PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018

(AUTONOMOUS)

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS 2016

CURRICULAM

(CHOICE BASED CREDIT SYSTEM)

(For the candidates admitted during the Academic Year 2017 - 2018)

SEMESTER III

S.No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	BS	MA16301	Transforms and Boundary Value Problems	3	2	0	4
2	PC	EE16301	Electron Devices and Circuits	3	0	0	3
3	PC	EE16302	Measurements and Instrumentation	3	0	0	3
4	PC	EE16303	Electromagnetic Theory	3	0	0	3
5	ES	IT16304	Object Oriented Programming With C++	3	0	0	3
6	BC	CH16301	Environmental Science and Engineering	3	0	0	3
Practical							
7	PC	EE16304	Electronics and Instrumentation Laboratory	0	0	4	2
8	ES	IT16307	Object Oriented Programming With C++ Laboratory	0	0	4	2
9	EEC	EN16301	Business English Course Laboratory	0	0	2	1
			TOTAL	**18**	**2**	**10**	**24**

SEMESTER IV

S.No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	BS	MA16404	Numerical Methods	3	2	0	4
2	PC	EE16401	Electrical Machines I	3	2	0	4
3	PC	EE16402	Electrical Power Generation	3	0	0	3
4	PC	EE16403	Linear Integrated Circuits and its Applications	3	0	0	3
5	PC	EE16404	Digital Logic Circuits	3	2	0	4
6	ES	EE16405	Communication Engineering	3	0	0	3
Practical							
7	PC	EE16406	Electrical Machines I Laboratory	0	0	4	2
8	PC	EE16407	Linear Integrated and Digital Circuits Laboratory	0	0	4	2
			TOTAL	**18**	**6**	**8**	**25**

SEMESTER III

MA16301 **TRANSFORMS AND BOUNDARY VALUE PROBLEMS (COMMON TO ALL BRANCHES)** **3 2 0 4**

COURSE OBJECTIVES

- To introduce fourier series analysis which is central to many applications in engineering apart from solving boundary value problems.
- To acquaint the student with Fourier transform techniques used in many engineering systems.
- To familiarize effective application of mathematical tools for the solutions of partial differential equations that model several physical processes.
- To apply one dimensional equation of heat conduction and study about wave equation.
- To learn and apply 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 –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 four 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 PERIODS 75

COURSE OUTCOMES

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

- comprehend fourier series, their different possible forms and the frequently needed practical harmonic analysis from discrete data.
- describe the concept of a function as a double integral under certain conditions and apply in the fourier transform pair and their properties.
- solve certain boundary value problems and apply the methods and results in engineering applications.
- employ partial differential equations to solve one dimensional wave and heat equations.
- demonstrate the knowledge of differential equations gained and solve them using Z transforms.

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.

WEB LINKS

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

EE16301 ELECTRON DEVICES AND CIRCUITS 3 0 0 3

COURSE OBJECTIVES

- To acquire the knowledge of PN junction diode, its VI characteristics and special diodes.
- To analyze the construction, theory and characteristics of BJT, FET and MOSFET.
- To impart knowledge on amplifier circuits and their performance and to familiarise the students with the concepts of biasing transistors and obtain the frequency response.
- To study the concepts on different classes of power amplifiers.
- To learn the basics of negative feedback amplifiers and their characteristics and 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 IIIAMPLIFIERS 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 IVMULTISTAGE 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 VFEEDBACK 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 PERIODS 45

COURSE OUTCOMES

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

- explain the VI characteristics of PN junction diode and special diodes.
- construct the characteristics of BJT, FET and MOSFET and analyze their VI characteristics.
- perform analysis of amplifiers and their frequency response
- give details about the operation of multistage power amplifiers.
- design feedback amplifiers and oscillators.

