NAGARJUNA

College of Engineering & Technology

An Autonomous College under VTU

VISION

Leadership and Excellence in Education.

MISSION

To fulfill the vision by imparting total quality education replete with the philosophy of blending human values and academic professionalism.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

III & IV Semesters

Scheme and Syllabus

With effect from Academic Year

2015 -16

Third Semester B.E.– Scheme

Sl. No	Course Code	Course	Teaching Dept.	L-T-P-S (Hrs/week)	Total Credits	Marks
1	15ECM31	EngineeringMathematics-III(IC)	Mathematics	3-0-2-0	4	100
2	15ECT32	Analog Electronic Circuits	EC	3-0-0-0	3	100
3	15ECT33	Logic Design	EC	3-0-0-0	3	100
4	15ECT34	Field Theory	EC	4-0-0-0	4	100
5	15ECT35	Network Analysis (IC)	EC	3-0-2-0	4	100
6	15ECI36X	Foundation Elective-I (IC)	EC	2-0-2-0	3	100
7	15ECL37	Analog Electronics Circuits Laboratory	EC	1-0-2-0	2	100
8	15ECL38	Logic Design Laboratory	EC	1-0-2-0	2	100
9	15ECH39	Soft Skills Development	EC	0-2-0-0	1	100
TOTAL				**20-2-8-0**	**26**	**900**

Foundation Elective–I (IC)

Sl. No	Course Code	Course
1	15ECI361	Computer Communication and Networking
2	15ECI362	Creating Interactive and Responsive Web Pages
3	15ECI363	Electronic Instrumentation

Fourth Semester B.E. – Scheme

Sl. No	Course Code	Course	Teaching Dept.	L-T-P-S (Hrs/week)	Total Credits	Marks
1	15ECM41	Engineering Mathematics -IV (IC)	Mathematics	3-0-2-0	4	100
2	15ECT42	Microprocessor	EC	4-0-0-0	4	100
3	15ECT43	Fundamentals of HDL	EC	3-0-0-0	3	100
4	15ECT44	Signals and Systems	EC	3-0-0-0	3	100
5	15ECI45X	Foundation Elective-II (IC)	EC	3-0-2-0	4	100
6	15ECT46X	Engineering Elective-III	EC	3-0-0-0	3	100
7	15ECL47	Microprocessors Laboratory	EC	1-0-2-0	2	100
8	15ECL48	HDL Laboratory	EC	1-0-2-0	2	100
9	15ECH49	Soft Skills Development	EC	0-2-0-0	1	100
TOTAL				**21-2-8-0**	**26**	**900**

Foundation Elective-II (IC)

Sl. No	Course Code	Course
1	15ECI451	Linear Integrated Circuits
2	15ECI452	Fundamentals of VLSI
3	15ECI453	Introduction to Programming using Python

Engineering Elective-III

Sl. No	Course Code	Course
1	15ECT461	Renewable Energy Resources
2	15ECT462	Object Oriented Programming using C++
3	15ECT463	Smart Materials
4	15ECT464	Management Information Systems

IC – Integrated Course **L – Lecture** **T-Tutorials**

P-Practical **S – Self Study**

Engineering Mathematics-III (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECM31	3:0:2:0	4	CIE:50 SEE:50	3 Hours	BS

Course Objectives:

This course will enable students to :

- The course is aimed at developing the application of mathematical skills in solving the engineering problems using computers.
- Learn to use the partial differential equations in engineering applications.
- Use of Transforms in the engineering problems.
- Able to find the approximated solutions to engineering problems numerically.

Syllabus

Module - I

Partial Differential Equations: Formation of PDE –Eliminating the Arbitrary constants and arbitrary functions, solutions of non homogenous PDE by direct integration., Method of separation of variables. Applications to PDE –Derivation of one dimensional of wave equation and solution by separation of variables-with specified boundary conditions. Derivation of one dimensional of Heat equation and solution by separation of variables-with specified boundary conditions. **08 Hours**

Module - II

Fourier Series: Periodic functions, Dirchlet's conditions, Euler's Formulae-Fourier series of periodic functions of period 2l and 2π, Half range Fourier series, Practical harmonic analysis. **08 Hours**

Module – III

Fourier and Z-Transform: Infinite Fourier Transform, Fourier Sine and Cosine Transform and their inverse transforms-Problems.

Z-Transforms- Definition, standard functions, statements of Linearity property, Damping and shifting rules-problems. Inverse Z-Transforms by partial fraction method. Difference equations – solutions by Z-transform. **08 Hours**

Module - IV

Numerical Methods: Numerical solutions of Algebraic and transcendental equations-Regula Falsi Method and Newton Raphson Method. Finite Differences-Forward, Backward and Central differences, Newton's Forward Newton's Backward and Sterling's interpolation formulae. Lagrange's Interpolation formula (without proof). Numerical Differentiation using Newton's Forward and Backward formulae.

08 Hours

Module - V

Introduction to MATLAB, and its family, Menus and toolbars, Types of windows and types of files, MATLAB Help system, Basic calculations in MATLAB, Basic variables, Functions –Elementary Mathematical, Built in and User defined functions. Array operations, Matrix operations, Loops: for and while loops, condition statements-if—then and if-then-else statements, plotting of graphs, working with scripts and files, approximations and errors using MATLAB, solutions of initial value problems, solutions of system of equations. **08 Hours**

List of MATLAB Experiments

Sl.no	Name of Experiment
01	Basics of MATLAB
02	Basic operations in MATLAB
03	Basic Vector operations
04	Basic Matrix operations
	Solution of Linear Equations
	Determination of Eigen values and Eigen vectors of a Square Matrix
	Solution of Linear Equations for Undetermined and Over determined Cases.
05	Basic Operations on Complex Numbers
06	Plotting of 2D and 3D Curves
07	Polynomial Evaluation and Determination of Roots of a Polynomial
	Determination of Polynomial using Method of Least Square Curve Fitting
	Determination of Polynomial Fit , Analyzing Residuals, Exponential fit and Error Bounds from Given Data
08	Use of Functions
09	Differentiation and Integration
10	Solution of linear differential equations
	Numerical Solutions of Ordinary Differential Equations By Euler's Method
	Numerical Solutions of Ordinary Differential Equations By 4^{th} order Runge Kutta Method

Course Outcomes:

On completion of this course, the students are able to :

- Form a partial differential equations and their solutions.
- Expressing the given functions as infinite series of sine and cosine.
- Find approximated solutions by numerical methods.
- Use the MATLAB to solve the various types engineering problems.

Text Books:

1. Dr. B.S. Grewal: "Higher Engineering Mathematics", (Chapters 10, 17, 18, 22, 23, 28-30), Khanna Publishers, New Delhi, 42nd Edition, 2012, ISBN No: 9788174091956.
2. N.P. Bali and Dr. Manish Goyal: "A Text Book of Engineering Mathematics", (Chapters 10,16,17,20,22,23), Laxmi Publications (P) Ltd., New Delhi, 9th Edition, 2014, ISBN: 9788131808320.
3. Rudrapratab: "Getting started with MATLAB", (Chapters 1-4), Oxford University press, United Kingdom, Indian Edition, 2014 (reprinted).

Reference Books:

1. Erwin Kreyszig: "Advanced Engineering Mathematics", (Chapters 11,12,19), Wiley Pvt. Ltd India, New Delhi, 9th Edition, 2011, ISBN 13: 9788126531356.
2. B.V. Ramana: "Higher Engineering Mathematics", (Chapters 17-21,32), Tata Mc Graw – Hill Publishing company Limited, New Delhi, 2nd Reprint, 2007, ISBN 13: 978-0-07063417-0.
3. S.S. Sastry: "Introductory methods of numerical analysis", (Chapters 2,3,6), PHI Learning Private, Delhi, 5th Edition, 2013, ISBN: 978-81-203-4592-8.
4. Stormy Attaway: "A practical introduction to programming and problem solving", Elsevier, Boston, 2nd Edition.

E-Resources:

1. http://bookboon.com/en/essential-engineering-mathematics-ebook
2. https://www.free-ebooks.net/ebook/essential-engineering-mathematics
3. http://www.zums.ac.ir/ebooks/mathematics/essential-engineering-mathematic.
4. https://archive.org/details/AdvancedEngineeringMathematics10thEdition
5. www.mathworks.com

Analog Electronics Circuits

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECMT32	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to understand:

- The principles, operation of the analog building blocks like diodes, BJT for performing various functions.
- The concepts ofrectifiers, clipping and clamping circuits.
- The functionality of circuit models, equations and illustrate the concepts involved.
- An overview and designing of amplifiers, feedback amplifiers and oscillators.

Syllabus

Module - I

Diode Circuits: Diode Resistance, Diode equivalent circuits, Transition and diffusion capacitance, Reverse recovery time, Load line analysis, Rectifiers, Clippers and clampers. **08 Hours**

Module - II

Transistor Biasing: Operating point, Fixed bias circuits, Emitter stabilized biased circuits, and Voltage divider biased, DC bias with voltage feedback, miscellaneous bias configurations, Bias stabilization- General expression, Fixed Bias, Emitter Bias and Voltage Divider type Bias. **08 Hours**

Module - III

Transistor at Low Frequencies: BJT transistor modeling, CE Fixed bias configuration, Voltage divider bias, Emitter follower, CB configuration, Collector feedback configuration, Analysis of circuits re model. Hybrid π Model (CE configuration).

Transistor Frequency Response: General Frequency considerations, Low frequency response, Miller effect capacitance. **08 Hours**

Module - IV

Darlington Emitter Follower, Feedback concept, Feedback connections type.

Power Amplifiers: Definitions and amplifier types, series fed class A amplifier, Transformer coupled Class A amplifiers, Class B amplifier operations, Class B amplifier circuits. **08 Hours**

Module - V

Oscillators: Oscillator operation, Phase shift Oscillator, Wien bridge Oscillator, Tuned Oscillator circuits, Crystal Oscillator. (BJT Version Only), Simple design methods of Oscillators. **08 Hours**

Course Outcomes

On completion of this course, students will be able to:

- Design Rectifiers, Clipping and Clamping circuits.
- Analyzing different ways of biasing transistors.
- Evaluate transistor frequency response.
- Design of simple amplifier and power amplifiers circuits.
- Analyzing different type's oscillator circuits for particular frequencies.

