – conductor properties– the nature of dielectric materials – boundary conditions– capacitance – different types of capacitances – capacitance of a two wire line– Poisson's and Laplace's equations – Examples of solution of each one of them.

UNIT III STEADY MAGNETIC FIELDS 9

Biot- Savart Law – applications – Ampere's circuital law – applications – curl of magnetic field intensity - Magnetic flux and magnetic flux density –magnetic field intensity due to straight conductors - the scalar and vector magnetic potentials – steady magnetic field laws – Magnetic boundary conditions.

UNIT IV FORCE TORQUE AND INDUCTANCE 9

Lorentz force equation – force between differential current elements – force and torque on a closed circuit – the nature of magnetic materials – magnetization and permeability –inductance and mutual inductance – inductance of solenoid and toroid.

UNIT V MAXWELLS EQUATIONS AND ELECTROMAGNETIC WAVES 9

Concept of displacement and conduction current – Modified Ampere's Circuital law – Maxwell's equations in point and integral forms – Comparison between Field Theory & Circuit Theory - Wave equations – Plane waves in free space – Polarization – Poynting Theorem and Poynting Vector and its significance – Energy in electromagnetic field.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- apply concepts and theories of electrostatics in field calculations for real world systems.

- analyze the concepts of electrostatic fields with capacitance
- determine the field due to moving charges.
- develop the boundary condition for different medium
- formulate the maxwell's equations and analyze the propagation of electromagnetic waves and their parameters in different media.

TEXT BOOKS

1. William H.Hayt, Jr., "Engineering Electromagnetics", Tata McGraw-Hill, 2011.
2. K.A.Gangadhar, "Field Theory", Khanna Publishers, 1997.
3. P.Dananjayan, "Engineering Electromagnetics", Lakhmi Publications, 2009.

REFERENCES

1. Joseph A. Edminister , "Theory and Problems of electromagnetic",Schaum's outline series,1999
2. David J.Griffite, "Introduction to electrodynamics" , Prentice Hall of India Private Limited, 1997.
3. Kraus and Fleish, "Electromagnetics with Applications", Tata McGraw Hill, 2005
4. Matthew N.O. Sadiku, "Principles of Electromagnetics", Oxford University Press, 2007.
5. Bhag Singh Guru, Hüseyin R. Hiziroglu, "Electromagnetic Field Theory Fundamentals", Cambridge University Press, 2004.

WEB LINKS

1. http://hyperphysics.phy-astr.gsu.edu/hbase/electric/elefie.html
2. http://mypages.iit.edu/~smile/guests/gsmxsec1.html
3. http://www.feynmanlectures.caltech.edu/II_05.html

IT15305 OBJECT ORIENTED PROGRAMMING 3 0 0 3

COURSE OBJECTIVES

- To review the control structures and data types with emphasis on structured data types and array processing.
- To understand fundamentals of programming such as variables, conditional and iterative execution, methods, and object-oriented concepts.
- To create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism; use data types, arrays and other data collections.
- To explore the Java Abstract Programming Interface (API) and Java Collection Framework through programming assignments.

UNIT I OVERVIEW 9

Object oriented programming concepts - Introduction to C++ – classes – access specifiers – function and data members – default arguments – function overloading – friend functions – static members –pointers and objects – constant objects – nested classes.

UNIT II BASIC CHARACTERISTICS OF OOP 9

Constructors – default constructor – Parameterized constructors – Constructor with dynamic allocation – copy constructor – destructors – operator overloading – overloading through friend functions – overloading the assignment operator – type conversion.

UNIT III ADVANCED PROGRAMMING 9

Polymorphism – virtual functions- Function and class templates - Exception handling – Inheritance

UNIT IV JAVA INTRODUCTION 9

Data types, variables and arrays, operators, control statements, classes, objects, methods – Inheritance

UNIT V EXCEPTION HANDING 9

Packages and Interfaces, Exception handling, Multithreaded programming, Strings, Input / Output

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- understand the concepts of objects and their significance in real world.
- investigate problem in terms of objects and entities.
- implement features of object oriented programming to solve real world problems.

- understand the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- compile, test and run Java programs comprising more than one class, to address a particular software problem.

