ANURAG
Engineering Engineers

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(Formerly CVSR College of Engineering)

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Pharma-D (Post Baccalaureate)
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M.Tech (Power Electronics & Electrical Drives)
M.Tech (Electrical Power Systems)
M.Tech (Machine Design)
M.Tech (VLSI System Design)
M.Tech (Embedded Systems)
M.Tech (Structural Engineering)

Master of Business Administration

COURSE STRUCTURE AND DETAILED SYLLABUS

II, III & IV – B.Tech – I & II Semesters

R18-Regulations

ELECTRONICS AND COMMUNICATION ENGINEERING

FOR
B.TECH FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2018-19)

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II YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Category	Course title	L	T	P	Credits
A53018	PC	Analog Devices & Circuits	3	0	0	3
A53019	PC	Electronic Measurements and Instrumentation	3	0	0	3
A53020	PC	Signals and Systems	3	0	0	3
A53021	PC	Probability Theory and Stochastic Processes	3	0	0	3
A53022	ES	Java Programming	3	0	0	3
A53207	ES	Java Programming Lab	0	0	2	1
A53208	PC	Analog Devices & Circuits Lab	0	0	3	1.5
A53209	PC	Basic Simulation Lab	0	0	3	1.5
A53210	HS	Soft Skills for Success Lab	0	0	2	1
A53013	MC	Environmental Studies	--	--	--	0
Total			**15**	**00**	**10**	**20**

II YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Category	Course title	L	T	P	Credits
A54018	BS	Mathematics-III	3	0	0	3
A54020	PC	Electro Magnetic Theory and Transmission Lines	3	1	0	4
A54021	PC	Analog and Digital Communication	3	0	0	3
A54008	PC	Switching Theory and Logic Design	3	0	0	3
A54022	PC	Analog Circuit Analysis	3	0	0	3
A54209	PC	Analog Circuit Analysis Lab	0	0	2	1
A54210	PC	Analog and Digital Communication Lab	0	0	3	1.5
A54211	PC	Switching Theory and Logic Design Lab	0	0	3	1.5
A54014	MC	Gender Sensitization	--	--	--	--
Total			**15**	**1**	**8**	**20**

III YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Category	Course title	L	T	P	Credits
A55032	PC	Pulse and Digital Circuits	3	1	0	4
A55033	PC	Microprocessors and Microcontrollers	3	0	0	3
A55034	PC	Digital Signal Processing	3	0	0	3
A55035	PC	Integrated Circuits and Applications	3	0	0	3
A55036 A55037 A55038	PE-I	1. Bio-Medical Instrumentation 2. Computer Organization and Operating System 3. Computer Networks	3	0	0	3
A55208	PC	Pulse and Digital Circuits Lab	0	0	3	1.5
A55209	PC	Microprocessors and Microcontrollers Lab	0	0	3	1.5
A55210	HS	Advance English Communication Lab	0	0	2	1
Total			**15**	**01**	**08**	**20**

III YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Category	Course Title	L	T	P	Credits
A56028	HS	Project Management	3	0	0	3
A56029 A56030 A56031	OE-I	1. Logical Reasoning, Verbal and Quantitative Ability 2. Data Base Management System 3. Data Science and Analytics	3	0	0	3
A56032	PC	Control Systems	3	0	0	3
A56033	PC	VLSI Design	3	1	0	4
A56034 A56035 A56036	PE-II	1. Embedded Systems 2. Advanced Microcontrollers 3. Real Time Operating System	3	0	0	3
A56208	PC	Digital Signal Processing Lab	0	0	3	1.5
A56209 A56210 A56211	PC	1. Embedded Systems Lab 2. Advanced Microcontrollers Lab 3. Real Time Operating System Lab	0	0	3	1.5
A56212	PC	Integrated Circuits and Applications Lab	0	0	2	1
Total			**15**	**01**	**08**	**20**

IV YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Category	Course Title	L	T	P	Credits
A57039	PC	Microwave & Radar Engineering	3	1	0	4
A57040 A57041 A57042	PE-III	1) Digital Image Processing 2) Satellite Communication 3) Analog VLSI Design	3	0	0	3
A57043 A57044 A57045	PE-IV	1) Optical Communication 2) Cellular & Mobile Communication 3) Mixed Signal Design	3	0	0	3
A57046 A57047 A57048	PE-V	1) Physical System Design 2) Adhoc Wireless Sensor Networks 3) Bio-Medical Signal Processing and Tele Medicine	3	0	0	3
A57049 A57050 A57051	PE-VI	1) Aritificial Intelligence 2) IOT & Cloud Computing 3) Machine Learning	3	0	0	3
A57210	PC	Microwave & Advanced Communication Lab	0	0	3	1.5
A57211	PC	VLSI Design Lab	0	0	3	1.5
A57212 A57213 A57214	PC	1) Aritificial Intelligence Lab 2) IOT & Cloud Computing Lab 3) Machine Learning Lab	0	0	2	1
A57215		Mini Project	0	0	4	2
Total			**15**	**01**	**12**	**22**

IV YEAR II SEMESTER **COURSE STRUCTURE**

Subject code	Category	Course Title	L	T	P	Credits
A58016 A58017 A58018	OE-II	1) Deep Learning 2) Robotics 3) Renewable Energy Technology	3	0	0	3
A58019 A58020 A58021	OE-III	1) Big Data 2) Phython Programming 3) Mechatronics	3	0	0	3
A58210		Technical Seminar	0	0	6	2
A58211		Comprehensive Viva Voce	-	-	-	2
A58212		Project Work	0	0	15	10
Total			**06**	**00**	**21**	**20**