Text Book:

1. Robert L. Boylestad and Louis Nashelsky: "Electronic Devices and Circuit Theory", (Chapters 1-5), 10th Edition, PHI/Pearson Education, 2012, ISBN: 978-81-317-6459-6.

Reference Books:

1. Jacob Millman and Christos C. Halkias: "Integrated Electronics", 2nd Edition, Tata - McGraw Hill, 2010, ISBN-978-007-015142-0.
2. David A. Bell: "Electronic Devices and Circuits", 5th Edition, PHI, 2008, ISBN: 978-0-19-569340-9.
3. U.B.Mahadevaswamy: "Analog Electronics Circuits: A Simplified Approach", 1st Edition, Pearson/Saguine, 2010, ISBN: 978-81-317-3234-2.

E-Resources:

1. http://www.allaboutcircuits.com/textbook/semiconductors/chpt-3/introduction-to-diodes-and-rectifiers/
2. http://fourier.eng.hmc.edu/e84/lectures/ch2/node4.html
3. http://www.allaboutcircuits.com/video-lectures/transistor-biasing/

Logic Design

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECT33	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to understand:

- The concepts of Boolean algebra and Boolean expression minimization techniques.
- The operations of combinational logic circuits like adder, subtractor, Multiplexers, Decoders, Encoders and Comparator.
- The operation of different types of Flip-Flops.
- The functioning of different types of counters and Shift registers.
- The construction of state diagrams, state table and state equations.

Syllabus

Module - I

Simplification of Boolean functions: Definition of combinational logic, Canonical forms, Generation of switching equations from truth tables, Karnaugh maps-three, four, five variables, Incompletely specified functions (Don't Care terms), Simplifying Max term equations, Quine Mc-Clusky minimization technique, Map Entered Variable. **08 Hours**

Module - II

Combinational Logic Circuits: Binary adders and subtractors, parallel adder and subtractor, carry look ahead adder, Comparators, Decoders, Encoders and Multiplexers. **08 Hours**

Module - III

Flip-Flops and Simple Flip –Flops Applications: Basic Bi-stable Element, Latches, SR Latch, Application of SR Latch, A Switch Debouncer, The SR Latch, The gated SR Latch, The gated D Latch, The Master Slave Flip-Flops (Pulse-Triggered Flip-Flops): The Master-Slave SR Flip-Flops, The Master-Slave JK Flip-Flop, Edge Triggered Flip-Flop: The Positive Edge-Triggered D Flip-Flop, Negative-Edge Triggered D Flip-Flop. **08 Hours**

Module - IV

Sequential Circuits: Characteristic Equations, Registers, Counters - Binary Ripple Counters, Synchronous Binary counters, Counters based on Shift Registers, Design

of a Synchronous counters, Design of a Synchronous mod-6 Counter using clocked JK Flip-Flops Design of a Synchronous mod-6 Counter using clocked D, T, or SR Flip-Flops. **08 Hours**

Module - V

Sequential Design: Introduction, Mealy and Moore Models, State Machine Notation, Synchronous Sequential Circuit Analysis, construction of state diagrams. **08 Hours**

Course Outcomes

On completion of this course, students should be able to:

- Design an optimal solution for a given digital problem using K – Maps.
- Design combinational digital circuits for the given specifications.
- Describe the different types of Flip-Flop.
- Design sequential digital circuits for the given specifications.
- Develop the appropriate Mealy FSM or Moore FSM.

Text Books:

1. John M Yarbrough: "Digital Logic Applications and Design", 1st Edition, Cengage Learning, New Delhi, Reprint, 2012, ISBN-13: 978-81-315-0058-3, ISBN-10: 81-315-0058-6.
2. Donald D Givone: "Digital Principles and Design", 1st Edition, Tata McGraw Hill, New Delhi, Reprint, 2005, ISBN: 0-07-052906-X.

Reference Books:

1. Charles H Roth: "Fundamentals of logic design", 5th Edition, Thomson, New Delhi, Reprint, 2007, ISBN: 81-315-0043-8.
2. M. Morris Mano and Charles R. Kime: "Logic and computer design Fundamentals", 2nd Edition, Pearson, Reprint, 2005, ISBN: 81-7808-334-5.

E-Resources:

1. http://nptel.ac.in/courses/117106086/
2. http://www.asic-world.com/digital/tutorial.html
3. https://www.wiziq.com/tutorials/digital-electronics

Field Theory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECT34	4:0:0:0	4	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to understand:

- The fundamental concepts and techniques in Fields and waves.
- The basic concepts of Energy, Potential and Boundary conditions.
- The importance of Poisson's and Laplace theorems and their applications.
- The basic principles of Maxwell's equations and Uniform Plane wave.

Syllabus

Module - I

Vector Analysis: Vector Algebra, the Cartesian coordinate system, vector field, circular coordinate system, cylindrical coordinate system, spherical coordinate system.

Electrostatics: Introduction, Coulomb's Law and field intensity, Electric flux density, Gauss's Law, Applications of Gauss's Law, Divergence theorem, Electric potential, Gradient of a scalar quantity, Relationship between Electric field and potential, Electric dipole and flux. **10 Hours**

Module - II

Energy and potential: Energy and potential in a moving point charge in an Electric Field, the Line Integral, definition of potential difference and potential, the potential field of a point charge and system of charges, Potential gradient, Energy density in an electrostatic field.

Conductors, dielectrics and capacitance: Current and current density, Continuity of current, metallic conductors, Conductor properties and boundary conditions, the method of images, Semiconductors, Nature of Dielectric materials, Boundary conditions for perfect dielectric materials, Capacitance, several capacitance examples, capacitance of a two wire line. **10 Hours**

Module - III

Poisson's and Laplace's Equations: Derivations of Poisson's and Laplace's Equations, Uniqueness theorem, Examples of the solutions of Laplace's and Poisson's equations. **10 Hours**

Module - IV

The Steady Magnetic Field: Biot-Savart Law, Ampere's Circuital Law, Curl, Stokes Theorem, Magnetic Flux and Magnetic Flux density, The Scalar and Vector magnetic potentials, Derivation of steady magnetic field Laws.

Magnetic Forces: Force on a moving charge, Force on a Differential current element, Force between differential Current elements, Force and Torque on a closed circuit.

11 Hours

Module - V

Time varying fields and Maxwell's equations: Faraday's law, displacement current, Maxwell's equation in point and Integral form, the retarded potentials.

Uniform plane wave: Wave propagation in free space and dielectrics, The Poynting vector and power considerations, Poynting's theorem and wave power, propagation in good conductors. **11 Hours**

Course Outcomes:

On completion of this course, students should be able to:

- Describe the basics of Vectors, Coordinate systems and Electrostatics.
- Discuss the concepts of Energy and potential for the boundary conditions.
- Analyzing basic theory of Poisson's and Laplace's equations.
- Apply the laws and theorems governing magnetic field.
- Apply the Maxwell's equations and relationship between Maxwell's equations and Uniform Plane wave.

Text Book:

1. William H Hayt Jr. and John A Buck: "Engineering Electromagnetic", 8th Edition, Tata McGraw-Hill, 2006, ISBN-13: 978-0071244497, ISBN-10: 0071244492.

Reference Books:

1. John Kraus: "Electromagnetics with Applications", 5th Edition, Tata Mc-Graw Hill, 1999, ISBN-13: 978-0072899696, ISBN-10: 0072899697.
2. Edward C. Jordan and Keith G Balmain: "Electromagnetic Waves and Radiating Systems", 2nd Edition, PHI, New Delhi, 1968, ISBN: 9780132499958.

E-Resources:

1. http://hyperphysics.phy-astr.gsu.edu/hbase/electric/maxeq.html
2. http://www.maxwells-equations.com/
3. http://mathworld.wolfram.com/CoordinateSystem.html
4. http://edndoc.esri.com/arcsde/9.1/general_topics/what_coord_sys.html

Network Analysis (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECI35	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to understand:

- The fundamental concepts and techniques in network analysis.
- The functioning of DC and AC sources for the graph theory.
- To design Resonant Circuit modules considering Frequency response of series and parallel Circuits.
- The importance of Network Theorems and their applications.
- Basic concepts of synthesis for designing filters.

Syllabus

Module - I

Basic Concepts: Practical sources, Source transformations, Network reduction using Star – Delta transformation, Loop and node analysis with linearly dependent and independent sources for DC and AC networks, Concepts of super node and super mesh. **08 Hours**

Module - II

Network Topology: Graph of a network, Concept of tree and co-tree, incidence matrix, tie-set, tie-set and cut-set schedules, Formulation of equilibrium equations in matrix form, Solution of resistive networks, Principle of duality. **08 Hours**

Module - III

Network Theorems I: Superposition, Reciprocity and Millman's theorems.
Network Theorems II: Thevinin's and Norton's theorems and Maximum Power transfer theorem. **08 Hours**

Module - IV

Resonant Circuits: Series and parallel resonance, frequency- response of series and parallel circuits, Q –factor, Bandwidth.
Transient behavior and initial conditions: Behavior of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations. **08 Hours**

Module - V

Two port network parameters: Definition of z, y, h and transmission parameters, modeling with these parameters, relationship between parameters sets. **08 Hours**

List of Experiments :

1. Verification of Thevinin's Theorem.
2. Maximum Power Transfer theorem for DC Circuits.
3. Characteristics of Series and Parallel resonant circuits.
4. Verification of Norton's Theorem.
5. Verification of superposition Theorem for DC circuits.
6. Analyze the Z-transforms for the resistive two port network.

Course Outcomes:

On completion of this course, students should be able to:

- Apply nodal and mesh analysis techniques to various electric circuits.
- Design various network theorems to simplify circuits.
- Design electric circuits using the Laplace transformation.
- Evaluate circuits using network topology.
- Design two-port networks using R-L, R-C or L-C components.

Text Books:

1. M. E. Van Valkenburg: "Network Analysis", (Chapters 1-5), 3rd Edition, Pearson Prentice Hall, New Delhi, 1974. ISBN: 978-81-203-0156-6.
2. W. H. Hyatt Jr., and J. E. Kemmerly, S. M. Durbin: "Engineering Circuit Analysis", 7th Edition, Tata McGraw Hill, New Delhi, 2011, ISBN: 978-0-07-015385-1.