TEXT BOOKS

1. B. Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.
2. H.M.Deitel, P.J.Deitel, "Java: how to program", Fifth edition, Prentice Hall of India private limited, 2003.

REFERENCES

1. Ira Pohl, “Object Oriented Programming using C++”, Pearson Education, Second Edition Reprint 2004.
2. S. B. Lippman, Josee Lajoie, Barbara E. Moo, “C++ Primer”, Fourth Edition, Pearson Education, 2005.
3. B. Stroustrup, “The C++ Programming language”, Third edition, Pearson Education, 2004.
4. Herbert Schildt, "The Java 2: Complete Reference", Fourth edition, TMH, 2002.

EE15304 ELECTRONICS AND INSTRUMENTATION LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To conduct relevant experiments for determining the characteristics of various electronic devices.
- To design and test amplifiers and oscillators
- To design and test power supplies

LIST OF EXPERIMENTS

1. Characteristics of PN Junction diode
2. Half wave and Full wave rectifiers with and without filter
3. Characteristics of Bipolar Junction transistor - CE, CB, CC Configurations
4. Characteristics of JFET
5. Characteristics of UJT
6. Characteristics of Photo Diode & Photo Transistor
7. Design of RC phase shift oscillator.
8. AC bridges.
9. DC bridges.
10. Instrumentation amplifiers.
11. Design of RC coupled amplifier
12. Design of Multivibrators.
13. Measurement of iron loss.
14. A/D and D/A converters.
15. Calibration of current transformer.

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- design and construct a power supply and analyze the ripple factor with filters.
- draw the characteristics of the electronic devices by conducting suitable experiments.
- draw the response characteristics of diode clippers and clampers by constructing them.

IT15309 OBJECT ORIENTED PROGRAMMING LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To get a clear understanding of object-oriented concepts.
- To understand object oriented programming through C++ & JAVA.

LIST OF EXPERIMENTS

C++:

1. Program using functions
    - functions with default arguments
    - implementation of call by value, address, reference
2. Simple classes for understanding objects, member functions & constructors
    - classes with primitive data members,
    - classes with arrays as data members
    - classes with pointers as data members
    - classes with constant data members
    - classes with static member functions
3. Compile time polymorphism
    - operator overloading
    - function overloading
4. Run time polymorphism
    - inheritance
    - virtual functions
    - virtual base classes
    - templates
5. File handling
    - sequential access
    - random access

JAVA:

6. Simple java applications
    - for understanding references to an instant of a class
    - handling strings in JAVA
7. Simple package creation
    - developing user defined packages in java
8. Interfaces
    - developing user defined interfaces

- use predefined interfaces

9. Threading
    - creation of threading in java applications
    - multi-threading
10. Exception handling mechanism in java
    - handling predefined exceptions
    - handling user defined exceptions

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- gain the basic knowledge on Object Oriented concepts.
- develop applications using Object Oriented Programming Concepts.
- implement features of object oriented programming to solve real world problems.

EN15301 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 in still 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 SOURCE

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

SEMESTER IV

EE15401 ELECTRICAL MACHINES I 3 2 0 4

COURSE OBJECTIVES

- To study the principles of electromechanical energy conversion in singly and doubly excited systems.
- To understand Working principles, types and characteristics and applications of DC generators.
- To know the Characteristics, starting and methods of speed control of DC motors.
- To impart knowledge of principle of operation and performance and three phase transformer connections.
- To estimation various losses in D.C. machines by conducting different tests

UNIT I BASIC CONCEPTS OF ROTATING MACHINES 15

Introduction to magnetic circuits – Magnetically induced e.m.f and force – AC operation of magnetic circuits – Hysteresis and Eddy current losses. Energy in magnetic systems – Principles of electromechanical energy conversion – Single and multiple excited systems – m.m.f of distributed A.C. windings – Rotating magnetic field – Generated voltage – Torque in round rotor machine.

UNIT II DC GENERATORS 15

Constructional details – emf equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Armature reaction andcommutation – Parallel operation of DC shunt and compound generators.

