Department of Electronics and Telecommunication Engineering

Session: 2020-21

B. Tech. Fourth Semester

Electrical Machines and Instruments

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
ESC	ETT401	Electrical Machines and Instruments	2	1	0	20	20	60	100	3

Course Objectives:

1. Develop a basic foundation of Electrical Machines.
2. Understand the basic principle, construction &operation, of ac and dc machines and electrical Instruments.
3. Understand the performance characteristics of ac and dc machines and electrical Instruments
4. Understand the applications of ac and dc machines as well as electrical Instruments in day today life.

Course outcomes:

Students will be able to:

1. Remember basic principles & construction, of electrical instruments and ac & dc machines.
2. Understand the operation, performance and characteristics of electrical instruments and ac & dc machines.
3. To identify the different issues related to the electrical instruments, speed control and torque improvement in ac & dc machines.
4. Analyse the performance indices of electrical instruments and ac & dc machines.dc machines during various conditions..
5. Evaluate the operation of ac and dc machines along with the testing of electrical instruments.

6. Solve the different problems related to operation, & performance indices of electrical instruments ac and dc machines.

Course Contents:

Module-1: DC Machines **5 Hrs**

Construction, working principle (motor & generator), EMF equation of DC Machine (motor and generator), Types and its characteristics of DC machines (motor and generator), back emf, starters of dc machine, Speed control of DC motor ,Breaking of DC motor, applications of DC machines (motor and generator).

Module-2: Synchronous Machines **5 Hrs**

Construction, types, armature reaction, circuit model of synchronous machine, determination of synchronous reactance, phasor diagram, power angle characteristics, parallel operation of synchronous generators, synchronous motor operation, synchronous condenser.

Module-3:Three phase Induction (Asynchronous) Motor **5 Hrs**

Types of induction motor, flux and mmf waves, development of circuit model, power across air gap, torque and power output, starting methods, cogging and crawling, speed control, deep bar/ double cage rotor, induction generator, efficiency .of induction motors

Module-4:Special Machines **5 Hrs**

Construction, working and application of steeper motor, variable reluctance motor, servo motor, FHP motor, hysteresis, repulsion, linear IM.

Module-5:Electrical Instruments **6 Hrs**

Classification selection of transducers strain gauges, LVDT, Temperature transducers, piezoelectric, photosensitive transducers, Hall Effect transducers, proximity devices Digital transducers need of signal conditioning and types, interfacing techniques of transducers with microprocessor and controller.

Module-6:Applications of Electrical Instruments **5 Hrs**

Measurement of electrical telemetry thickness vibration,, humidity, thermal conductivity and gas analysis emission computerized tomography, smoke and fire detection, burglar alarm, object counter level measurement, on /off timers, RTC, sound level meter, tachometer, VAWmeter.

Text Books:

1. Electrical Machines by Ashfaqu Husain, Dhanpatrai and publication

2. Instrumentation Devices System edition C. S. Rajan, G. R. sharma.

Reference Books:

1. A course in Electrical and Electronic Measurement and Instrumentation" by A. K. Sawhney (Publisher name: Dhanpat Rai & Co.)

2. Electronics Instrumentation by H.S. Kalsi (Publisher McGraw Hill)

3. Abhijit Chakrabarti & Sudipta Debnath, "Electrical Machines", Tata McGraw-hill Publication.

4. William H Hayt, Jack E Kimmerly and Steven M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill.

5. A.E. Fitzgerald, Charles Kingsley & Jr. Stephen D. Umans, "Electrical Machinery", Tata McGraw-hill Publication 6th Edition.

6. I.J Nagarath & D.P Kothari, "Electrical Machines", Tata McGraw-hill Publication 4th Edition.

7. T. J. E. Miller, "Brushless permanent-magnet and reluctance motor drives", Oxford University Press (1989).

8. B. L. Theraja, "Electrical technology" volume 2, S. Chand.

Signal and System

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
PCC	ETT402	Signal and System	3	0	0	20	20	60	100	3

Prerequisites:

1. Basic Idea of Transform and its mathematical descriptions (Laplace, Fourier and Z-Transform)
2. Differential equations and Integrals (advanced level)
3. Ordinary differential equations
4. Series and expansions
5. Fourier analysis and complex Fourier Series/transform
6. Applications of Fourier series, Fourier Transform to circuits.