Reference Books:

1. M. Nahvi, J. A. Edminister: "Electric Circuits", 10th Edition, Tata-McGraw Hill, New Delhi, 2007, ISBN 0-07-463591-3.
2. C.K. Alexander, M. N O Sadiku: "Fundamentals of Electric Circuits", 3rd Edition, Tata McGraw Hill, New Delhi, 2007, ISBN: 978-0-07-064803-6.

E–Resources:

1. http://www.allaboutcircuits.com/textbook/
2. http://fourier.eng.hmc.edu/e84/lectures/ch2/node3.html
3. http://tutorial.math.lamar.edu/Classes/DE/LaplaceIntro.aspx
4. http://fourier.eng.hmc.edu/e84/lectures/ch2/node4.html

Computer Communication and Networking (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECI361	2:0:2:0	3	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to :

- Understand the basics of data communication system and network models.
- Identify the need and techniques for digital and analog transmissions.
- Get exposed to different error detection and correction methods.

Syllabus

Module - I

Introduction to Communications: Data Communications, Networks - Physical structure, Categories of Networks, Network Models –The OSI Model, TCP/IP Protocol Suite. **06 Hours**

Module - II

Digital Transmission: Digital to Digital Conversion – Line coding, Line coding schemes (Unipolar, Polar, Bipolar only),Analog to Digital Conversion – PCM Encoder and Decoder, Transmission Modes. **05 Hours**

Module - III

Analog Transmission: Digital to Analog conversion - Introduction, ASK, PSK, FSK, Analog to Analog conversion – Introduction, AM, PM, FM. **05 Hours**

Module - IV

Multiplexing and Spectrum Spreading: Multiplexing - Introduction, FDM, Synchronous TDM, Statistical TDM, , Spread Spectrum – Introduction, FHSS, DSSS. **05 Hours**

Module - V

Error Detection and Correction: Introduction, Block Coding, Cyclic Codes – CRC, Polynomials, Cyclic code encoder using Polynomials, Advantages of cyclic codes. Checksum. **05 Hours**

Laboratory

1. Write a program to convert digital to analog data transmission.
2. Write a program to convert analog to digital data transmission.

3. Write a program for error detecting code using CRC-CCITT (16 bits).
4. Using TCP/IP sockets write a client server program to make the client send the file name and to make the server send back the contents of the requested file if present.

Course Outcomes:

On completion of this course, the students are able to :

- Describe the basics of data communication system and network models.
- Distinguish between different techniques of digital transmissions.
- Compare different methods of analog transmissions.
- Explain various types of multiplexing and spread spectrum mechanisms.
- Solve problems of error detection and correction using Block coding and CRC mechanisms.

Text Book:

1. Behrouz A. Forouzan: "Data Communication and Networking", (Chapters 1,2, 4-6, 10), McGraw Hill Education, New Delhi, India, 5th Edition, Copyright: 2013. Publication Date: February 17, 2012, ISBN: 9781259064753.

Reference Books:

1. William Stallings: "Data and Computer Communication", Pearson Education, Delhi, 8th Edition, 2007, ISBN: 9788131715369.
2. Craig Zacker: "The Complete Reference Networking", McGraw-Hill Education, New Delhi, India, 1st Edition, 2002, ISBN: 13: 978-0070474161.
3. Wayne Tomasi: "Introduction to Data Communications and Networking", Pearson Education, Delhi, 1st Edition, ISBN 13: 978-8131709306.

E-Resources:

1. http://www.mhhe.com/engcs/compsci/forouzan/frontmatter.pdf.
2. http://ebookinga.com/data-communication-and-networking-tata-mcgraw-hil.
3. https://www.goodreads.com/book/show/209441.Introduction_to_Data_Communications_and_Networking.

Creating Interactive and Responsive Web Pages (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECI362	2:0:2:0	3	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to:

- To learn the evolution of the World Wide Web and its relevance in today's world.
- To get a clear understanding of the technologies involved in developing a website.
- To learn web technology with a focus on creating interactive and responsive web pages.

Syllabus

Module - I

HTML 5 and CSS: Introduction to Hyper Text Markup Language, Key components of HTML document, HTML elements, Headers, Linking, Images, Unordered Lists, and Nested and ordered Lists.
Tables, Divs and forms: HTML Tables and Formatting, HTML Forms, Internal Linking, Creating and Using Images, Maps, Div and span tags. CSS: Introduction, CSS selector, positioning, layouts, debugging. **06 Hours**

Module - II

JavaScript: Browser and Document object, scripts and HTML Document, variables, expressions, Data type conversions, decisions and loops, control structure, windows Document object, forms and form handling elements, scripting, event handling.
05 Hours

Module- III

jQuery: Using selectors with jQuery, Manipulating page elements with jQuery, jQuery event model, jQuery and Ajax, jQuery animation and advanced effects, jQuery plugins. **05 Hours**

Module- IV

Bootstrap: Bootstrap Scaffolding, Bootstrap CSS, Bootstrap Layout Components, Bootstrap JavaScript Plugins, Using Bootstrap. **05 Hours**

Module - V

XML: What is XML? What are the differences between HTML and XML, what is the purpose of XML?

AJAX: AJAX Introduction, AJAX XML Http, AJAX Request, AJAX Response, AJAX with Server side. **05 Hours**

Hands on

1. HTML and CSS -

a. Create a HTML page to display the following content <Ensure the format is same as shwn below>; Use HTML Tables UnorderList and OrderList (UL and OL):

1. Development Environment • Eclipse (SpringSource Tool Suite distribution) • Apache Tomcat/VMware® vFabric™ tc Server • Spring Insight • Testing tools	**2. Spring Overview** • Introduction to Spring configuration • Bean life cycle • Simplifying configuration • Integration testing with Spring
3. Getting Started with Spring Web MVC • Spring model-view-controller (MVC) overview • DispatcherServlet • Controller programming model overview • Spring MVC views • Simplifying configuration	**4. Spring MVC Configuration Options** • Spring MVC infrastructure Beans • URL mappings • Handler interceptors and handler adapters • Exception resolvers • Message source

b. Create a HTML page to display testimonials received from customers along with their picture and Name as shown below:

2. Java Script and jQuery

a. jQuery form validations:

Front-End: Develop below form using HTML to create new user:

Field Details:

1. Name <String, Length(16), Mandatory, Validations: Minimum Length: 3, Can accept special characters>
2. Email <String, Length(60), Mandatory, Validations: Should be a valid email id>
3. Password <String, Length(16), Mandatory, Validations: Minimum Length: 5, Can accept special characters>

- Create Buttons - "Create an account" and "Cancel"
- Form should be Scrollable
- For field validations, use jQuery
- Ensure all validations pertaining to Name, Email and Password are taken care. If the use enters incorrect values appropriate error message should be displayed and should allow the user to enter correct data

b. jQuery image slider:

In an HTML page, insert a minimum of 5 images; Ensure inserted images are scrollable.
Hint: To make images scrollable use jQuery image slider or use javascript.

Sample screen shot :

3. Develop below form using HTML to Search and Book Tickets:

Validations :

1. All fields are Mandatory except “Single Lady” Field
2. Onwards date must be less than Return date

4. Bootstrap, AJAX and jQuery:

a. Create a Bootstrap Page that helps maintain Employee Information in an organization.

b. When clicked on the “Add New Employee” button, load a dialog box as shown below

Validations:

1. All fields are Mandatory.
2. On successful submission of the form, the new employee details has to be appended as a last row in the table.
3. When clicked on the Edit icon, a similar pop-up as the "Add new Employee" form has to be displayed with the input fields populated with appropriate values. When the form is submitted in the Edit flow, ensure all the validations are in place. The name of the button in the Edit flow has to be "Update" instead of "Add".
4. When clicked on the Delete icon, a confirmation dialog box has to be displayed with a message "Are you sure, you want to delete this entry?" If the user clicks "Yes", the corresponding row has to be deleted from the table. If the user clicks "No" the table has to remain unaffected.

Course Outcomes:

On completion of this course, the students are able to :

- Develop web layouts with style sheets and web screens in a presentable form.
- Write interactive web pages through form validations and other methods. Use the same in UI development.
- Use the Java Script libraries to accelerate UI development.
- Design and develop responsive and mobile first web pages.
- Develop applications by using synchronous and asynchronous communication over web.

Text Book:

1. Jon Duckett: "Web Design with HTML, CSS, JavaScript and jQuery Set", Wiley, 1st Edition, 2014, ISBN 13: 978-1118907443.

Reference Books:

1. Jake Spurlock: "Bootstrap, Shroff", O'Reilly Media, United States of America, 1st Edition, 2013, ISBN: 978 -1 -4493-4391-0.
2. Bear Bibeault, Yehuda Katz and Aurelio De Rosa: "jQuery in Action", Dreamtech Press, New Delhi, India, 3rd Edition, 2015, ISBN: 978-1617292071.

E-Resources:

1. http://www.w3schools.com/
2. https://learn.jquery.com/
3. https://developer.mozilla.org/en-US/Learn/Getting_started_with_the_web/JavaScript_basics

Electronic Instrumentation (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECI363	2:0:2:0	3	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to understand:

- The concepts oferrors and characteristics of the measurement systems.
- The importance of various technologies available to measure R, L, C using Voltmeters and Multimeters.
- Basic working principle of DVM, DMM, CRO, DFM.
- The fundamental concepts and working of CRT.
- The functioning of different Signal Generators and Bridge Circuits.
- The principle of Different types of Transducers.

Syllabus

Module - I

Introduction

Measurement Errors: Gross errors and systematic errors, Absolute and relative errors, accuracy, Precision, Resolution and Significant figures.

Voltmeters and Multimeters: Introduction, Multirange voltmeter, Extending voltmeter ranges, Loading, AC voltmeter using Rectifiers – Half wave and Full wave, Peak responding and True RMS voltmeters. **06 Hours**

Module - II

Digital Instruments: Digital Voltmeters – Introduction, DVM's based on V – T, V – F and Successive approximation principles, Resolution and sensitivity, General specifications, Digital Multi-meters, Digital frequency meters, Digital measurement of time. **05 Hours**

Module - III

Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram and working of each block, Typical CRT connections, Dual beam and dual trace CROs, Electronic switch. **06 Hours**

Module - IV

Signal Generators: Introduction, Fixed and variable AF oscillator, Standard signal generator, Laboratory type signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator, Sweep frequency generator, Frequency synthesizer.