UNIT III DC MOTORS 15

Principle of operation – Back emf and torque equation – Characteristics of series, shunt and compound motors – Starting of DC motors – Types of starters – Speed control of DC series and shunt motors.

UNIT IV TRANSFORMERS 15

Constructional details of core and shell type transformers – Types of windings – Principle of operation – emf equation – Transformation ratio – Transformer on no-load – Parameters referred to HV / LV windings – Equivalent circuit – Transformer on load – Regulation – Parallel operation of single phase transformers – Auto transformer – Three phase transformers – Vector group.

UNIT V TESTING OF DC MACHINES AND TRANSFORMERS 15

Losses and efficiency in DC machines and transformers – Condition for maximum efficiency –Testing of DC machines – Brake test, Swinburne's test, Retardation test and Hopkinson's test– Testing of transformers – Polarity test, load test, open circuit and short circuit tests – All day efficiency.

TOTAL: 75 PERIODS

COURSE OUTCOMES

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

- describe the concepts of electromechanical energy conversion.
- discuss the characteristics and applications of DC generators.
- recognize the characteristics and speed control of DC motors.
- analyze the performance of transformers.
- estimate the efficiency of DC machines and transformers by conducting suitable tests

TEXT BOOKS

1. D.P. Kothari and I.J. Nagrath, "Electric Machines", Tata McGraw Hill, 2002.
2. P.S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2003.
3. Theraja A.K &Theraja B.L, " A Text book of Electrical Technology (Vol II)", S Chand & Co- ., 2008.

REFERENCES

1. A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, "Electric Machinery", Tata McGraw Hill, 2003.
2. Smarajit Ghosh, "Electrical Machines", Pearson Education, 2012.
3. Parkar Smith, N.N., "Problems in Electrical Engineering" CBS Publishers and Distributers, 1984.
4. J.B. Gupta, "Theory and Performance of Electrical Machines", S.K.Kataria and Sons, 2002.
5. K. Murugesh Kumar, "Electric Machines", Vikas publishing, 2002.

WEBLINKS

1. http://www.newagepublishers.com/samplechapter/001374.pdf
2. http://nptel.iitk.ac.in/courses/Webcourse-contents/IIT-MADRAS/Elec_Mach1/Transformers1.pdf

EE15402 TRANSMISSION AND DISTRIBUTION 3 0 0 3

COURSE OBJECTIVES

- To impart knowledge on the basics of transmission and distribution of power system.
- To develop expression for computation of fundamental parameters of lines.
- To categorize the lines into different classes and develop equivalent circuits for these classes.
- To analyze the voltage distribution in insulator strings and methods to improve the same.
- To impart knowledge for estimation of sag and tension.

UNIT I INTRODUCTION 9

General layout of power system - Standard voltages for transmission - Advantages of high voltage transmission. Feeders, distributors and service mains.Distribution- Requirements of power distribution - Radial & Ring main systems – Overhead versus Underground System - AC and DC distribution: Calculation for concentrated and uniform loading.

UNIT II TRANSMISSION LINE PARAMETERS 9

Line parameters: Calculation of Resistance, Inductance and Capacitance of single phase and threephase overhead lines with Symmetrical and Unsymmetrical spacing for solid, stranded conductors and bundled conductors - Transposition of line conductors - Applications of self and mutual GMD - Skin and proximity effects- Interference with neighboring communication circuits.

UNIT III ANALYSIS OF TRANSMISSION LINE PERFORMANCE 9

Performance of power transmission lines- Short transmission lines - Medium transmission lines- End condenser, Nominal T and Nominal π model - Transmission efficiency and voltage regulation - Long transmission lines - ABCD constants of transmission lines, Ferranti effect.

UNIT IV INSULATORS AND CABLES 9

Insulators - Properties and types of insulators - potential distribution over a string of insulators - String efficiency - Methods of improving string efficiency. Underground Cables - Construction of LT and HT Cables - Insulation resistance, Capacitance and dielectric stress of a single core cable - Grading of cables – Capacitance of 3-core cables.