Course Objectives:

1. To develop a strong foundation of continuous and discrete time signal and system.
2. Introduce ideas for analysis of various types of continuous & discrete time system.
3. Learn fundamental concepts and transforms as relevant to time and frequency domain Signals.
4. Understand the process of sampling and interpolation in real time signal transmission.

Course Outcomes:

1. Understanddifferent types of signals & systems.
2. Familiar with the properties of LTI (Linear Time Invariant System) system and process involved in analysis of signals before transmission.
3. Solve various complex mathematical problems for signal analysis and conversion of signals from one domain to another.
4. Apply knowledge of sampling and interpolation to sample and reconstruct signals during real time signal transmission and reception.
5. Analyze continuous and discrete systems in time and frequency domain.

6. Design Various Mathematical models to Investigate stability of the system.

Course Contents:

Module-1: Basics of signals and system **6 Hrs**

Introduction and Classification of signals, Definition of signal, Continuous time and discrete time signal, Classification of signals as even, odd, periodic and non-periodic, Deterministic and non-deterministic, energy and power, elementary signals used for testing, Exponential, sine, impulse, step and its properties, ramp, rectangular, triangular, signum, sinc, Operations on signals, Amplitude scaling, addition, multiplication, differentiation, integration, time scaling, time shifting and time folding, Systems Definition, Classification, linear and non-linear, time variant and invariant, causal and non-causal, static and dynamic, stable and unstable, invertible.

Module-2: Time Response Analysis **6 Hrs**

Continuous-Time and Discrete-Time Signals, Transformations of the Independent Variable, Continuous-Time and Discrete-Time Systems, Basic System Properties, Discrete-Time LTI (Linear Time Invariant System) Systems, the Convolution Sum, Continuous-Time LTI Systems, the Convolution Integral, Properties of Linear Time-Invariant Systems, Causal LTI Systems Described by Differential and Difference Equations.

Module-3: Fourier Series Analysis **6 Hrs**

The Response of LTI Systems to Complex Exponentials, Fourier Series Representation of Continuous-Time Periodic Signals, Convergence of the Fourier Series, Properties of Continuous-Time Fourier Series, Fourier Series Representation of Discrete-Time Periodic Signals, Properties of Discrete-Time Fourier Series, Fourier Series and LTI Systems, Examples of Continuous-Time Filters Described by Differential Equations, Examples of Discrete-Time Filters Described by Difference Equations.

Module-4: Fourier Transform Analysis **6 Hrs**

The Continuous-Time Fourier Transform, Representation of Aperiodic Signals, The Fourier Transform for Periodic Signals, Properties of the Continuous-Time Fourier Transform, Systems Characterized by Linear Constant-Coefficient Differential Equation, The Discrete-Time Fourier Transform, Representation of Aperiodic Signals, The Fourier Transform for Periodic Signals, Properties of the Discrete-Time Fourier Transform, Systems Characterized by Linear Constant-Coefficient Difference Equations.

Module-5: Frequency Response Analysis **6 Hrs**

The Magnitude-Phase Representation of the Frequency Response of LTI Systems, Concept of Frequency Response, Group Delay, Phase Delay, Time-Domain Properties of Ideal Frequency-Selective Filters, Time- Domain and Frequency-Domain Aspects of Non ideal Filters, First-Order and Second-Order Continuous-Time Systems, Discrete-Time System, Representation of a Continuous-Time Signal by its Samples, the Sampling theorem, Reconstruction of a Signal from Its Samples Using Interpolation, Aliasing effect, Discrete-Time Processing of Continuous-Time Signals.