Measurement of resistance, inductance and capacitance: Wheatstone's bridge, Kelvin bridge, AC bridges, Capacitance Comparison bridge, Maxwell's bridge, Wein's bridge, Wagner's earth connection. **06 Hours**

Module - V

Transducers-I: Introduction, Electrical transducers, Selecting a transducer, Resistive transducer, Resistive position transducer, Strain gauges, Resistance thermometer, Thermistor, Inductive transducer, Differential output transducers and LVDT.

Transducers–II: Piezoelectric transducer, photoelectric transducer, Photovoltaic transducer, Semiconductor photo devices, Temperature transducers-RTD, Thermocouple. **05 Hours**

List of Experiments

1. Study blockwise construction of a analog oscilloscope & function generator.
2. Study blockwise construction of a multimeter & frequency counter.
3. Study measurement of different components and parameters like q of a coil using lcr q – meter.
4. Study distortion factor meter and determination of the % distortion of the given oscillator.
5. Study characteristics of temperature transducer like thermocouple, thermistor and rtd with implementation of a small project using signal conditioning circuits like instrumentation amplifier.
6. Measurement of strain using strain gauge.
7. Study differential pressure transducer & signal conditioning of output signal.
8. Measurement of level using capacitive transducer.

Course Outcomes:

On completion of this course, students will be able to:

- Analyze characteristics of various measuring instruments and different types of errors.
- Describe the different current and voltage meters.
- Use the CRO and able to measure different parameters.
- Use Signal generators and function generator.
- Describe the working of different types of Transducers.

Text Books:

1. H. S. Kalsi: "Electronic Instrumentation", 3rd Edition, TMH, New Delhi, 2010, ISBN: 978-0-07-070206-6.
2. David A Bell: "Electronic Instrumentation and Measurements", 3rd Edition, PHI, New Delhi, 2006, ISBN: 9788120323605.

Reference Book:

1. Cooper D and A D Helfrick: "Modern electronic instrumentation and measuring techniques", PHI, New Delhi, 1990, ISBN: 978-81-203-0752-0.

E-Resources:

1. http://www.testandmeasurementtips.com/oscilloscopes/different-types-of-oscilloscopes
2. http://www.myklassroom.com/Engineering-branches/21/Electronics-and-Instrumentation-Engg.- (EIE)
3. http://www.radio-electronics.com/info/t_and_m/generators/signal-generator-types.php
4. http://www.delabs-circuits.com/cirdir/analog/analog2.html

Analog Electronics Circuits Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECL37	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to understand:

- Basic operation of semiconductor devices.
- The analog components used in electronics.
- The design of operational circuits using analog devices.
- The use of appropriate test equipment to analyze circuit operation.

List of Experiments

1. Design of Clamping circuits: positive clamping / negative clamping.
2. Design and testing of Diode clipping (Single/Double ended) circuits for peak clipping, peak detection.
3. Design and testing of Half wave Rectifier with and without Capacitor filter. Determination of ripple factor and efficiency.
4. Design and testing of Full wave Rectifier with and without Capacitor filter. Determination of ripple factor and efficiency.
5. Design and testing of Bridge Rectifier with and without Capacitor filter. Determination of ripple factor and efficiency.
6. Design of RC coupled Single stage BJT amplifier and determination of the gain-frequency response.
7. Design of BJT Darlington Emitter follower and determination of the gain-frequency response.(Single circuit) (One Experiment).
8. Design and testing for the performance of BJT-RC Phase shift Oscillator for $f_0 \leq 10$ KHz.
9. Design and testing for the performance of BJT – Hartley and Colpitts Oscillators for RF range $f_0 \geq 50$ KHz.
10. Design and testing for the performance of BJT -Crystal Oscillator for $f_0 > 100$ KHz.
11. Design and Testing of a transformer less Class – B push pull power amplifier and determination of its conversion efficiency.

Course Outcomes:

On completion of this course, students will be able to:

- Design various types of clipping and clamping circuits.
- Analyze and design different rectifiers.
- Design BJT amplifier and power amplifier.
- Design and evaluate Darlington emitter follower.
- Design and evaluate the performance of various types of oscillators.

E-Resources:

1. http://www.allaboutcircuits.com/textbook/semiconductors/chpt-3/introduction-to-diodes-and-rectifiers/
2. http://fourier.eng.hmc.edu/e84/lectures/ch2/node4.html
3. http://www.allaboutcircuits.com/video-lectures/transistor-biasing/

Logic Design Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECL38	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to understand:

- The practical aspects of the Digital Electronic Circuits.
- The designing of different types of the Combinational Circuits.
- The designing of various Sequential Circuits.

List of Experiments:

1. Simplification, Realization of Boolean Expression using Logic/Universal gates.
2. Realization of Half/Full Adder and Half/Full Subtractor using Logic Gates,
   a) Realization of Parallel Adder/Subtractor using 7483 Chip.
   b) BCD to Excess-3 Conversion.
3. Realization of Binary to Gray code conversion and vice versa.
4. MUX / DEMUX – use of 74153, 74139 for arithmetic circuits and Code converter.
5. Realization of 1/2 bit Comparator and study of 7485.
6. Use of a) Decoder chip to drive LED displays b) Priority Encoder.
7. Truth Table verification of Flip-Flop's, a) JK Master Slave b) T and D.
8. Realizations of 3 bit counter as sequential circuit and Mod N counter design (IC 7476).
9. Shift Left, Shift Right, SISO, SIPO, PISO, PIPO operations using IC7495.
10. Implementation of Ring/ Johnson Counter.
11. Implementation of Sequence Generator.

Course Outcomes:

On completion of this course, students will be able to:

- Design and analyze simple Boolean expression using basic gates.
- Design and verification of various Combinational Circuits.
- Analyze practical application of decoder chip and priority encoder.
- Evaluate the various Sequential Circuits.
- Design and analyze various types of registers and counters.

E-Resources:

1. http://nptel.ac.in/courses/117106086/
2. http://www.asic-world.com/digital/tutorial.html
3. https://www.wiziq.com/tutorials/digital-electronics

Soft Skills Development

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECH39	0:2:0:0	1	CIE:50 SEE:50	2 Hours	HSS

Syllabus

Course Objectives:

This course will enable students to understand:

- Improve the communication skills.
- Develop the art of presentation and writing effectively.
- Enhance the technical knowledge.

To improve the communication and presentation skill, every student has to give a seminar on technical topics assigned by the faculty supervisor. Each supervisor will be assigned with 15-20 students to guide and monitor the presentation. The presentation shall be for 15 to 20 minutes. A brief report on the seminar has to be submitted by the student to the concerned department after completion of the seminar. The report shall be signed by the supervisor and the Head of the concerned department.

The objective of the seminar is to introduce students to the major constituent of technology that is concerned with reading, understanding, summarizing, explaining and presenting existing technical topics. Students have to refer one or more topics that are assigned to them by their supervisors. The idea behind the seminar system is to familiarize student more extensively with the methodology of their chosen subject, allow them to develop presentation skills, and also interact with example of practical problems.

Course Outcomes:

On completion of this course, students will be able to:

- Get rid of stage fear and answer questions from audience.
- Communicate confidently and fluently.
- Comprehend and prepare reports effectively.

Engineering Mathematics-IV (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECM41	3:0:2:0	4	CIE:50 SEE:50	3 Hours	BS

Course Objectives:

This course will enable students to :

- Develop the application of mathematical skills in solving statistics and probability problems using computers.
- Find differentiation, integration and solutions of differential equations using numerical methods.
- Analyse of complex variable functions, Introduction of Statistical Software's.

Syllabus

Module - I

Numerical Methods-I: Numerical Integration-Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rule. Numerical solutions of ordinary differential equations of first order and first degree- Picard's method, Taylor's Series method, Modified Euler's Method, Runge-Kutta Method of 4^{th} order and Milne's Predictor Corrector Method. **08 Hours**

Module - II

Numerical Methods-II: Numerical solutions of simultaneous first order ordinary differential equations: Picard's method and Runge- Kutta method of fourth order. Numerical solutions of second order ordinary differential equations: Picard's method and Runge-Kutta method of fourth order. Numerical solutions of partial differential equations:-One dimensional heat equation. one dimensional wave equation**.**

08 Hours

Module - III

Complex variables: Functions of a complex variable, derivative of complex functions. Analytic functions: Cauchy's-Riemann equations in Cartesian and polar forms (No problems by using limits), Harmonic functions, construction of analytic functions by using Milne-Thomson method. Cauchy Theorem, Cauchy's integral formula-problems. **08 Hours**

Module - IV

Probability and statistics: Probability distributions: Poisson distribution, Poisson distribution is the limiting case of binomial distribution. Constants of Poisson distribution (no proof), Continuous random variable, Continuous probability distribution, Normal distribution (no proof)-problems.

Sampling and inference: Sampling distribution, testing of hypothesis, level of significance, confidence limits. Test of significance of large samples, sampling of variables, central limit theorem, confidence limits for unknown means, students t-distribution. **08 Hours**

Module - V

Introduction to R, Basic Data types, vector operations, matrix construction, lists, data frames, Elementary statistics with R-Qualitative and Quantitative data, Numerical measures, probability distribution, interval estimation and simple linear regression.

08 Hours

List of Lab Experiments

1 Introduction to R Software and basic commands
2 Demonstration and operations of Vectors
3 Operations of Matrices
4 Demonstration of Lists
5 Demonstration of Data Frames
6 Qualitative Data Analysis
7 Quantitative Data Analysis
8 Numerical Measures of Data
9 Probability Distribution
10 Linear Regressions

Course Outcomes:

On completion of this course, the students are able to :

- Determine the Differentiation, Integration and solutions of Differential equations using numerical methods.
- Find the differentiation and integrals of complex functions.
- Find the probability using different distributions and analysis by using samplings
- Use the statistical software's.

Text Books:

1. Dr. B.S. Grewal: "Higher Engineering Mathematics", (Chapters 20,26,27,30,32, 33), Khanna Publishers, New Delhi, 42nd Edition, 2012, **ISBN:** 9788174091956.
2. N.P. Bali and Dr. Manish Goyal, "A Text Book of Engineering Mathematics", (Chapters : 19,21,22,24,25), Laxmi Publications (P) Ltd., New Delhi, 9th Edition, 2014, **ISBN:** 9788131808320.
3. W.N.Venables, D.M.Smith : "An introduction to R. R- manual".