UNIT V OVERHEAD TRANSMISSION LINES AND SAG 9

Overhead Transmission Lines- Types of supporting structures and line conductors used. Sag calculation- Effect of wind and ice loading –Corona – Substation layout -Overhead transmission system in India.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- compute transmission line parameters such as resistance, inductance and capacitance of overhead transmission lines and underground cables.
- compute voltage drop and power loss in DC and AC radial, ring and interconnected distribution networks.
- categorize the different types of insulators and cables.
- evaluate the performance of overhead transmission lines based on their models.
- design insulator strings for high voltage overhead transmission lines.

TEXT BOOKS

1. Soni Gupta &Bhatnaagar , "A Course in Electrical Power", DhanpatRai& Sons,2001.
2. C. L. Wadhwa, "Electrical Power Systems", New Age International,2009.
3. V.K.Mehta, Rohit Mehta, "Principles of Power Systems", S. Chand &Co., 2011.

REFERENCES

1. W.D. Stevenson, "Elements of Power System Analysis", TMH, 2009.
2. S. M. Singh, "Electric power generation Transmission & Distribution", PHI, 2009.
3. Dr. S. L. Uppal, "Electrical Power", Khanna Publications, 2003.
4. B. R. Gupta, "Power System Analysis and Design", S. Chand, 2003.
5. G.Ramamurthy, "Handbook of Electrical power Distribution", Universities Press, 2013.

WEB LINKS

1. http://en.wikipedia.org/wiki/Electric_power_transmission
2. http://www.elp.com/transmission-and-distribution.html

EE15403 CONTROL SYSTEMS 3 2 0 4

COURSE OBJECTIVES

- To understand the methods of representation of systems and to obtain system transfer function models.
- To provide knowledge on time response of systems and steady state error analysis
- To acquaint basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.
- To impart the concept of stability of control system and methods of stability analysis.
- To study the design of compensators for a control system.

UNIT I SYSTEMS AND THEIR REPRESENTATION 15

Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Synchros – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNIT II TIME RESPONSE 15

Time response – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – P, PI, PID modes of feedback control.

UNIT III FREQUENCY RESPONSE 15

Frequency response – Bode plot – Polar plot – Constant M and N circles – Nichol's chart – Determination of closed loop response from open loop response – Correlation between frequency domain and time domain specifications.

UNIT IV STABILITY OF CONTROL SYSTEM 15

Characteristics equation – Location of roots in S plane for stability – Routh Hurwitz criterion – Root locus construction – Effect of pole, zero addition – Gain margin and phase margin – Nyquist stability criterion.

UNIT V COMPENSATOR DESIGN 15

Performance criteria – Lag, lead and lag-lead networks – Compensator design using bode plots and root locus. Introduction to MATLAB Simulink.

TOTAL: 75 PERIODS

COURSE OUTCOMES

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

- model a control system using differential equations and transfer functions.
- analyse the transient response of control systems in using time domain

- evaluate and analyse control systems using frequency domain methods
- check the stability of systems and the effect of pole zero addition
- design compensators for control systems.

TEXT BOOKS

1. M.N. Bandyopadhyay, “Control Engineering Theory and Practice”, Prentice Hall of India, 2003.
2. I.J. Nagrath& M. Gopal, “Control Systems Engineering”, New Age International Publishers, 2003.
3. SmarajitGhosh, “Control System Engineering”, Pearson Education, 2012.

REFERENCES

1. B.C. Kuo, “Automatic Control Systems”, Prentice Hall of India Ltd., 1995.
2. M. Gopal, “Control Systems, Principles & Design”, Tata McGraw Hill, 2002.
3. K. Ogata, “Modern Control Engineering”, Pearson Education, 2003.
4. S.K.Bhattacharya, “Control System Engineering”, Pearson, 2013.
5. Arthur, G.O.Mutambara, “Design and Analysis of Control; Systems”, CRC Press, 2009.

WEB LINKS

1. http://bookboon.com/en/control-engineering-problems-with-solutions-ebook
2. http://www.facstaff.bucknell.edu/mastascu/econtrolhtml/Intro/Intro1.html

EE15404 LINEAR INTEGRATED CIRCUITS & ITS APPLICATIONS 3 0 0 3

COURSE OBJECTIVES

- To study the IC fabrication procedure.
- To infer the characteristics and application of Op-amp ICs.
- To familiarize the concepts of waveform generation and converters.
- To impart the knowledge on basic applications of Special IC's.
- To interpret the internal functional blocks of applications ICs.