Module-6: Laplace and Z-Domain Analysis **6 Hrs**

The Laplace Transform, Region of Convergence for Laplace Transforms, Inverse Laplace Transform, Properties of the Laplace Transform, Analysis and Characterization of LTI Systems Using Laplace Transform, System Function Algebra and Block Diagram Representations, The Unilateral Laplace Transform,

The z-Transform, Region of Convergence for the z-Transform, Inverse z-Transform, , Properties of z-Transform, Analysis and Characterization of LTI Systems Using z-Transforms, System Function Algebra and Block Diagram Representations, The Unilateral z-Transform.

Text Books:

1. Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons (Asia) Private Limited,
2. B. P. Lathi, "Linear Systems and Signals", OXFORD University Press.
3. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall, 1983.
4. "Signals and Systems", A. Nagoor Kanni, 2nd Edition, McGraw Hill.

Reference Books:

1. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", TMH New Delhi, 2001.
2. M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB", TMH, 2003.
3. Signals Systems and Transforms, 3rd Edition, 2004, C. L. Philips, J.M.Parr and Eve A.Riskin , Pearson education.

4. S.S. Soliman & M.D. Srinath, "Continuous and Discrete Signals and Systems", Prentice-Hall,1990.
5. Shaila Dinkar Apte "Signals and Systems" Principles and Applications",Cambridge UniversityPress.

E-Resources:

1. NPTEL link principal of signals and system.

   https://www.youtube.com/watch?v=xrVWB9VYZ64&list=PLq-Gm0yRYwTjwxaqapPsSAHzs4_nkQLVr

2. E-BOOK Signal and Systems Simon Haykin Wiley

   https://www.academia.edu/38588821/Signal_and_Systems_Simon_Haykin_Wiley

3. E-BOOK B. P. Lathi, "Linear Systems and Signals",

   https://india.oup.com/productPage/5591038/7421214/9780198062271

Electronics Devices and Circuits-II

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
ESC	ETT403	Electronic Devices and Circuits-II	2	1	0	20	20	60	100	3

Prerequisites: Basic knowledge of Semiconductor Physics

Course Objectives:

1. To introduce semiconductor devices MOSFET, it's characteristics ,DC analysis, biasing and applications
2. To analyze and interpret MOSFET circuits for small signal
3. To study the different types of voltage regulators
4. To design different electronic circuits

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Explain the working principle, operation and characteristics of Semiconductor devices such as MOSFET
2. Apply Knowledge of semiconductor devices and concepts to implement various electronic circuits.
3. Analyze different amplifier configurations.
4. Evaluate the small signal model and performance parameters of the device.
5. Design different oscillator circuits for various frequencies
6. Build and test the performance of electronic circuits

Course Contents:

Module-1: MOSFET **6 Hrs**

Structure, Symbol , Construction of n-channel E-MOSFET, MOS Transistor operation, E-MOSFET characteristics & parameters, non-ideal voltage current characteristics viz. Finite

output resistance, body effect, sub-threshold conduction, breakdown effects and temperature effects , N-MOS, P-MOS and CMOS devices

Module-2: MOSFET Biasing and its DC Analysis **5 Hrs**

Common source circuit, Load Line & Modes of operation, Common MOSFET configurations: DC Analysis, constant current source biasing, MOSFET as switch, diode/active resistor, Current sink and source, Current mirror

Module-3: CMOS Inverter **5 Hrs**

Principle of operation, dc characteristics, transient characteristics, noise margin, static load MOS inverter, transmission gate

Module-4: Study of CMOS Logic **6 Hrs**

Study of Combinational logic, gates, compound gates, multiplexers, and memory elements using CMOS technology

Module-5: Oscillators **5 Hrs**

Barkhausen criterion, stability with feedback. Classification of oscillators, RC Oscillators: FET RC Phase Shift oscillator, Wein bridge oscillator, LC Oscillators: Hartley and Colpitts oscillators, Crystal oscillators, UJT Relaxation oscillator

Module-6: Voltage Regulators **5 Hrs**

Block diagram of an adjustable three terminal positive and negative regulators (317,337) typical connection diagram, current boosting, Low drop out voltage regulators, Introduction to Switch Mode Power supply (SMPS), Block diagram of SMPS, Types of SMPS. Comparison of Linear Power supply and SMPS