TEXT BOOKS

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

REFERENCES

1. Donald A. Neaman, “Electronic Circuits” Tata McGraw Hill
2. Mathur.S.P.,KulshreshthaD.C. &Chanda.P.R.,Electronic Devices – Applications and Integrated circuits– Umesh Publications.,1999.
3. Allen Mottershed, “Electronic Devices & Circuits, An Introduction”, Prentice Hall Of India (P) Ltd,1999.
4. S.Salivahanan, “Electronic Devices and Circuits”, Tata McGraw Hill, 2008, Second Edtion
5. Rashid, “Microelectronic circuits” Thomson Publication, 1999.
6. P.RameshBabu , “Electronic Devices and Circuits”, SciTech Publications Pvt Ltd, 2005

WEB LINKS

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
4. http://onlinevideolecture.com/?course_id=821

EE16302 MEASUREMENTS AND INSTRUMENTATION 3 0 0 3

COURSE OBJECTIVES

- To acquire 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 understand the working principle and applications of CRO and other electronic measuring devices
- To familiarize the instrumentational equipments such as signal generators and analyzer.
- To illustrate 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 IIIELECTRONIC 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 IVSIGNAL 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.

UNIT V 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.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- explain the basic quantities in measurements using bridges.
- analyze various measuring techniques for both electrical and non-electrical quantities.
- evaluate the various types of oscilloscope.

- elaborate the basic fundamentals of signal generators and analyzer.
- compare & differentiate the types of transducers.

TEXT BOOKS

1. Albert D.Helfrick and William D.Cooper – Modern Electronic Instrumentation and Measurement Techniques, Pearson / 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, New Delhi, 18th Edition, 2012

REFERENCES

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

WEB LINKS

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

EE16303 ELECTROMAGNETIC THEORY 3 0 0 3

COURSE OBJECTIVES

- To study 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 know the concepts of force between various elements and inductance.
- To acquire knowledge on the concepts of field equations and electromagnetic waves.

UNIT I STATIC ELECTRIC FIELDS 9

Coulomb‟s law – Electric field intensity – electric field due to infinite conductors and circular disc – 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 – dipole – potential due to dipole.

UNIT II CONDUCTORS, DIELECTRICS AND CAPACITANCE 9

Current density – continuity of current – conductor properties– the nature of dielectric materials – boundary conditions– capacitance – capacitance in different dielectric medium – capacitance of a two wire line - Energy density in electrostatic field – Poisson‟s and Laplace‟s equations.

UNIT IIISTEADY 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 and circular disc - scalar and vector magnetic potentials – Magnetic boundary conditions.

UNIT IVFORCE 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 – Energy density in magnetic field.

UNIT VMAXWELLS 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 – Poynting Theorem and Poynting Vector and its significance.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of this course, the 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 Publishing Ltd, New Delhi,7th Edition, 2011.
2. GangadharK.A ,Field theory, Khanna Publication Limited, New Delhi, 15th Edition, Third reprint 2004.

REFERENCES

1. Muthusubramanian R and Senthilkumar N, Electromagnetic field theory, Anuradha publications,1999.
2. Joseph A. Edminister ,Theory and Problems of electromagnetics Schaum‟s outline series, 3rd Edition, 1999.
3. David J.Griffite, Introduction to electrodynamics, Prentice Hall of India Private Limited, 3rd Edition 1999.

WEB LINKS

1. http://nptel.ac.in/downloads/115101005/
2. http://nptel.ac.in/syllabus/syllabus_pdf/115101005.pdf

IT16304 OBJECT ORIENTED PROGRAMMING WITH C++ 3 0 0 3

COURSE OBJECTIVES

- To learn the basic concepts of object oriented programming.
- To understand the basics of C++ language.
- To classify C++ data types, access modifiers, classes and objects.
- To examine the relationship between classes.
- To construct object oriented programming using C++.

UNIT I INTRODUCTION TO C++ 9

Object oriented programming concepts - Introduction to C++ - Tokens – Keywords – Identifiers and constants – Basic data types– User defined data types – Derived data types – Symbolic constants – Declaration of variables – Dynamic initialization of variables – Reference variables – Operators in C++ – Scope resolution operator – Manipulators – Expressions and their types – Control structures - The main function – Function prototyping – Call by reference – Return by reference – Inline functions – Default arguments –Function overloading.

UNIT II CLASSES AND OBJECTS 9

Specifying a class – Defining member functions – Private member functions –Arrays within a class – Memory allocation for objects – Static data members – Static member functions – Arrays of objects – Objects as function arguments –Friendly functions – Returning objects. Constructors: Parameterized constructors – Multiple constructors in a class – Constructors with default arguments – Dynamic initialization of objects – Copy constructor – Dynamic constructors – Destructors.