UNIT I FABRICATION OF ICS 9

Integrated Circuit Technology, Moore's law, Steps in fabrication of IC-wafer preparation-epitaxial growth-lithography-diffusion, Fabrication of resistors, capacitors, diodes, BJT and FET.

UNIT II OP-AMP CHARACTERISTICS AND APPLICATIONS 9

Op-amp configurations, Ideal op-amp circuit analysis-DC and AC characteristics of ideal op-amp, - Inverting and Non-inverting amplifiers – summing amplifier - difference amplifier - voltage follower - Differentiator - Integrator –Nonlinear applications- clamper - clipper – sample and hold circuit, Log and Antilog Amplifier, Multiplier.

UNIT III WAVEFORM GENERATORS & CONVERTERS 9

Sine wave generator- Weinbridge and phase shift oscillator, square wave, triangular wave, saw tooth wave generation, Schmitt trigger, and Window detector. Digital to analog converters- basic concepts, analog switches, types-weighted, R-2R ladder DAC. Analog to Digital converter- basic concepts, types-Flash, successive approximation and dual slope.

UNIT IV SPECIAL ICS 9

IC555 Timer-Timer functional diagram, monostable and astable operation, Schmitt trigger and their applications.Phase Locked Loop-Operation of 565 PLL-Closed loop analysis of PLL-PLL applications, Voltage Controlled Oscillator.

UNIT V APPLICATION ICS 9

Regulator IC's- LM78XX, 79XX Fixed voltage regulators, IC 723 General purpose register, LM 317, LM380 power amplifier, ICL 8038 function generator IC, isolation amplifiers, optocoupler, opto electronic ICs

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- describe the IC fabrication procedure.

- examine the characteristics and application of op-amp.
- design waveform generation and Filters
- design circuits for application using special ICs.
- interpret the internal functional blocks and the applications of special ICs

TEXT BOOKS

1. David A.Bell, "Op-amp & Linear ICs", Oxford, 2013.
2. Roy Choudry and Shail Jain, "Linear Integrated Circuits", New Age, 2003
3. Gayakwad, R.A., "Op-amps & Linear Integrated Circuits", Prentice Hall of India, 2003.

REFERENCES

1. Sergio Franco, "Design with operational amplifiers and Analog Integrated circuits", Tata McGraw Hill, 2002
2. Millman, J. and Halkias, C.C., "Integrated Electronics-Analog and Digital System", Tata McGraw Hill, 1995.
3. Floyd ,Buchla, "Fundamentals of Analog Circuits", Pearson, 2013.
4. Salivahanan S &KanchanaBhaskaran V.S, "Linear Integrated Circuits", TMH, 2008.
5. Robert F.Coughlin, Fredrick F.Driscoll, "Op-amp and Linear ICs", Pearson Education, 2012.

WEB LINKS

1. en.wikipedia.org/wiki/Category:Linear_integrated_circuits
2. www.gobookee.org/linear-integrated-circuits-notes

EE15405 DIGITAL LOGIC CIRCUITS 3 2 0 4

COURSE OBJECTIVES

- To study various number systems and to simplify the mathematical expressions using Boolean functions – simple problems.
- To study the implementation concepts of combinational circuits.
- To study the design of various synchronous and asynchronous circuits.
- To expose the students to various memory devices.
- To design digital circuits

UNIT I NUMBER SYSTEM & BOOLEAN ALGEBRA 15

Review of number system; types and conversion, codes. Boolean algebra: De-Morgan's theorem, switching functions and simplification using K-maps &Quine McCluskey method.

UNIT II COMBINATIONAL CIRCUITS 15

Design of Logic gates, NAND and NOR Implementations, Design of adder, subtractor, comparators, code converters, encoders, decoders, multiplexers and demultiplexers- Function realization using gates, multiplexers and demultiplexers

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 15

Flip flops - SR, D, JK and T; Analysis of synchronous sequential circuits; design of synchronous sequential circuits – Synchronous counters– Modulus counters, Up/Down counters, state diagram, state reduction, state assignment.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 15

Analysis of asynchronous sequential machines, Races & Hazards, state assignment techniques, asynchronous design problems, Asynchronous counters, Up/Down counters, Modulus counters.