Text Books:

1. Neil Weste and David Harris, Addison-Wesley**"**CMOS VLSI Design – A Circuits and Systems Perspective", Fourth edition , Pearson
2. R.L.Boylestad&Nashlesky, "Electronic devices and Circuits Theory" Nineth Edition, Prentice Hall of India
3. Donald Neaman, "Electronic Circuit Analysis and Design", Third Edition,Tata McGraw Hill

4. Millman, Halkias, "Integrated Electronics- Analog and Digital Circuits and Systems", Second Edition , Tata McGraw Hill

Reference Books:

1. BrijeshIyer, S. L. Nalbalwar, R. Dudhe, "Electronics Devices & Circuits", Synergy Knowledgeware Mumbai, 2017. ISBN:9789383352616
2. David A. Bell," Electronic Devices and Circuits", Fourth Edition, PHI
3. Floyd," Electronic Devices", Seventh Edition, Pearson
4. Sedra and Smith, "Microelectronic Circuits ", Oxford University Press, 2004

E-Resources:

1. https://nptel.ac.in/content/storage2/courses/117101058/downloads/
2. http://www.nesoacademy.org/electronics-engineering/analog-electronics/analog
3. https://onionesquereality.wordpress.com/.../more-video-lectures-iit-open
4. http://www.electronics-tutorials.ws/transistor/tran_1.html
5. http://www.allaboutcircuits.com/textbook/semiconductors/chpt-1/active-versus-passive-devices/

Partial Differential Equation and Numerical Methods

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
BSC	ETT404	Partial Differential Equation and Numerical Methods	2	1	0	20	20	60	100	3

Course Objectives:

1. To prepare students for successful career in industries, for Post Graduate programme and to work in research institutes.
2. To understand different numerical techniques used for solving algebraic and transcendental equations.
3. To understand numerical methods to solve a system of linear equations.
4. To understand numerical integration and differentiation techniques.

Course Outcomes:

At the end of course students will be able to

1. Understand calculation and interpretation of various errors in numerical methods and partial differential equations.
2. Familiar with finite precision computation.
3. Solve nonlinear equations in a single variable and find numerical solutions.
4. Apply Numerical analysis which has enormous application in the field of science and some fields of Engineering.
5. Analyze the numerical integration and differentiation, numerical solution of ordinary differential equation.
6. Design mathematical model for various electronic applications.

Course Contents:

Module-1: Error Analysis **4 Hrs**

Significant figures, round-off, precision and accuracy, approximate and true error, truncation error and Taylor series, machine epsilon, data uncertainties, error propagation, importance of errors in computer programming.

Module-2: Solution of Transcendental / Polynomial Equations and System of Linear Equation **6 Hrs**

Solution of Transcendental / Polynomial Equations: Finding root of polynomial equations deploying computational methods such as Bisection, Regula-falsi, Newton-Raphson, Seccant, Successive approximation. System of linear equation: Solving linear equations deploying computational methods such as Gauss elimination, Gauss Jordan, Partial pivoting, Matrix triangularisation (LU decomposition), Cholesky, Gauss Seidel and Jacobi methods.

Module-3: Interpolation and Polynomial Approximation **6 Hrs**

Least square approximation, Orthogonal polynomials Chebyshev polynomials, Finite difference operator and their relations, Forward, backward, central and divided difference, Newton's forward divided difference, Backward difference interpolation, Sterling interpolation, Lagrange‟s interpolation polynomials, Spline interpolation, Least square approximation.

Module-4: Numerical Integration and Differentiation **5 Hrs**

Numerical Integration: Methods based on interpolation such as Trapezoidal rule, Simsons 1/3 and 3/8 rules. Numerical differentiation: Euler's method, Modified Euler's method, Taylor's series, Runge Kutta 2ndand 4th order, Stability analysis of above methods.