Reference Books:

1. Erwin Kreyszig: "Advanced Engineering Mathematics", (Chapters 13, 14,19,21,24,25), Wiley Pvt. Ltd., India, New Delhi, 9th Edition, 2011, ISBN 13: 9788126531356.
2. B.V. Ramana: "Higher Engineering Mathematics", (Chapters 22,23,27-29,32,33), Tata McGraw – Hill Publishing Company Limited, New Delhi, 2nd Reprint, 2007, ISBN 13: 978-0-07063417-0.
3. S.S.Sastry: "Introductory methods of numerical analysis", (Chapters 6,8,9), PHI Learning Private Ltd., Delhi, 5th Edition, 2013, *ISBN*: 978-81-203-4592-8.
4. John Verzani: "Using R for introductory Statistics", Champan and Hall/ CRC, New York, Washington D.C., ISBN: 978-1-59327-384-2.

E-Resources:

1. http://www.zums.ac.ir/ebooks/mathematics/essential-engineering-mathematic.
2. https://archive.org/details/AdvancedEngineeringMathematics10thEdition
3. https://www.**r**-project.org/

Microprocessor

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECT42	4:0:0:0	4	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to understand:

- Concept of evolution and structure of microprocessors.
- The Instruction set of 8086 microprocessor.
- The Hardware architecture of microprocessor.
- Concept of Multi programming the microprocessor for performing various tasks.

Syllabus

Module - I

8086 Processors: Historical background, The microprocessor-based personal computer system, 8086 CPU Architecture, registers and segments, operation of stack, pin diagram of 8086.

Instruction Set of 8086: Assembler instruction format, data transfer and arithmetic, branch and loop type, NOP and HALT. **10 Hours**

Module - II

Flag and Logical instructions: Flag manipulation, logical and shift and rotate instructions. Illustration of these instructions with example programs, Directives and operators.

Byte and String Manipulation: String instructions, REP Prefix, Table translation, Number format conversions, Procedures, Macros. **10 Hours**

Module - III

8086 Interrupts: 8086 Interrupts and interrupt responses, Hardware interrupt applications, Software interrupt applications, Interrupt examples.

8086 Interfacing: 8255 block diagram and architecture, Interfacing microprocessor to keyboard, Interfacing a microprocessor to a stepper motor. **10 Hours**

Module - IV

8086 based Multiprocessing Systems: Coprocessor configurations, The 8087 numeric data processor: data types, processor architecture, instruction set and examples.

System Bus Structure: Basic 8086 configurations: minimum mode, maximum mode,

Bus Interface: Peripheral Component Interconnect (PCI) bus, the Universal Serial Bus (USB). **11 Hours**

Module - V

80386 Processor: Introduction to the 80386 microprocessor, architecture, special 80386 registers.

80486 Processor: Introduction to the 80486 microprocessor, Introduction to the Pentium microprocessor. **11 Hours**

Course Outcomes:

On completion of this course, students should be able to:

- Describe the architecture of 8086.
- Analyze the appropriate usage of instructions in programming.
- Develop the interfacing programs with various interfaces.
- Analyze the appropriate algorithms for solving problems in math coprocessor.
- Distinguish various advanced processors.

Text books:

1. Y.C. Liu and G.A. Gibson: "Microcomputer Systems - The 8086 / 8088 Family", 2nd Edition, (Chapter 1), Prentice Hall of India, New Delhi, 2003, ISBN: 81-203-0409-8.
2. Barry B. Brey: "The Intel Microprocessor, Architecture, Programming and Interfacing", (Chapters 2-5), 8th Edition, Pearson Education, New Delhi, 2009, ISBN: 9780135026458, ISBN: 978-81-317-2622-8.

Reference Books:

1. Douglas Hall: "Microprocessor and Interfacing - Programming and Hardware", 3rd Edition, TMH, New Delhi, 2012, ISBN-9781259006159.
2. A.K. Ray and K.M. Bhurchandi: **"**Advanced Microprocessors and Peripherals", 3rd Edition, TMH, New Delhi, 2013, ISBN-9781259006135.

E-Resources:

1. http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/Microprocessors%20and%20Microcontrollers/pdf/Teacher_Slides/mod1/M1L3.pdf
2. http://www.nptel.ac.in/courses/Webcoursecontents/IIScBANG/Microprocessors%20and%20Microcontrollers/pdf/Lecture_Notes/LNm2.pdf
3. http://www.feis.unesp.br/Home/departamentos/engenhariaeletrica/cap_2_extra_8087.pdf

Fundamentals of HDL

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECT43	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to understand:

- Basic concept of HDL, comparison between Verilog and VHDL.
- Fundamentals of data flow and behavioral designs.
- The concept of structural and mixed language descriptions.
- The concepts task, functions and file processing in HDL.
- The concept of map Register Transfer Logic code to hardware domain.

Syllabus

Module - I

Introduction: Why HDL? , A Brief History of HDL, Structure of HDL Module, Operators, Data types, Types of Descriptions, simulation and synthesis, brief comparison of VHDL and Verilog. **08 Hours**

Module - II

Data-Flow Descriptions: Highlights of Data-Flow Descriptions, Structure of Data-Flow Description, Data Type – Vectors.

Behavioural Descriptions: Behavioral Description highlights, Structure of HDL behavioral Description, The VHDL variable: Assignment Statement, Sequential statements. **08 Hours**

Module - III

Structural Description: Highlights of structural description, organization of structural description.

Mixed-Language Descriptions: Highlights of Mixed-Language Description, How to invoke one language from the other, Mixed Language Description examples, and Limitations of Mixed-Language Description. **08 Hours**

Module - IV

Procedures and Functions: Procedures, Tasks, and Functions: Highlights of Procedures, tasks, and Functions, Procedures and tasks, Functions. Advanced HDL Descriptions: File Processing, Examples of File Processing. **08 Hours**

Module - V

Synthesis Basics: Highlights of Synthesis, Synthesis information from Entity and Module, Mapping Process and always in the Hardware Domain. **08 Hours**

Course Outcomes:

On completion of this course, students should be able to:

- Describe the various descriptions in VHDL and Verilog.
- Develop program using data flow and behavioural descriptions.
- Develop program using structural and mixed language description.
- Develop programs using procedure, task, and function.
- Analyze and synthesis VHDL and VERILOG codes for digital circuits.

Text Book:

1. Nazeih M. Botros: " HDL Programming (VHDL and Verilog)", (Chapters 1-5), Dreamtech Press Publishers, New Delhi, 2008, ISBN-13: 9788177226973.

Reference Books:

1. J. Bhaskar: "A Verilog HDL Primer", 2nd Edition, BS Publications, Hyderabad, 2001, ISBN: 8178000121.
2. Volnei A. Pedroni: 'Circuit Design with VHDL", 1st Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2004, ISBN: 8120326830.

E-Resources:

1. http://www.xilinx.com/video/hardware/basic-hdl-coding-techniques.html
2. http://www.academia.edu/1492361/VHDL_BASICS_WITH_EXAMPLES
3. http://ece-research.unm.edu/jimp/vlsi/slides/vhdl.html
4. http://www.asic-world.com/systemverilog/basic1.html
5. http://www.referencedesigner.com/tutorials/verilog/verilog_01.php
6. http://vhdlguru.blogspot.in/p/example-codes.html

Signals and Systems

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECT44	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to understand:

- The basic types of continuous-time and discrete-time signals and system properties.
- The convolution operation on continuous and discrete LTI system.
- The concept of differential and difference equations in describing an LTI systems and express the system in block diagram representations.
- Fourier Transform representation, various properties of continuous and discrete Fourier transform.
- Properties of Z-Transforms and role of ROC for evaluating causality, stability of the given signal.

Syllabus

Module - I

Introduction to signals and systems: Classification of continuous and discrete time signals, basic operations on independent variables, elementary signals: Exponential, sinusoidal signals, unit impulse, unit step and unit ramp signals, systems viewed as interconnection of operations, CT and DT systems, properties of systems. **08 Hours**

Module - II

Time-domain representations for LTI systems: Impulse response representation, convolution sum, convolution integral, Properties of impulse response representation, step response. Differential and difference equation representation of an LTI System, Solutions for Differential and difference equation, Block diagram representation-direct form I and direct form II through differential and difference equations**.**

08 Hours

Module - III

Fourier Transform: Continuous Fourier transforms and Discrete Fourier transform and their properties. Application of Fourier transform-solving difference and differential equation, frequency response, impulse response, Comment on stability and causality analysis. **08 Hours**

Module - IV

Z-Transforms-1: Introduction, definition of Z-transform, properties of ROC. Properties of Z transform, inverse Z-transforms using partial fraction and long division method.

08 Hours

Module - V

Z-Transforms-2: Transform analysis of LTI Systems using Z-transform, system function, causality, stability, Unilateral Z-Transform and its application to solve difference Equation. **08 Hours**

Course Outcomes:

On completion of this course, students should be able to:

- Discriminate various elementary signals and identify the properties of systems.
- Compute convolution operation on continuous and discrete time signals and express difference and differential equations as block diagram.
- Express the signals using Fourier transform and apply their properties for solving differential and difference equation.
- Analyze Z transforms and inverse Z transforms using various methods.
- Analyze LTI systems using Z transforms.

Text Books:

1. Simon Haykin: "Signals and Systems", 4th Edition, John Wiley India Pvt. Ltd., Reprint, 2004, ISBN: 978-81-265-1265-2.
2. Michael J Roberts: "Fundamentals of Signals and Systems", 2nd Edition, Tata McGraw-Hill, 2010, ISBN: 978-0-07-070221-9.

Reference Books:

1. Alan V Oppenheim, Alan S, Willsky and Hamid Nawab: "Signals and Systems", 2nd Edition, Pearson Education Asia / PHI, Indian Reprint, 2002, ISBN: 81-203-1246-5.
2. H.P Hsu, R. Ranjan, "Signals and Systems", Scham's Outlines, TMH, 1995, ISBN-13: 978-0-07-060171-0.