UNIT V MEMORIES AND LOGIC FAMILIES 15

Memories: ROM, PROM, EPROM, EEPROM, PLA, PAL, FPGA - Digital logic families: RTL, TTL, ECL, CMOS.

TOTAL: 75 PERIODS

COURSE OUTCOMES

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

- device the number systems and simplify Boolean functions
- illustrate the various combinational circuits.
- design the synchronous and circuits.
- perform design and analysis of asynchronous circuits.

- develop digital circuits using basic IC's.

TEXT BOOKS

1. M. Morris Mano, "Digital Logic and Computer Design", Prentice Hall of India, 2002.
2. R.P.Jain, "Modern Digital Electronics", Tata Mc.Graw Hill, 2003
3. Thomas.L.Floyd, "Digital Fundamentals", Pearson Education, 2003.

REFERENCES

1. Charles H.Roth, "Fundamentals Logic Design", Jaico Publishing, 2002.
2. S.Arivazhagan, "Digital Logic Circuits", 2000
3. John F.Wakerly, "Digital Design Principles and Practice", Pearson Education, 2002.
4. John M.Yarbrough, "Digital Logic, Application & Design", Thomson, 2002.
5. Puri, "Digital Electronics:Circuits and Systems", Tata Mc.Graw Hill, 2000

WEB LINKS

1. en.wikipedia.org/wiki/Digital_electronics
2. http://freevideolectures.com/Course/2319/Digital-Systems-Design/3

EE15406 COMMUNICATION ENGINEERING 3 0 0 3

COURSE OBJECTIVES

- To understand about the fundamentals of modulation techniques.
- To know about the Transmitter and Receiver of different type of modulation.
- To gain knowledge on the different methods of pulse modulation techniques.
- To understand about the spread spectrum and multiple access techniques used in communication systems.
- To educate the basics of Satellite, Telecommunication and Optical communication.

UNIT I MODULATIONTECHNIQUES 9

Introduction to Modulation Techniques – Types – Need for Modulation_ Amplitude Modulation – Generation of AM waves (DSB-FC) - Suppressed carrier systems (DSB-SC) – Single side band modulation (SSB) – Vestigial side band modulation (VSM) - comparison of various AM systems. Introduction to Angle Modulation: Definitions for FM & PM – Narrow band FM – Wide band FM – FM Modulators –FM Demodulators- Comparison between AM & FM.

UNIT II TRANSMITTERS AND RECEIVERS 9

Demodulation of AM waves – Envelope Detectors – Synchronous Detectors - Pilot carrier method – AM Transmitters - Low level and High level transmitters – AM Receivers – TRF receiver, Super heterodyne receiver.

UNIT III PULSE MODULATION 9

Introduction to Pulse modulations – concepts of sampling and sampling theorems, PAM, PWM, PPM, PTM, quantization technique and coding: Delta Modulation, slope overload error. ADM - Inter Symbol Interference, Pulse Code Modulation, DPCM.

UNIT IV SPREAD SPECTRUM AND MA TECHNIQUES 9

Introduction to SS Techniques: Direct –sequence Spread Spectrum (DSSS) – Frequency Hopping Spread Spectrum (FHSS) –Time Hopping Spread Spectrum (THSS) – MA Techniques: FDMA – TDMA – CDMA – SDMA – OFDM.

UNIT V COMMUNICATION SERVICES 9

Tele Communication: GSM Architecture – 1st Gen, 2nd Gen and 3rd Gen Networks - Frequency Reuse – GPRS - EDGE. Satellite communication: Read – orbit – Satellite altitude – Transmission path – its loss – Satellite system. Fiber optical communication: Need – Principles of light transmission A 122 in a fiber – optical fiber communication system –Light sources – Types & configuration of Optical Fiber.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- characterize and determine different methods of analog communication schemes.
- describe the Transmitter and Receiver of Modulation Techniques.
- characterize Pulse Modulation techniques and ISI methods.
- analyze different spread spectrum and multiple access techniques.
- describe the operation of Telecommunication, Satellite and Optical Communication Systems.