UNIT III OPERATOR OVERLOADING AND INHERITANCE 9

Defining operator overloading: Overloading unary, binary operators. Manipulation of strings using operators – Rules for overloading operators – Type Conversions - Defining derived classes – Single inheritance – Multilevel Inheritance – Multiple inheritance –Hierarchical inheritance – Hybrid inheritance – Virtual base classes – Abstract classes.

UNIT IV POLYMORPHISM AND TEMPLATES 9

Introduction to pointers to objects: This pointer – Pointers to derived classes – Virtual functions – Pure virtual functions. Function templates, user defined template arguments, class templates.

UNIT V EXCEPTION HANDING AND GENERIC PROGRAMMING 9

Exception Handling: Exception handling mechanism, multiple catch, nested try, rethrowing the exception – Namespaces – std namespace- Standard Template Library.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- identify and apply object oriented concepts like abstraction, encapsulation, modularity, hierarchy, typing, concurrency and persistence.
- relate the real world object into entity.
- create reusable system components.
- estimate the various metrics specific to object oriented development.
- predict the runtime error using exception handling technology.

TEXT BOOKS

1. E.Balagurusamy, “Object Oriented Programming with C++”, Tata McGraw Hill, Sixth Edition, 2013.

REFERENCES

1. Ira Pohl, “Object Oriented Programming using C++”, Pearson Education, Second Edition Reprint 2004.
2. S. B. Lippman, JoseeLajoie, Barbara E. Moo, “C++ Primer”, Fourth Edition, Pearson Education, 2005.
3. B. Stroustrup, “The C++ Programming language”, Third edition, Pearson Education, 2004.

WEB LINKS

1. http://nptel.ac.in/courses/106105151/
2. https://www.tutorialspoint.com/cplusplus/cpp_object_oriented.htm
3. http://www.studytonight.com/cpp/cpp-and-oops-concepts.php

CH16301 **ENVIRONMENTAL SCIENCE AND ENGINEERING**
(COMMON TO CIVIL,CSE, EEE, CHE & IT) **3 0 0 3**

COURSE OBJECTIVES

- 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 acquire knowledge about ecological balance and preserve bio-diversity.
- To understand 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. Role of an individual in conservation of natural resources.

UNIT IIECOSYSTEMS 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 (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.

UNIT IIIPOLLUTION **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 - Disaster management: Floods – earthquake - cyclone-landslides. Electronic waste-Sources-Causes and its effects.

UNIT IVSOCIAL 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. 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 VHUMAN 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 PERIODS 45

COURSE OUTCOMES

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

- explain the relationship between the human population and environment.
- elaborate the basic concepts of environment studies and natural resources.
- gain 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. Raman Sivakumar, Introduction to Environmental Science and Engineering, 2nd Edn, Tata McGraw Hill Education Private Limited, New Delhi,(2010).
2. 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, Jaico Publising House, Mumbai, 2004.
5. Clair Nathan Sawyer, Perry L. McCarty, Gene F. Parkin, "Chemistry for Environmental

EE16304 ELECTRONICS AND INSTRUMENTATION LABORATORY 0 0 3 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 and Zener 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. Frequency response of RC coupled amplifier
12. A/D and D/A converters.
13. Calibration of current transformer.

TOTAL PERIODS 60

COURSE OUTCOMES

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

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

IT16307 OBJECT ORIENTED PROGRAMMING WITH C++ LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To implement fundamental knowledge of object oriented programming.
- To demonstrate C++ syntax and semantics
- To solve simple engineering problems.
- To develop a solution for complex problems in the real world.

LIST OF EXPERIMENTS

1. Write C++ Programs using Classes and Objects.
2. Design C++ Classes with static members, methods with default arguments, friend functions.
3. Develop C++ Programs using Operator Overloading.
4. Develop C++ Programs using constructor, destructor, and copy constructor.
5. Develop C++ Programs Overload the new and delete operators.
6. Develop C++ Programs using Inheritance, Polymorphism and its types.
7. Develop C++ Programs using Arrays and Pointers.
8. Develop C++ Programs using Dynamic memory allocation.
9. Develop C++ Programs using Function Templates.
10. Develop C++ Programs using Exceptions Handling.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- design object-oriented concepts and how they are supported by C++
- analyze, use, and create functions, classes, to overload operators.
- create and initialize real world entities using constructors.
- describe exception handling and file handling mechanism.
- apply the concepts of data encapsulation, inheritance, and polymorphism to develop large scale software.