E-Resources:

1. http://link.springer.com/chapter/10.1007/978-1-4020-6272-8_4#page-1
2. http://www.thefouriertransform.com/
3. http://lpsa.swarthmore.edu/LaplaceZTable/LaplaceZFuncTable.html

Linear IC's and Applications (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECI451	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to understand:

- The use of op amp in DC and AC applications.
- The concepts of practical OP-AMP specifications, characteristics, biasing of OP-AMPs.
- The frequency response and bandwidth performance of practical OP-AMP.
- The concept of 555 timer, PLL and its applications.

Syllabus

Module - I

Operational Amplifier Fundamentals: Basic OP-AMP circuit, OP-AMP parameters: Input and Output voltage, CMRR and PSRR, Offset voltages and currents, Input and Output impedances, Slew rate and Frequency limitations.

OP-AMPs as DC Amplifiers: Biasing OP-AMPs, Direct coupled -Voltage Followers, Non-inverting Amplifiers, Inverting amplifiers, Summing amplifiers, Difference amplifier. **08 Hours**

Module - II

OP-AMPs as AC Amplifiers: Capacitor coupled Voltage Follower, High input impedance-Capacitor coupled Voltage Follower, Capacitor coupled Non-inverting Amplifiers, High input impedance - Capacitor coupled Non-inverting Amplifiers, Capacitor coupled Inverting amplifiers, setting the upper cut-off frequency, Capacitor coupled Difference amplifier, Use of a single polarity power supply. **08 Hours**

Module - III

OP-AMPs frequency response and compensation: Circuit stability, Frequency and phase Response, Frequency compensating methods, Band width, Slew rate effects, Zin Mod compensation, and circuit stability precautions. **08 Hours**

Module - IV

OP-AMP Application: Current amplifiers, precision rectifiers, Clamping circuits, Peak detectors, sample and hold circuits, Log and antilog amplifiers, Multiplier and divider, Triangular / rectangular wave generators.

Non-linear circuit applications of OP-AMP: Crossing detectors, inverting Schmitt trigger circuits, Mono-stable and A-stable multivibrator, Active Filters: First and Second order Low pass and High pass filters. **08 Hours**

Module - V

Other Linear IC applications: 555 timer: Basic timer circuit, 555 timer used as a stable and Mono-stable multivibrator, Schmitt trigger; PLL: Operating principles, Phase detector / Comparator, VC; D/A and A/ D converters: Basic DAC Techniques, AD converters, IC 723 general purpose Regulator. **08 Hours**

List of Experiments

1. Design a Second order active LPF
2. Design a Second order active HPF
3. Design a Second order active BPF
4. Design and test a Schmitt trigger circuit for the given values of UTP and LTP
5. Design and test R-2R DAC using op-amp
6. Design and test the circuits Astablemultivibrator for given frequency and duty cycle using IC 555
7. Design and test the circuits Monostablemultivibrator for given pulse width W using IC555

Course Outcomes:

On completion of this module, students should be able to:

- Describe the practical OP-AMP specifications and characteristics.
- Determine OP-AMP as AC amplifiers.
- Analyzing stability condition of OP-AMP.
- Analyzing OP-AMP linear and non linear applications.
- Analyzing of 555 timers, PLL and their applications.

Text Books:

1. David A. Bell: "Operational Amplifiers and Linear IC's", 2nd Edition, (Chapters 1-4), PHI/Pearson, 2008, ISBN: 9788120323599.
2. D. Roy Choudhury and Shail B. Jain: "Linear Integrated Circuits", 4th Edition, (Chapter 5), New Age International, 2010, ISBN: 9788122430981.

Reference Books:

1. Robert F. Coughlin and Fred F. Driscoll: "Operational Amplifiers and Linear Integrated Circuits", 6th Edition, PHI/Pearson, 2001, ISBN: 8120320964.
2. Ramakant A. Gayakwad: "OP-AMPs and Linear Integrated Circuits", 4th Edition, PHI/Pearson, 2000, ISBN: 8120320581.

E-Resources:

1. http://www.electronics-tutorials.ws/opamp/opamp_1.html
2. http://www.radio-electronics.com/info/circuits/opamp_basics/operational-amplifier-basics-tutorial.php
3. http://www.chem.uoa.gr/applets/appletopamps/appl_opamps2.html
4. http://www.allaboutcircuits.com/textbook/semiconductors/chpt-8/introduction-operational-amplifiers/

Fundamentals of VLSI (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECI452	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to understand:

- The fundamental concepts of fabrication process and VLSI design flow.
- The ideal, non-ideal V-I and C-V characteristics.
- Design of CMOS combinational logic circuits.
- The basic concepts of testing and dynamic logic circuits.
- The fundamental concepts of low power VLSI Design.

Syllabus

Module - I

Introduction: A brief History**,** MOS Transistors, CMOS logic, CMOS fabrication and Layout, VLSI Design flow, Fabrication, Packaging and Testing.

CMOS Processing Technology: CMOS technologies Layout Design Rules, CMOS Process Enhancements. **08 Hours**

Module - II

MOS Transistor Theory: Introduction, Ideal I-V characteristics, Non ideal I-V effects, DC transfer Characteristics, C-V characteristics **08 Hours**

Module - III

Combinational MOS Logic circuits: MOS Logic circuits with Depletion NMOS load, CMOS logic circuits complex logic circuits, CMOS Transmission gates.

Sequential MOS Logic circuits: SR Latch, clocked latch and flip flop circuits, CMOS D Latch and edge triggered flip flop. **08 Hours**

Module - IV

Dynamic logic circuits: Basic principles of Pass Transistor circuits, Dynamic CMOS circuit techniques**:** CMOS TG logic, Dynamic CMOS logic, High performance Dynamic circuits, charge sharing problems, remedies.

Design for testability: Fault type and models, Controllability, Observability, Ad hoc testing, Scan based techniques, BIST, Current monitoring I_{DDQ} Test. **08 Hours**

Module - V

Low power CMOS Logic circuits: Introduction, Overview of power consumption, Low power design through voltage scaling, Estimation and Optimization of switching activity, Reduction of switched capacitance, Adiabatic logic circuits. **08 Hours**

List of Experiments

1. Simulation of basic gates.
2. Simulation of universal gates.
3. Simulation of Transmission Gate.
4. Simulation of Combinational Logic Circuits.
5. Layout ofbasic gates.
6. Layout of universal gates.
7. Layout of Transmission Gate.

Course Outcomes:

On completion of this module, students should be able to:

- Describe the fabrication process and VLSI design flow.
- Discuss V-I and C-V characteristics of MOSFETS.
- Analyze sequential and combinational logic circuits using CMOS.
- Discuss the concepts of testing and dynamic CMOS circuits.
- Describe the concepts of low power VLSI design.

Text Books:

1. Niel H.E Weste, David Harris: "CMOS VLSI Design-A Circuits and Systems Perspective", 3rd Edition, Pearson Education, 2006, ISBN: 9788131764671.
2. Sung Mo Kang, Yusuf Leblebici: "CMOS digital integrated circuits-Analysis and Design", 3rd Edition, Tata McGraw Hill, 2003, ISBN 10: 0070530777, ISBN13: 9780070530775.

Reference Book:

1. John P. Uyemura: "Introduction to VLSI Circuits and Systems", 1st Edition, John Wiley, 2003, ISBN: 0471127043.

E- Resources:

1. http://ece-research.unm.edu/jimp/vlsi/slides/chap3_1.html
2. http://www.slideshare.net/kalyankumarkalita/dynamic-logic-circuits
3. http://www.slideshare.net/jainatush/vlsi-test-principles-and-architectures-design-for-testability
4. http://www.eeherald.com/section/design-guide/Low-Power-VLSI-Design.html

Introduction to Programming using Python (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECI453	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students:

- Understand programming concepts, and various programming paradigms
- Get a clear understanding of Object Oriented Programming
- Learn Python with a focus on regular expressions, exception handling, file handling, creating modules, interacting with database.

Syllabus

Module - I

Introduction and overview Introduction, What is Python, Origin, Comparison, Comments, Operators, Variables and Assignment, Numbers, Strings, Lists and Tuples, Dictionaries, if Statement, while Loop, for Loop and the range() Built-in Function, Files and the open() Built-in Function, Errors and Exceptions, Functions, Classes, Modules. **Syntax and Style:** Statements and Syntax, Variable Assignment, Identifiers, Basic Style Guidelines, Memory Management, Python Application Examples. **08 Hours**

Module - II

Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types. Numbers and Strings, Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions. Sequences: Strings, Lists, and Tuples, Sequences, Strings, Strings and Operators, String-only Operators, Built-in Functions, String Built-in Methods, Special Features of Strings.

08 Hours

Module-III

Lists Operators, Built-in Functions, List Type Built-in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples. Conditionals and Loops: if statement, else statement, else-if statement, while statement, for statement, break statement, continue statement, pass statement, else statement. **08 Hours**

Module - IV

Files and Input/Output File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules.

Exception handling: The dir Function, Errors, Runtime Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, raise, assert. **08 Hours**

Module-V

Regular Expressions: Introduction/Motivation, Special Symbols and Characters for REs, REs and Python. Programming Exercise: Check for data error in CSV files: Numeric Check, Alphanumeric Check, Email Check, Date Check

Database Interactions: Database Connection, creating database tables, insert data into table, reading, updating data. **08 Hours**

List of Experiments:

1. Create a new program called hello world.py. You will use this file to write your very first 'Hello world!' program.
2. Write a program using print that, when run, prints out a tic-tac-toe board.
3. Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3,1/4... 1/10.
4. Write a program using a for loop that calculates exponentials. Your program should ask the user for a base base and an exponent exp, and calculate baseexp.
5. Write a method fact that takes a number from the user and prints its factorial.
6. Write a function roots that computes the roots of a quadratic equation. Check for complex roots and print an error message saying that the roots are complex.

Course Outcomes:

On completion of this module, students should be able to:

- Apply the concepts of Object Oriented principles used in Python.
- Apply Types, Type Operators and Built-in functions and use the same in developing specific programs.
- Apply the usage of built-in libraries, creation of customized libraries and efficient ways to store and retrieve data.
- Use file handling and exception handling mechanisms and apply the same in solving specific problems.
- Apply techniques using regular expressions and apply the same in solving specific problems.