Module-5: Advance Partial Differential equations **5 Hrs**

Introduction Partial differential equation, method of separation of variables, Application of partial differential equations .(Heat equation ,wave equation , Laplace Equation)

Module-6: Object Oriented Programming **6 Hrs**

Software Evaluation, Object oriented programming paradigm, Basic concepts of object oriented programming, Benefits of OOP, Object oriented languages, Applications of OOP Beginning with C++: Structure of C++ program, Creating the source file, Compiling & linking, Basic data types, User defined data types, Symbolic constants, Declaration of variables, Dynamic initialization of variables, Reference variables, Operators in C++, Scope resolution

operator, Type cast operator. Functions in C++: Function prototyping, Inline functions, Function overloading, Friend and virtual functions. Classes and Objects: Specifying a class, Defining member functions, C++ program with class, Arrays within a class, Memory allocation for objects, Constructors, Multiple constructor in class, Dynamic initialization of objects, Dynamic constructor, Destructors.

Texts Books:

1. Steven C Chapra, Reymond P. Canale, "Numerical Methods for Engineers", TataMcGraw Hill Publications, 2010.

2. E.Balaguruswamy, "Numerical Methods", TataMcGraw Hill Publications,1999.

References Books:

1. V. Rajaraman, "Fundamental of Computers", Prentice Hall of India,NewDelhi,2003.

2. S. S. Sastri,"IntroductoryMethodsofNumericalMethods",PrenticeHallofIndia,NewDelhi 3rd edition,2003.

3. K. E. Atkinson, "An Introduction to Numerical Analysis",Wiley,1978.

4. M.J. Maron, "Numerical Analysis: A Practical Approach", Macmillan, New York, 1982D. Ravichandran, "Programming with C++", TMH

5. E. Balagurusamy, "Object-Oriented Programming with C++", TMH, New Delhi, 2001,2nd Edition

6. Yeshwant Kanetkar, "Let us C++, BPB Pub.", Delhi, 2002, 4thEdition

Basics of Python Programming

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
ESC	ETT405	Basics of Python Programming	3	0	0	20	20	60	100	3

Prerequisites: The prerequisite for learning Python is basic knowledge of concepts like Variables, Loops, and Control Statements etc.

Course Objectives:

To make students aware about

1. To understand the role computation can play in solving problems.
2. To understand why Python is a useful scripting language for developers.
3. To learn how to design and program Python applications.
4. To learn how to read and write files in Python
5. To learn how to design object□oriented programs with Python classes.
6. To learn how to use exception handling in Python applications for error handling.

Course Outcomes:

Students will be able to

1. Remember variables, types, operators,data structures, arguments, object oriented programming and libraries.

2. Understand assignment, keyword, expressions, lists, modules, exceptions and standard libraries.

3. Apply variables, types, operators, data structures, arguments, object oriented programming and Libraries.

4. Analyse modern updates in python for keyword, expressions, lists, modules, exceptions, standard libraries.

5. Evaluate storage space required to program python scripts, variables, types, operators and data structures.

6. Create python code to make functional Electronics hardware.

Course Contents:

6 Hrs

Module-1: Introduction

History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

Module-2: Types, Operators and Expressions **6 Hrs**

Types – Integers, Strings, Booleans; Operators - Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bit-wise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while break, continue, pass.

Module-3: Data Structures **6 Hrs**

Lists, Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences, Comprehensions.

Module-4: Default Arguments **6 Hrs**

Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function- Global and Local Variables. Modules: Creating modules, import statement, from. Import statement, name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages.

Module-5: Object-Oriented Programming OOP in Python **6 Hrs**

Classes, self-variable Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, Error, and Exceptions: Difference between an error and Exception, Handling Exception, try except for block, Raising Exceptions, User Defined Exceptions.