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS

Software: Turbo C++.

Hardware: Flavor of any WINDOWS or LINUX and Standalone desktops 30 Nos.

EN16301 BUSINESS ENGLISH COURSE LABORATORY 0 0 2 1

COURSE OBJECTIVES

- To develop the reading skills of the students and to familiarize them in skimming and scanning.
- To instill the communication concepts and enhance the students conversational skills through various practice sessions .
- To familiarize variety of business correspondence.
- To develop their receptive skills such as listening and reading and to make the students well versed in the productive skills (writing and speaking) and to assist them in improving their vocabulary and comprehension of grammar.

UNIT I READING AND VOCABULARY 6

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

UNIT IIWRITING 9

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

UNIT IIILISTENING 6

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

UNIT IVSPEAKING 9

Conversation between the interlocutor and the candidate - interaction in social contexts - A mini presentation by each candidate on a business theme - organising a larger unit of discourse – giving information and expressing opinions – interactive communication conversation between candidates followed by further prompting from the interlocutor- Expressing opinions- agreeing and disagreeing.

TOTAL PERIODS 30

COURSE OUTCOMES

At the end of this course, students will able to

- enhance the business vocabulary through reading and to develop their pronunciation skills.
- speak effectively in English in various 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 Oxford University Press, New Delhi. 2011.
2. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005.
3. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi.

WEB LINK

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

SEMESTER IV

NUMERICAL METHODS

MA16404 **(COMMON TO AERO,CIVIL,EEE,MECH & MCT)** **3 2 0 4**

COURSE OBJECTIVES

- To analyse different methods to find solution for a large system of linear equations
- To find the intermediate values for a series of given data
- To develop efficient algorithms for solving problems in science, engineering and technology
- To solve the non linear differential equations that cannot be solved by regular conventional method.
- To apply finite element method to increase the accuracy of second order differential equations

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 15

Solution of equation –Iteration method : Newton Raphson method – Solution of linear system by Gaussianelimination and Gauss - Jordon method – Iterative method – Gauss-Seidel method – Inverse of a matrix by Gauss Jordon method – Eigenvalue of a matrix by power method.

UNIT II INTERPOLATION AND APPROXIMATION 15

Lagrangian Polynomials – Divided differences – Newton‟s Divided Difference, Hermite Interpolation Polynomial and Interpolating with a cubic spline – Newton‟s forward and backward difference formulas.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 15

Differentiation using interpolation formulae –Numerical integration by trapezoidal and Simpson‟s 1/3– Romberg‟s method – Two and Three point Gaussian quadrature formulas – Double integrals using trapezoidal and Simpsons‟ rule.

UNIT IVINITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 15

Single step methods: Taylor series method – Modified Euler method for first order equation – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne‟s and Adam‟s predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 15

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL PERIODS 75

COURSE OUTCOMES

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

- comprehend the basics of linear equations.
- apply the interpolation methods for constructing approximate polynomials
- demonstrate the knowledge of numerical differential equations in computational and simulation process
- utilize the concept of initial value problems in the field of science and engineering
- describe the computational procedure of the amount of heat emitted or transferred from an object

TEXT BOOKS

1. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th edition, Wiley Publications, 2010.
2. T. Veerarajan. and T .Ramachandran, "Numerical Methods with programming in C", 2nd ed., Tata McGraw-Hill, 2006.
3. Sankar Rao K " Numerical Methods For Scientisits And Engineers –3rd Edition Princtice Hall of India Private, New Delhi, 2007.