TEXT BOOKS

1. Simon Haykin, "Digital Communications", John Wiley, 2006.
2. Thedore.S.Rappaport, "Wireless Communication", Pearson Education, 2010
3. Singh.R.P.,Sapre.S.D, "Analog and DigitalCommunication Systems", Tata McGraw Hill, 2010.

REFERENCES

1. Kennedy, "Electronics of Communication Systems", Tata McGraw Hill, 2000.
2. Roddy D. And Coolen J, "Electronic communications", Prentice Hall of India, 2000.
3. Anokh Singh, "Principles of communication Engineering",S.Chand& Co. 2000.
4. Lathi B.P. "Modern digital and analog communication systems", Oxford University Press, 2009.
5. Deshpande, N.D, "Communication Electronics", Tata McGraw Hill, 2000.

WEB LINKS

1. www.wikipedia.org/wiki/Category:modulation
2. www.web.ee.ccu.edu.tw/.../class%20ppt/Multiple%20Access%20Techniques
3. http://www.tech-faq.com/geostationary-satellite.html
4. www.nptel.ac.in/courses/117102062 & 117101051

EE15407 ELECTRICAL MACHINES I LABORATORY 0 0 4 2

COURSE OBJECTIVE

- To make the students to perform and analyze various experiments on D.C. machines and transformers.

LIST OF EXPERIMENTS

1. Load test on DC shunt motor and compound motor.
2. Load test on DC Series motor.
3. Speed Control of DC Shunt Motor and Swinburne's test.
4. Load test on DC shunt generator, DC compound generator.
5. Load test on single phase transformer.
6. Open circuit & Short circuit test on single phase transformer.
7. Open circuit characteristics of DC generator (Self and Separately Excited)
8. Hopkinson's test
9. Sumpner's test on 1-phase transformers
10. 3-phase transformer connections
11. Separation of no load losses in single phase transformer

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- describe the performance of DC generators.
- summarize the characteristics of DC motors under loaded and unloaded conditions.
- predetermine the performance of DC motors.
- implement the speed control in DC shunt motor.
- calculate the Equivalent Circuit parameters and performance of Transformers

EE15408 CONTROL SYSTEM LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To acquire programming skills in the analysis and design of control systems.
- To gain the knowledge for deriving transfer function of systems
- To analyse the stability of systems
- To test the performance of standard control equipments using analog simulation methods.

LIST OF EXPERIMENTS

1. Digital simulation of first and second order system
2. Stability Analysis of Linear systems by Routh Hurwitz polynomial.
3. Stability Analysis of Linear systems by Root locus, Bode plot and Nyquist plot
4. Design of Lag and lead compensator.
5. Design of P, PI, PD, PID controllers.
6. Transfer function of DC and AC servomotor
7. Study of synchros**.**
8. Analog simulation of type 0 type 1 system
9. Stepper motor control
10. Transfer function of armature controlled and field controlled DC Motor.
11. Transfer function of DC generator
12. AC and DC closed loop control system

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- basic knowledge on simulation of control system .
- design the feedback loop to achieve the desired output
- analyse the stability of systems
- investigate servo motor speed and position control principles
- design controllers and compensators according to a given specifications.

EE15409 LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To familiarize with the operation of analog circuits using Op-amp
- To design of waveform generators.
- To understand the basic operations of Digital ICs
- To introduce the functions of counter, shift register and MUX-DEMUX circuits.

LIST OF EXPERIMENTS

LINEAR INTEGRATEDCIRCUITS

1. Inverting and non inverting amplifier
2. Summing amplifier and Difference amplifier
3. Integrator and Differentiator
4. Astable and monostable multivibrator using IC555
5. Waveform generators using IC741

DIGITAL CIRCUITS

1. Verification of logic gates
2. Boolean function implementation
3. Adder and Subtractor
4. Code Converters
5. Multiplexer and de-multiplexer
6. Encoder and Decoder
7. Synchronous counter

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- describe the operation of amplifiers using BJT and FET
- examine different waveforms of variable frequency
- design multiplexers, data converters and counters