Module-6: Brief Tour of the Standard Library **6 Hrs**

Operating System Interface – String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics Testing: Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

Text Books:

1 Python Programming: A Modern Approach, VamsiKurama, Pearson

2. Learning Python, Mark Lutz, Orielly

Reference Books:

1 Think Python, Allen Downey, Green Tea Press

2. Core Python Programming, W.Chun, Pearson

3. Introduction to Python, Kenneth A. Lambert, Cengage

E-Resources:

1.https://www.python.org/

2.https://swayam.gov.in/nd1_noc19_cs41/preview

3. https://www.codecademy.com/learn/learn-python

4. https://www.learnpython.org/

5. https://developers.google.com/edu/python/

6. https://www.datacamp.com/tracks/python-programming

7. https://www.udemy.com/courses/search/?q=python+programming

8. https://docs.python.org/3/tutorial/index.html

9. http://www.pythonchallenge.com/

10. https://www.tutorialspoint.com/python/index.htm

Professional Ethics and Human Values

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
MC	ETT40	Professional Ethics and Human Values	1	0	0	50	0	0	50	Audit

Course Objectives:

1. To create a general awareness about Professional Ethics and Human Values.
2. To enable future professional engineers to contribute to Society and human well-being.
3. To inculcate professional behavior and a sound work / workplace ethic in young minds
4. To understand social responsibility at the personal, professional and corporate levels.
5. To appreciate the concept of gender diversity and related issues from an ethical viewpoint
6. To appreciate ethical dilemma while discharging duties in professional life.

Course Outcomes:

The students will be able to

1. Understand the need, basic guidelines, content and process for value education.
2. Understand the need of self and body, harmony of self with body.
3. Understand the harmony in the family, difference between respect and differentiation.
4. Understand the harmony in nature, interconnectedness and mutual fulfillment in nature, holistic perception of harmony.
5. Understand natural acceptance of human values, competence in professional ethics.

Course Contents:

Module-1: Human Values **3 Hrs**

Morals, Values and Ethics – Integrity – Work Ethic – Honesty – Commitment – Courage – Empathy – SelfConfidence – Character – Caring and Sharing – Empathy and Leadership.

Module-2: Professional Ethics **3Hrs**

Introduction to and history of Ethics – profession and professionalism – professional roles played by an engineer – engineering ethics – senses of 'Engineering Ethics' – variety of moral issues supported by case studies, e.g. moral / ethical dilemma, moral autonomy, consensus and controversy, etc. – models of professional roles – codes of conduct and codes of ethics – valuing time – co-operation – commitment – ethics at the workplace – gender diversity – diversity at the workplace – women's empowerment – sexual harassment at work, etc.. 32

Module-3: Global Issues **3 Hrs**

Types of technology (e.g. simple, high, intermediate, and appropriate technologies) and their ethical application – transfer of technology, its benefits and drawbacks – role of multinational corporations in technology transfer – environmental ethics – need for sustainable development, environmental hazards due to irresponsible technological development e.g. global warming, acid rain, etc., with case studies – computer ethics, prevention of IPR infringement, computer crime, social problems resulting from computerization, ethical social networking, etc.

Module-4: Engineering As Social Experimentation **3 Hrs**

Meaning of experimentation – engineering as experimentation – engineers as responsible social experimenters to benefit society – R&D efforts towards ethically and environmentally sustainable design of products and systems – codes of ethics and a balanced view towards legal, ethical and business aspects of technology use

Module-5: Safety,Responsibility and Rights **3 Hrs**

Knowledge of safety and risk – uncertainty of design – ethical need to reduce safety and risk – need for testing product and system designs for safety – concept of risk benefit analysis – ethical issues in costbenefit analysis – difference between gifts and bribes – protecting employee rights – human rights and human responsibilities – case studies involving natural and manmade disasters, e.g. Chernobyl, Bhopal Gas Tragedy, floods in Uttarakhand, Mumbai, etc.

Module-6: Whistle Blowing **2Hrs**

Meaning and brief history of whistle blowing – internal and external whistle blowing – Ethical and legal issues involved – Managing whistle blowing – case studies involving whistle blowers like Manjunath, Satyendra Dubey, etc.

Text Books:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.

2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

Reference Books:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.

2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics , Concepts and Cases", Cengage Learning, 2009

3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003

4. Edmund G Seebauer and Robert L Barry, "Fundametals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001

5. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,New Delhi 2013.