REFERENCES

1. P. Kandasamy, K. Thilagavathy and K. Gunavathy, "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003
2. Gerald C.F. and Wheatley, P.O., "Applied Numerical Analysis" 6th Edition, Pearson Education Asia, New Delhi, 2002.
3. M.K.Jain , S.R.K. Iyangar , R.K.Jain , "Numerical Methods For Scientific & Engineering Computation" New Age International (P) Ltd , New Delhi , 2005.
4. M.B.K. Moorthy and P.Geetha, "Numerical Methods" , Tata McGraw Hill Publications company, New Delhi, 2011.

WEB LINKS

1. https://www.youtube.com/watch?v=QTQ8bO1F-Dg
2. https://www.youtube.com/watch?v=AT7Olelic8U
3. https://www.youtube.com/watch?v=TH06N7Q7FJw
4. https://www.youtube.com/watch?v=DnBJLpdVHCY
5. https://www.youtube.com/watch?v=5TccPEz2nB8

EE16401 ELECTRICAL MACHINES I 3 2 0 4

COURSE OBJECTIVES

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

UNIT I BASIC CONCEPTS OFROTATINGMACHINES 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 DCGENERATORS 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 IIIDCMOTORS 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 MACHINESANDTRANSFORMERS 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 PERIODS 75

COURSE OUTCOMES

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

- describe the concepts of electromechanical energy conversion.
- deliberate the characteristics and applications of DC generators.
- identify the characteristics and speed control of DC motors.
- examine the performance of transformers.
- evaluate 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.

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1. A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, “Electric Machinery”, Tata McGraw Hill, 2003
2. SmarajitGhosh, “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.

WEB LINKS

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

EE16402 ELECTRICAL POWER GENERATION 3 0 0 3

COURSE OBJECTIVES

- To understand basic concepts of thermal and hydro power plants.
- To distinguish the basic structure and operation of nuclear and diesel power plants.
- To study basic concepts and applications of solar photovoltaic power conversion systems.
- To comprehend the basic concepts of wind power conversion system and types of power generators.
- To acquire the knowledge of tariff and economic aspects in power generation.

UNIT I THERMAL AND HYDRO POWER STATION 9

Thermal power station: Schematic arrangement, choice of site, efficiency of steam power station, Types of prime movers - Environmental aspects for selecting the sites and locations of thermal power stations. Hydro power station: Schematic arrangement, choice of site constituents of hydro power plant, Hydro turbine. Environmental aspects for selecting the sites and locations of hydro power stations

UNIT II NUCLEAR AND DIESEL POWER STATION 9

Nuclear power station: Schematic arrangement, selection of site, types of reactors, Hazards, Environmental aspects for selecting the sites and locations of nuclear power stations.

Diesel power station: Schematic arrangement, Choice and characteristic of diesel engines.

UNIT IIISOLAR PHOTOVOLTAIC POWER CONVERSION SYSTEMS 9

Solar Photovoltaic (SPV) systems: Operating principle, Photovoltaic cell concepts, Types of solar cells, fabrication of SPV cells, Cell, module, array (Series and parallel connections),SPV system components and their characteristics. Applications of solar thermal systems: Heating, Cooling, Drying, Distillation, Power generation. Applications of Solar Photovoltaic systems: Battery charging, Pumping, Lighting.

UNIT IVWIND POWER CONVERSION SYSTEM 9

Introduction to wind energy : basic principles of wind energy conversion - Basic components of wind energy conversion systems - classifications of WECS-HAWT, VAWT, Geared wind power plants (WPPs) - Schemes of electric generation: Squirrel Cage Induction Generators (SCIG), wound rotor (WRIG), doubly-fed (DFIG), wound rotor synchronous generator (WRSG), Permanent magnet synchronous generator (PMSG) - Site selection considerations.

UNIT V TARIFF AND ECONOMIC ASPECTS IN POWER GENERATION 9

Terms commonly used in system operation, various factors affecting cost of generation: Load curves, load duration curves, Connected load, maximum load, Peak load, base load and peak load power plants, load factor, Plant capacity factor, Plant use factor, Demand factor, diversity factor, Cost of power plant, Tariffs.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- describe the functioning of basic energy conversion devices, the traditional & alternative energy sources.
- explain concept of thermal and hydro electric power plants.
- clarify the operation of nuclear and diesel power plants.
- discriminate the advantages of non –conventional power generator.

- obtain knowledge on tariff and economic.