Text Book:

1. Mark Lutz: "Learning Python", 5th Edition, O'REILLY, 2013, ISBN: 978-1-4493-5573-9.

Reference Books:

1. Barry, Paul: "Head First Python", 2nd Edition, O'REILLY, 2010, ISBN: 978-1-4493-8267-4.
2. David M. Beazley: "Python Essential Reference", 4th Edition, Developer's Library, 2010, ISBN: 0672329786.

E-Resources:

1. http://www.tutorialspoint.com/python/
2. https://www.codementor.io/learn-python-online
3. https://www.youtube.com/playlist?list=PL9FAE4422FA13FDE4

Renewable Energy Resources

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECT461	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to:

- Provide detailed information of the present energy scenario and the available Renewable Energy Resources.
- Get detailed insight knowledge in basics of solar radiation geometry and various measurement techniques.
- Understand the solar energy through solar thermal devices, PV conversion and their performance analysis.
- Gain the conceptual knowledge about the various energy conversion methods such as Wind, Tidal, OTEC and Geothermal.
- Give introduction to energy from Biomass, Hydrogen energy and their impact on environment and sustainability.

Syllabus

Module - I

Introduction: Energy source, India's production and reserves of commercial energy sources, need for non-conventional energy sources.

Solar Radiation: Extra-Terrestrial radiation, spectral distribution of extraterrestrial radiation, solar constant, solar radiation at the earth's surface, beam, diffuse and global radiation, solar radiation data.

Measurement of Solar Radiation: Pyrometer, shading ring pyrheliometer, sunshine recorder, schematic diagrams and principle of working. **09 Hours**

Module - II

Solar Radiation Geometry: Flux on a plane surface, latitude, declination angle, surface azimuth angle, hour angle, zenith angle, solar altitude angle expression for the angle between the incident beam and the normal to a plane surface (No derivation), local apparent time. Apparent motion of sun, day length, numerical examples.

Radiation Flux on a Tilted Surface: Beam, diffuse and reflected radiation, expression for flux on a tilted surface (no derivations), numerical examples.

Solar Thermal Conversion: Collection and storage, thermal collection devices, liquid flat plate collectors, solar air heaters concentrating collectors (cylindrical, parabolic, paraboloid) (Quantitative analysis). **09 Hours**

Module - III

Performance Analysis of Liquid Flat Plate Collectors: General description, collector geometry, selective surface (qualitative discussion) basic energy-balance equation, stagnation temperature, transmissivity of the cover system, transmissivity-absorptivity product, numerical examples. The overall loss coefficient, correlation for the top loss coefficient, bottom and side loss coefficient, problems (all correlations to be provided). Temperature distribution between the collector tubes, collector heat removal factor, collector efficiency factor and collector flow factor, mean plate temperature, instantaneous efficiency (all expressions to be provided). Effect of various parameters on the collector performance; collector orientation, selective surface, fluid inlet temperature, number covers, dust. **09 Hours**

Module - IV

Photovoltaic Conversion: Description, principle of working and characteristics, applications.

Wind Energy: Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, Wind machines: Types of wind machines and their characteristics, horizontal and vertical axis wind mills.

Tidal Power: Tides and waves as energy suppliers and their mechanics, fundamental characteristics of tidal power, harnessing tidal energy, limitations.

Ocean Thermal Energy Conversion : Principle of working, Rankine cycle.

Geothermal Energy Conversion: Principle of working, Types of geothermal station with schematic diagram. **08 Hours**

Module - V

Energy from Bio Mass: Photosynthesis, photosynthetic oxygen production, energy plantation, bio gas production from organic wastes by anaerobic fermentation, description of bio-gas plants, transportation of bio-gas, problems involved with bio-gas production, application of bio-gas, application of bio-gas in engines, advantages.

Hydrogen Energy : Properties of Hydrogen with respected to its utilization as a renewable form of energy, sources of hydrogen, production of hydrogen, electrolysis of water, thermal decomposition of water, thermo chemical production bio-chemical production. **07 Hours**

Course Outcomes:

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

- Explain the present energy scenario and the available Renewable Energy Resources.
- Describe the basics of solar radiation geometry and various measurement techniques.
- Analyze the knowledge gained in tapping the solar energy through solar thermal devices, pv conversion and their performance analysis.
- Demonstrate the various energy conversion methods such as Wind, Tidal, OTEC and Geothermal.
- Apply knowledge of Biomass and Hydrogen energy and their impact on environment and sustainability.

Text Books:

1. G D Rai: "Non-Conventional Energy Sources", (Chapters 1-3,6-9,11), 5th Edition, Khanna Publishers, 2011, ISBN-13: 9788174090737.
2. John Twidell and Tony Weir: "Renewable Energy Resources", (Chapters 2,5-7,9-14), 3rd Edition, Routledge Publisher, 2015, ISBN-13: 978041558437.
3. N K Bansal: "Non-Conventional Energy Resources", (Chapters 1-3,9,10,12,13), 1st Edition, Vikas Publishing, 2014, ISBN-13: 978935978577.

Reference Books:

1. B H Khan: "Non-Conventional Energy Resources", (Chapters 4-10), 2nd Edition, Tata McGraw-Hill Pub., 2006, ISBN-13: 9780070142763.
2. S P Sukhatme, J K Nayak, "Solar Energy", (Chapters 3,4), 3rd Edition, Tata McGraw-Hill Pub., 2008, ISBN-13: 9780070260641.

Object Oriented Programming with C++

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECT462	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to understand:

- Features of object oriented Programming concepts.
- Inline functions, default arguments, classes and objects.
- Constructor, Types of constructor and destructor and their order of execution.
- Operator overloading and its necessity.
- The virtual function, polymorphism, exception handling.

Syllabus

Module - I

Introduction: Origin of C++, features of OOP, Sample C++ program, Different data types, operators, expressions, implicit conversion, Type cast operator and statements, arrays and strings, pointers and user defined types, reference variable, memory management operator, name space, control structure, Function, default argument, inline functions, function overloading, recursive functions. **09 Hours**

Module - II

Classes and Objects: Classes, structures and classes are related. Friend functions, inline functions, Constructors, Different types of constructor, Destructors, Static data members, when constructor and destructors are executed, scope resolution operator. Nested classes, local classes, passing objects to functions, returning objects, this pointer. **09 Hours**

Module - III

Inheritance: Base Class, Inheritance, Types of inheritance and protected members, protected base class inheritance, inheriting multiple base classes, Constructors, Destructors and inheritance, Passing parameters to base class constructors, Granting access, Virtual base classes. **09 Hours**

Module - IV

Virtual functions, Polymorphism and Operator overloading: Operator over loading basics, creating a member operator function, Operator overloading using friend functions such as +, - , pre-increment, post-increment, etc., overloading <<, >>. Virtual

function, calling a Virtual function through a base class reference, Virtual attribute is inherited; Virtual functions are hierarchical, pure virtual functions, Abstract classes, Using virtual functions, Early and late binding. **08 Hours**

Module - V

Generic function, Exception handling C++ File I/O: Generic function, a function with two generic types, Generic sort. Exception handling fundamentals, catching class types, using multiple catch, catching all exception.<stream>, and the file classes ,opening and closing file, reading and writing text files, put(), get(), read(), write(), geline(), eof(), seekg(), seekp(), tellp(), tellg(). **07 Hours**

Course Outcomes:

On completion of this course, students will able to:

- Apply the concepts of Object Oriented Programming.
- Implement the concepts of classes and objects.
- Apply the concepts of inheritance to solve complex problems.
- Implement mechanism of virtual function and polymorphism.
- Develop generic function to perform different operations on different data types and implement exception handling.

Text Book:

1. Herbert Schildt: "The Complete Reference C++", 4th Edition, Tata McGraw Hill, 2003, ISBN 13: 9780070532465.

Reference Books:

1. Stanley B. Lippmann, Josee Lajore: "C++ Primer", 4th Edition, Pearson Education, 2005, *ISBN*-10: 0-321-71411-3.
2. Paul J Deitel, Harvey M Deitel: "C++ for Programmers", Pearson Education, 2009, *ISBN*-10: 0137059663.

E-Resources:

1. http://www.tutorialspoint.com/cplusplus/cpp_tutorial.pdf
2. http://www.ddegjust.ac.in/studymaterial/mca-3/ms-17.pdf

Smart Materials

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECT463	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to:

- Understand the characteristics of composites and smart materials in the product design process.
- Know the types of sensing and actuation devices.
- Gain the knowledge of optics and electromagnetic technology.
- Study the importance of different control systems.
- Realize and understand the principles of vibration and modal analysis.

Syllabus

Module - I

Introduction: Characteristics of composites and ceramics materials, Dynamics and controls, concepts, Electro-magnetic materials and shape memory alloys-processing and characteristics.

Control Design: Design of shape memory alloys, Types of MR fluids, Characteristics and application, principles of MR fluid value designs, Magnetic circuit design, MR Dampers, Design issues. **09 Hours**

Module - II

Sensing and Actuation: Principles of electromagnetic, acoustics, chemical and mechanical sensing and actuation, Types of sensors and their applications, their compatibility writer, conventional and advanced materials, signal processing, principles and characterization. **09 Hours**

Module - III

Structures: Principles of drag and turbulence control through smart skins, applications in environment such as aerospace and transportation vehicles, manufacturing, repair and maintainability aspects.

Optics and Electromagnetic: Principles of optical fiber technology, characteristics of active and adaptive optical system and components, design and manufacturing principles. **09 Hours**

Module - IV

Controls: Principles of structural acoustic control, distributed, analog and digital feedback controls, Dimensional implications for structural control. **08 Hours**

Module - V

Principles of Vibration And Modal Analysis: PZT Actuators, MEMS, Magnetic shape Memory Alloys, characteristics and Applications.
Information Processing: Neural Network, Data Processing, Data Visualization and Reliability: Principles and Application domains. **07 Hours**

Course Outcomes:

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

- Explain the characteristics of composites and smart materials in the product design process.
- Identify various types of sensing and actuation devices.
- Analyze the optics and design structures using smart materials.
- Demonstrate the working principles of different control systems.
- Describe the principles of vibration and modal analysis.

Text Books:

1. A V Srinivasan, D Michael Mcfarland: "Smart Structures:Analysis and Design", (Chapters 2-5,7,8), 1st Edition, Cambridge University Press, 2001, ISBN-13: 9780521659772.
2. M V Gandhi, B S Thomson: "Smart Materials and Structures", (Chapters 13-75), 1st Edition, Chapman and Hall Pub., 1992, ISBN-13: 9780412370106.