6. World Community Service Centre, " Value Education", Vethathiri publications, Erode, 2011

E- resources:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

Electrical Machines and Instruments Lab

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
ESC	ETL401	Electrical Machines and Instruments Lab	0	0	2	60	0	40	100	1

Course Objectives:

1. Develop a basic foundation of Electrical Machines.
2. Understand the basic principle, construction & operation, of ac and dc machines and electrical Instruments.
3. Understand the performance characteristics of ac and dc machines and electrical Instruments.
4. Understand the applications of ac and dc machines as well as electrical Instruments in day today life.

Course Outcomes:

Students will be able to:

1. Remember basic principles & construction, of electrical instruments and ac & dc machines.
2. Understand the operation, performance and characteristics of electrical instruments and ac & dc machines.
3. To identify the different issues related to the electrical instruments, speed control and torque improvement in ac & dc machines.
4. Analyse the performance indices of electrical instruments and ac & dc machines.
5. Evaluate the operation of ac and dc machines along with the testing of electrical instruments.
6. Solve the different problems related to operation, & performance indices of electrical instruments ac and dc machines.

List of Experiments:

1. To study the construction of field and armature of DC Machine.
2. To determine external characteristics of DC Generator
3. To perform Load test on DC shunt motor.
4. To perform speed control of DC shunt motor using armature and field control method.
5. To perform Load test on DC shunt generator.
6. .To study and perform the voltage build up in the DC shunt Generator
7. To study the internal construction of three phase induction motor.
8. To perform no Load and block rotor tests on squirrel cage induction motor
9. To study various starting methods of three phase induction motor
10. To control speed of induction motor by V/F control
11. To control speed of slip ring induction motor by rotor resistance control
12. To study the internal construction of three phase synchronous machine.
13. Determination of sequence impedance of salient pole synchronous machine
14. To perform speed control of Stepper motor
15. To study various electrical instruments with their industrial applications.

Signal and System Lab

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
PCC	ETL402	Signal and System Lab	0	0	2	60	0	40	100	1

Course Objectives:

1. Develop a strong foundation of continuous and discrete time signal and system analysis using Scilab.
2. Understand the various continuous and discrete time signals generation methods.
3. Understand the basic operations on the signals.
4. Understand the Design and analysis of linear time-invariant (LTI) systems.
5. Understand the spectral characteristics of signals using Fourier analysis.
6. Develop a strong foundation of systems using Laplace transform and Z-transform

Course Outcomes:

Upon successful completion of this course the students will be able to:

1. Understand basics of Scilab syntax, functions and programming.
2. Familiar With characterization of various continuous and discrete time signals.
3. Solve the Problems on basic operations on the signals.
4. Apply Knowledge of linear time-invariant (LTI) systems for computing its response.
5. Analyze the spectral characteristics of signals using various transforms.
6. Design the Mathematical model of systems using various transforms.

Course Contents:

1. Introduction to Scilab.
2. To create user defined functions for generating Continuous and Discontinues time sinusoidal signal.
3. To create user defined functions for generating Continuous and Discontinues time delta signal and unit step signal.
4. To create user defined functions for generating Continuous and Discontinues time Exponential and RAMP Signal.
5. To create user defined functions for signal operation: signal addition, subtraction, and multiplication.
6. To create user defined functions for signal operation: time shifting, time scaling and time inversion.
7. To compute convolution of two signals and verify its properties.
8. To compute auto-correlation of two signals and verify its properties.
9. To compute cross-correlation of two signals and verify its properties.
10. To obtain the response of LTI system defined by linear constant coefficient difference equations.
11. To synthesize the periodic signal using Fourier series.
12. To analyze the spectrum of the signal using Fourier transform and verify its properties.
13. To compute and plot the impulse response and pole-zero diagram of transfer function using Laplace transform
14. To compute and plot the impulse response and pole-zero diagram of transfer function using Z-transform.
15. Program for calculating Inverse z-transform of Given function.
16. Program for calculating Inverse Laplace-transform of Given function
17. To Analyze discrete-time signals with the (discrete) Fast Fourier transform
18. To find whether the system is linear or non linear for the Given signal.