TEXT BOOKS

1. Arora and Domkundwar, "A Course in Power Plant Engineering" DhanpatRai and Co.Pvt.Ltd., New Delhi 2014.
2. P.K. Nag, "Power Plant Engineering" Tata McGraw Hill, Second Edition , Fourth reprint 2014.
3. G.D. Rai, "An introduction to power plant technology" Khanna Publishers 2016.

REFERENCES

1. Bernhardt G.A.Skrotzki and William A. Vopat, "Power station Engineering and Economy", Tata McGraw Hill, 20th reprint 2002.
2. L.Monition ,MleNir, J.Roux, " Hydroelectric Power Stations" John Wiley & Sons Publishers 2014..
3. M.M. El-Wakil, "Power Plant Technology" Tata McGraw Hill, 2013.
4. Venugopal K and Prahu Raja V, "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, 2010.
5. Sh. H.Cohen, G.F.C. Rogers. H.I.H.Saravanamuttoo, "Power Plant Engineering" CBS Published 2014.

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2. castlelab.princeton.edu/EnergyResources/GenerElectPower__Shalaan.pdf
3. www.indiacore.com/.../kssidhu-non-conventional-energy-resources.pdf
4. www.academia.edu/.../Non_Conventional_Methods_of_Power_Generati...

EE16403 LINEAR INTEGRATED CIRCUITS AND ITS APPLICATIONS 3 0 0 3

COURSE OBJECTIVES

- To generalize the IC fabrication procedure.
- To infer the characteristics and application of Op - amp ICs.
- To understand 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, 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.

UNIT IIIWAVEFORM GENERATORS AND CONVERTERS 9

Sine wave generator: Weinbridge and phase shift oscillator- square wave, triangular wave, saw tooth wave generation, Schmitt trigger. Digital to analog converters- basic concepts, 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 and their applications. Phase Locked Loop: Operation of 565 PLL - PLL applications, Voltage Controlled Oscillator. Multiplier and their applications.

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, opto coupler, opto electronic ICs

TOTAL PERIODS 45

COURSE OUTCOMES

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

- illustrate the IC fabrication procedure.
- describe the characteristics and application of op-amp.
- design waveform generators and Filters
- design circuits using special ICs.
- interpret the internal functional blocks and the applications of special ICs

TEXT BOOKS

1. Roy Choudry and Shail Jain, “Linear Integrated Circuits”, New Age, 2003
2. Gayakwad, R.A., 'Op-amps & Linear Integrated Circuits', Prentice Hall of India, New Delhi ,3rd Edition, 2003.

REFERENCES

1. Sergio Franco,‟ Design with operational amplifiers and Analog Integrated circuits‟, Tata McGraw Hill 3rd Edition 2002
2. Millman, J. and Halkias, C.C., 'Integrated Electronics-Analog and Digital Systems', Tata McGraw Hill, 9th Reprint, 1995.
3. Floyd ,Buchla,”Fundamentals of Analog Circuits, Pearson, 2013
4. Jacob Millman, Christos C.Halkias, „Integrated Electronics - Analog 4.Salivahanan S &KanchanaBhaskaran V.S, “Linear Integrated Circuits”, TMH, 2008.
5. Robert F.Coughlin, Fredrick F.Driscoll, “Op-amp and Linear ICs”, 6th Edition, Pearson Education, 2012

WEB LINKS

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

EE16404 DIGITAL LOGIC CIRCUITS 3 2 0 4

COURSE OBJECTIVES

- To analyze various number systems and to simplify the mathematical expressions using Boolean functions – simple problems.
- To develop the implementation concepts of combinational circuits.
- To discuss the design of various synchronous and asynchronous circuits.
- To identify various memory devices.
- To understand the basics of VHDL programmes.

UNIT I NUMBER SYSTEM AND BOOLEAN ALGEBRA 15

Review of number system; types and conversion, codes. Boolean algebra: De-Morgan's theorem, switching functions and simplification using K-maps &QuineMcCluskey 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 IIISYNCHRONOUS SEQUENTIAL CIRCUITS 15

Flip flops - SR, D, JK and T; Analysis of synchronous sequential circuits; design of synchronous sequential circuits – Synchronouscounters– 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 PERIODS 75

COURSE OUTCOMES

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

- compile number systems and simplify Boolean functions
- illustrate the various combinational circuits.
- design the synchronous and asynchronous circuits.
- develop VHDL coding for simple circuits.