Reference Books:

1. Eric Udd: "Fiber Optic Sensors: An introduction for Engineers and Scientists", (Chapters 1-16), 2nd Edition, John Wiley and Sons Pub., 2011, ISBN-13: 9780470126844.
2. G P Gibss: "Adaptive Structures", John Wiles and Sons, New York, 1998.
3. Banks HT, RC Smith, Y Wang, Massow S A, "Smart Materials and Structures", Paris, 1996.

Management Information Systems

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECT464	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to:

- Effectively use and administrate information systems in different business applications.
- Understand problem solving techniques to model information system solutions for business problems.
- Understand the business and professional responsibilities related to the use of information system in organizations.

Syllabus

Module - I

Foundations of information systems in business: Introduction to Information Systems in Business: Why study Information Systems?, What you need to know, A global Information society, Success and Failure with IT, Why Businesses need Information Technology. Fundamentals of Information Systems: Fundamental Information System concepts: System concepts, Components of an Information System, Information System Resources, Information System activities, Overview of Information Systems: The expanding Role of Information Systems, Operations support Systems, Management support Systems, Other classifications of Information Systems. **08 Hours**

Module - II

Solving Business Problems with Information Systems: A Systems Approach to problem Solving: The Systems approach, Defining problems and opportunities, Developing alternative solutions, Evaluating Alternative solutions, Selecting the best solution, Using the Systems approach. Developing Information System Solutions: The system development cycle, Starting the Systems Development process, Systems Analysis, Systems Design, Prototyping, Implementing a new Information System, Maintenance of Information System, Computer Aided Systems Engineering, End user development.

Business applications –I

The Internet, Electronic Commerce and Business: Introduction, Business use of the Internet, Interactive marketing, Business value of the Internet, Customer value and

the Internet. Fundamentals of Electronic Commerce: Introduction, Foundations and applications of e-commerce, Business to Consumer and Business to Business commerce, Electronic payments and security. **08 Hours**

Module - III

Intranets, Extranets, and Enterprise Collaboration: Intranets and Extranets in Business: Business Value, Applications and Technologies for Intranets, Role of Extranets, Enterprise Collaboration Systems: Enterprise Collaboration, Group Ware, Electronic communication and Conferencing tools, collaborative work management tools. Information Systems for Business Operations: Business Information Systems: Cross Functional Marketing, Manufacturing, Human Resources, Accounting and Financial Information Systems. **08 Hours**

Module - IV

Transaction Processing Systems: Transaction Processing, Data entry, Batch and Real-time processing, Database maintenance, Document and Report generation, Inquiry processing.

Business applications -II

Information Systems for Strategic Advantage: Introduction, Competitive strategy, Strategic Roles for Information System, Breaking Business Barriers, Value chain and strategic Information System, Strategic Applications and Issues in information Technology, Re-engineering Business process, Improving Business quality, Becoming an agile competitor. Creating a virtual Company, Building the knowledge-creating company, Using the Internet Strategically. **08 Hours**

Module - V

Managing information technology: Enterprise and global Management: Managing Information Resources and Technologies: Information Technology Architecture, Managers and Information Technology, Organizations and Information Technology, Information Resource Management, Strategic Management Operational Management, Resource Management, Technology Management, Global Information Technology Management: The International Dimension, Global IT Management, Cultural, Political and Geo-Economic challenges, The global company, Global Business and IT strategies, Global Business and IT applications, Global IT Platforms, Global data Issue, Global Systems development, You and Global IT Management, Planning.

Implementing change: Planning for Business change with IT: Organizational planning, Information System planning Methodologies, The scenario approach, planning for competitive advantage, Critical success factors, Business Systems Planning, Computer -Aided Planning tools, implementing business change. **08 Hours**

Course Outcomes:

On completion of this course, students will able to:

- Describe the roles and functionalities of information system.
- Analyze types of solutions for business and its applications.
- Analyze the usage of Intranet and Extranet in business applications.
- Describe database management and competitive strategic approach of information systems in business applications.
- Describe various approaches in managing information technology.

Text Books:

1. James O'brien, George Marakas: "Management Information System", 10th Edition, Mcgraw Hill Education, 2010, ISBN-13: 978-0-07-337681-3, ISBN: 0-07-337681-7.
2. M V Gandhi, B S Thomson: "Smart Materials and Structures", (Chapters 13-75), 1st Edition, Chapman and Hall Pub., 1992, ISBN-13: 9780412370106.

Reference Books:

1. Kenneth C. Laudon and Jane P. Laudon: "Management Information System, Managing the Digital Firm", 11th Edition, Pearson Education, 2006.
2. Steven Alter: "Information Systems-The Foundation of E-Business", 4th Edition, Pearson Education, 2002.

E-Resources:

1. https://books.google.co.in/books/about/Management_Information_System.html.
2. http://www.pearsoned.co.uk/bookshop.

Microprocessors Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECL47	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to understand:

- The concept of assembly language programming.
- The appropriate algorithm for the given problem in assembly language program.
- The various interfacing components and its usage.

Syllabus

List of Experiments:

1) Data transfer instructions like:
   i. Byte and word data transfer in different addressing modes.
   ii. Block move (with and without overlap).
   iii. Block interchange.
2) Arithmetic and logical operations like:
   i. Addition and Subtraction of multi precision no.s.
   ii. Multiplication and Division of signed and unsigned.
   iii. ASCII adjustment instructions.
   iv. Code conversions.
3) Arithmetic programs to find square cube, LCM, GCD, factorial,
   i. Bit manipulation instructions like checking.
   ii. Whether given data is positive or negative.
   iii. Whether given data is odd or even.
   iv. Logical 1's and 0's in a given data.
   v. 2 out 5 code.
   vi. Bit wise palindrome.
4) Branch/Loop instructions like:

   Arrays: addition/subtraction of N no.s. Finding largest and smallest nos. Ascending and Descending order.
5) Programs on String manipulation like string transfer, string reversing, searching for a string, etc.

6) Programs involving Software interrupts:

I) Programs to use DOS interrupt INT 21h Function calls for Reading a Chara cter from Keyboard, Buffered Keyboard input, Display of character.

II) Experiments on interfacing 8086 with the following interfacing modules through DIO (Digital Input/Output-PCI bus compatible) card,

a) Logical controller interface.

b) Stepper motor interface.

Course Outcomes:

On completion of this course, students will be able to:

- Develop the program for data transfer.
- Develop arithmetic logical and bit manipulation Assembly level programs.
- Develop programs to understand branch and looping instruction.
- Analyze the usage of appropriate interrupts in programming and interfacing.
- Analyze and interface the peripherals using assembly level language.

Text Books:

1. Y.C. Liu and G. A. Gibson: "Microcomputer systems - The 8086/8088 Family", 2nd Edition, (Chapter 1), Prentice Hall of India, New Delhi ,1996, ISBN: 81-203-0409-8.
2. A.K. Ray and K.M. Bhurchandi: "Advanced Microprocessors and Peripherals", 3rd Edition TMH, New Delhi, 2013, ISBN: 9781259006135.

E-Resources:

1. http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/pdf/Teacher_Slides/mod1/M1L3.pdf
2. http://www.nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/pdf/Lecture_Notes/LNm2.pdf
3. http://www.feis.unesp.br/Home/departamentos/engenhariaeletrica/cap_2_extra_8087.pdf

HDL Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECL48	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to understand:

- The concept of HDL programming for Logic gates.
- The Hardware description programs for combinational and sequential circuits.
- The different types of interfacing components.

Syllabus

List of Experiments:

1. Write HDL code to realize all the logic gates.
2. Write a HDL program for the following combinational designs,
   i. Decoder.
   ii. Encoder.
   iii. Multiplexer and de-multiplexer.
   iv. Comparator.
3. Write a HDL code to describe the functions of a Full Adder Using three modeling styles.
4. Develop the HDL code for the following Flip-Flops, SR, D, JK, T.
5. Design 4 bit binary, BCD counters (Synchronous reset and Asynchronous reset).

Interfacing:

1. Write HDL code to control speed and direction of Stepper motor.
2. Write HDL code to generate different waveforms (Square, Triangle, Ramp etc.,) using DAC Change the frequency and amplitude.
3. Write HDL code to control speed of DC motor.

Course Outcomes:

On completion of this course, students will be able to:

- Develop HDL programs for Logic gates.
- Develop HDL programs for combinational designs.
- Develop HDL programs for sequential designs.
- Develop HDL programs for various counters.
- Analyze and Interface with various electrical components.

E- Resources:

1. http://www.xilinx.com/video/hardware/basic-hdl-coding-techniques.html
2. http://www.academia.edu/1492361/VHDL_BASICS_WITH_EXAMPLES
3. http://ece-research.unm.edu/jimp/vlsi/slides/vhdl.html
4. http://www.asic-world.com/systemverilog/basic1.html
5. http://www.referencedesigner.com/tutorials/verilog/verilog_01.php
6. http://vhdlguru.blogspot.in/p/example-codes.html

Soft Skills Development

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ECH49	0:2:0:0	1	CIE:50 SEE:50	2 Hours	HSS

Course Objectives:

This course will enable students to understand:

- Improve the communication skills.
- Develop the art of presentation and writing effectively.
- Enhance the technical knowledge.

Syllabus

To improve the communication and presentation skill, every student has to give a seminar on technical topics assigned by the faculty supervisor. Each supervisor will be assigned with 15-20 students to guide and monitor the presentation. The presentation shall be for 15 to 20 minutes. A brief report on the seminar has to be submitted by the student to the concerned department after completion of the seminar. The report shall be signed by the supervisor and the Head of the concerned department.

The objective of the seminar is to introduce students to the major constituent of technology that is concerned with reading, understanding, summarizing, explaining and presenting existing technical topics. Students have to refer one or more topics that are assigned to them by their supervisors. The idea behind the seminar system is to familiarize student more extensively with the methodology of their chosen subject, allow them to develop presentation skills, and also interact with example of practical problems.

Course Outcomes:

On completion of this course, students will be able to:

- Get rid of stage fear and answer questions from audience.
- Communicate confidently and fluently.
- Comprehend and prepare reports effectively.