Electronics Devices and Circuits-II Lab

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
ESC	ETL403	Electronic Devices and Circuits-II Lab	0	0	2	60	0	40	100	1

Prerequisites: Basic knowledge of Semiconductor Physics and theoretical knowledge of respective practical.

Course Objectives:

1. To identify Basic electronic components and devices
2. To observe the characteristics of MOSFET, CMOS Inverter, UJT
3. To analyze different amplifier configurations and their Frequency response
4. To design and Simulate Electronic circuits

Course Outcomes:

At the end of the laboratory work, students will demonstrate the ability to:

1. Acquire the basic concepts of different semiconductor components and understand the use of semiconductor devices in different electronic circuits.
2. Plot and study the characteristics of semiconductor devices like MOSFET, UJT
3. Simulate Electronic circuits using SPICE.
4. Calculate different performance parameters of transistor.
5. Design, build, and test the performance of various circuits.

List of Experiments:

1. To Plot Drain and Transfer characteristics of N- Channel E- MOSFET
2. To design NMOS Common source amplifier
3. To obtain the frequency response of MOSFET amplifier in common source configuration with given specifications
4. To Study MOSFET as a Switch
5. To assemble and characterize MOSFET current mirrors
6. To design and plot the static (VTC) and dynamic characteristics of a digital CMOS inverter using Virtual lab
7. To design and plot the dynamic characteristics of 2-input NAND and NOR logic gates using CMOS technology using Virtual lab
8. Implement 2:1 Multiplexer using transmission gate
9. Implementation of NAND and NOR gate
10. To Design and Simulate Wein Bridge oscillator using FET
11. To Design and Simulate RC Phase shift oscillator using FET
12. To Design and Simulate Hartley Oscillator using FET
13. To Design and Simulate Colpitts Oscillator using FET
14. To Study the operation of UJT as a Relaxation Oscillator
15. To Design adjustable Voltage Regulated Power Supply using LM317

Circuit Simulation and Lab

Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	TOTAL	
ESC	ETL406	Circuit Simulation and Lab	0	0	2	60	0	40	100	1

Course Objectives:

This laboratory course aids students to get practical experience in-

1. To study the PCB designs tool like Proteus.
2. To study the Circuit Logic Software for stimulating the Diode, Transistors & FETs.
3. To study the practical's aspect of MultiSim.
4. To study the Orcad & PSPICE software for designing oscillator, filter & various gates.

Course Outcomes:

Students will be able to:

1. Apply the knowledge of designing with standard designing strategies, Selection of components and designing rules.
2. Acquire the basic knowledge of optimization techniques.
3. Know and familiar with different levels and methods of designing.
4. Identify and characterize basic devices such as BJT and FET from their package information by referring to manufacturers' data sheets.
5. Design, Build and Test the performance of Linear Applications of active devices using equipment set-up like Power Supply, Signal generators, Oscilloscope.
6. Simulate a few of the circuit applications using appropriate Circuit Simulation package.

List of Experiments:

1. Introduction to Proteus software for PCB design.
2. Analyse VI characteristic of PIN diode on circuit design software.
3. Design full wave rectifier on circuit design software.
4. Introduction to CircuitLogix software for circuit design.
5. Analyse V-I characteristics of a Zener Diode using circuit design software.
6. Design the transistor using circuit design software.
7. Introduction to MultiSim software for circuit design.
8. Examine an inverting amplifier by using Op-Amp IC 741on multisim software.
9. Design an Integrator circuit by using Op-Amp IC 741 on circuit simulation software.
10. Develop the monostable multivibrator using the IC555 on circuit simulation software.
11. Introduction to Orcad software for circuit design.
12. Design Wein bridge oscillator using circuit simulation software.
13. Simulate RC Phase - Shift Oscillator using circuit simulation software.
14. Develop Hartley Oscillator using circuit simulation software.
15. Introduction to SPICE software for circuit design.
16. Distinguish AND, OR, NOT, NOR, NAND, EX-OR gates using SPICE.
17. Design Differentiator using SPICE.
18. Simulate active low-pass, high-pass & band-pass filter using SPICE.