TEXT BOOKS

1. M. Morris Mano, “Digital Logic and Computer Design”, Prentice Hall of India, 2002.
2. J.Bhaskar ,“A VHDL primer”,3rd edition 2004, Prentice Hall of India Limited.

REFERENCES

1. Charles H.Roth, “Fundamentals Logic Design”, Jaico Publishing, IV edition, 2002.
2. Floyd, “Digital Fundamentals”, 8th edition, Pearson Education, 2003.

3. John F.Wakerly, “Digital Design Principles and Practice”, 3rd edition, Pearson Education,2002.
4. Charles H,Roth ,“Digital system design using VHDL” , 2nd Edition 2005, PWS Publishing Company.
5. John M.Yarbrough, “Digital Logic, Application & Design”, Thomson, 2002.

WEB LINKS

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

EE16405 COMMUNICATION ENGINEERING 3 0 0 3

COURSE OBJECTIVES

- To understand the fundamentals of analog communication and different type of modulation.
- To know about the pulse modulation and On off keying (OOK) Systems.
- To gain knowledge on the different coding techniques.
- To familiar with the spread spectrum and multiple access techniques in communication systems.
- To educate the basics of telecommunication, satellite and optical communication services.

UNIT I ANALOG COMMUNICATION 9

Introduction to Modulation Techniques: Types –Amplitude Modulation – Generation of AM waves – Double Side Band (DSB) - Suppressed Carrier Systems (DSB/SC) – Single Side Band Modulation (SSB) – Vestigial Side Band Modulation (VSB) - comparison of various AM Systems -AM Receivers – TRF Receiver, Super Heterodyne Receiver. Definitions for FM & PM – Narrow band FM – Wide band FM.

UNIT II DIGITAL COMMUNICATION 9

Pulse Modulations: Concepts of Sampling and Sampling Theorems, PAM, PWM, PPM, PTM.Quantization Technique: Delta Modulation, Slope Overload Error - ADM - Pulse Code Modulation, DPCM.OOK Systems: ASK, FSK, PSK, Applications of Data Communication.

UNIT III CODING TECHNIQUES 9

Primary Communication: Entropy, Properties, BSC, BEC. Source Coding: Shannon Fanon &Huffman Coding Theorem - Efficiency of Transmissions, Error Control Codes and Applications: Convolutional & Block Codes.

UNIT IVSPREAD 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 – Frequency Reuse – GPRS – EDGE. Satellite Communication: Read – orbit – Satellite altitude – Transmission Path – Satellite System. Fiber Optical Communication: Need – Principles of Light Transmission– Optical Fiber Communication System –Light Sources – Types &Configuration of Optical Fiber.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- characterize and determine different methods of analog communication schemes.
- describe the pulse modulation of digital communication techniques.
- characterize the different type of coding techniques.
- analyze different spread spectrum and multiple access techniques.
- describe the operation of telecommunication, satellite and optical communication systems.

TEXT BOOKS

1. Taub & Schiling “Principles of communication systems” Tata McGraw hill 2007.
2. J.Das “Principles of digital communication” New Age International, 1986.
3. Thedore.S.Rappaport, “Wireless Communication”, Pearson Education, 2010.

REFERENCES

1. Kennedy, Electronics of Communication Systems – McGraw Hill – 5th reprint – 2000.
2. Simon Haykin, “Digital Communications”, John Wiley, 2006.
3. Lathi B.P. “Modern digital and analog communication systems” Oxford University Press, 2009.

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

EE16406 ELECTRICAL MACHINES I LABORATORY 0 0 4 2

COURSE OBJECTIVES

- Perform various experiments on DC machines and transformers and analyze their performance.

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. Seperation of no load losses in single phase transformer

TOTAL PERIODS 60

COURSE OUTCOMES

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

- estimate 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

EE16407 LINEAR INTEGRATED AND DIGITAL 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 commence 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 monostablemultivibrator 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 PERIODS 60

COURSE OUTCOMES

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

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