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II-Year B.Tech-ECE-I-Semester	**L**	**T/P/D**	**C**
	3	**0/0-**	**3**

ANALOG DEVICES AND CIRCUITS

Prerequisite: APPLIEDPHYSICS

Course Objectives:

- To learn the characteristics of diode and how to make use of diode in different applications
- To explain the operation and characteristics of transistors in different modes
- To apply different biasing methods to make transistor stable
- To explain the operation, design and Analysis of BJT and FET amplifiers.
- To analyse feedback amplifiers and design of Oscillators

UNIT-I:P-N JUNCTION DIODE AND RECTIFIERS:

Review of P-N Junction Diode Volt-Ampere Characteristics, Transition and Diffusion Capacitances, Diode Equivalent Circuits, The P-N Junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Harmonic Components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, Voltage Regulation Using Zener Diode. Zener Diode Characteristics, Principle of Operation and Characteristics of Tunnel Diode.

UNIT-II: BIPOLAR JUNCTION TRANSISTOR AND FIELD EFFECT TRANSISTOR:

The Junction Transistor, BJT Operation, BJT Symbol, Transistor as an Amplifier, Common Base, Common Emitter and Common Collector Configurations.

The Junction Field Effect Transistor (Construction, Principle of Operation, Symbol), Pinch – Off Voltage –Volt –Ampere Characteristics, The JFET Small Signal Model, MOSFET (Construction, Principle of Operation, Symbol) MOSFET Characteristics In Enhancement and Depletion Modes.

UNIT-III: TRANSISTOR BIASING AND STABILIZATION:

Operating Point, The DC and AC Load Lines, Need for Biasing, Types of biasing methods: Fixed Bias, Collector Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization Against Variation In V_{BE} and β, Bias Compensation Using Diodes and Transistors. Thermal Runway, Thermal Stability.

UNIT-IV: BJT AND FET AMPLIFIERS:

BJT Hybrid Model, Determination of h-Parameters from Transistor Characteristics, Analysis of A Transistor Amplifier Circuit Using h-Parameters, Comparison of CB, CE And CC Amplifier Configurations.FET Common Source Amplifier, Common Drain Amplifier, FET as Voltage Variable Resistor, Comparison of BJT And FET, The Uni junction Transistor

UNIT–V: FEED BACK AMPLIFIERS AND OSCILLATORS:

Concepts of feedback. Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Simple problems.

Condition for oscillations. RC and LC type oscillators, Crystal oscillators, Frequency and amplitude stability of oscillators, Generalized analysis of LC oscillators, Quartz (Hartley, Colpitts), RC-phase shift and Wien-bridge oscillators.

TEXT BOOKS:

1. Integrated Electronics Analog and digital circuits and systems– J. Millman, C.C.Halkias, and SatyabrataJit Tata McGraw Hill, 2nd Ed., 2007.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition,2006.
3. Introduction to Electronic Devices and Circuits- Rober T. Paynter PE,2005.
4. Electronics Devices and Circuits – A. P. Godse Technical Publications.2009.

REFERENCE BOOKS:

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.., 2003.
3. Microelectronics – Millman and Grabel, Tata McGraw Hill, 2001.
4. Electronic Devices and Circuits – Dr. K. Lal Kishore,2004,BSP

Course Outcomes:

After completing the course, students should be able to

- Apply the diode concepts in different applications
- Understand the BJT, FET and revolutionary MOSFET that lead to the development of integrated circuits and study their construction and characteristics
- Compare different biasing methods and compensation methods to make transistor stable
- Design and analyze simple basic amplifiers using both BJTs and FETs
- Design and analyze feedback amplifiers and oscillators using BJTs

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II-Year B.Tech-ECE-I-Semester	**L**	**T/P/D**	**C**
	3	**0/0-**	**3**

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Prerequisite: Applied Physics

Course Objectives:

- To develop an awareness to various electronic measurement Concepts
- To know the operation and design of different electronic instruments
- To learn the operation of various generators and analyzers
- To measure using AC and DC bridges
- To Familiarize with different types of transducers.

UNIT-I

Block Schematics of Measuring Systems, Performance Characteristics: Static Characteristics: Accuracy, Resolution, Precision, Gauss Error, Types of Errors. Dynamic Characteristics: Repeatability, Reproducibility, Fidelity, Lag.

Analog Measuring Instruments: D' Arsonval Movement, DC Voltmeter and Ammeter, rectifier type AC Voltmeters, Ohmmeters, Multimeter, Extension of Range of voltmeter and ammeter , True RMS Responding Voltmeters.

Digital Measuring Instruments: Digital Voltmeters: Ramp Type, Staircase Ramp, Dual slope Integrating type, Successive Approximation Type, Digit display.

UNIT-II

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Delay lines, Dual Beam CRO. Applications, Specifications.

Special purpose oscilloscopes: Sampling oscilloscopes, Storage oscilloscopes, digital Storage CROs, Frequency and Period Measurements.Lissajous Figures, CRO Probes.

UNIT-III

Signal Generators: AF, RF Signal Generators, Function Generators, Specifications.

Signal Analyzers: AF, HF Wave Analyzers, Heterodyne wave Analyzers, Harmonic Distortion Analyzers, and Spectrum Analyzers.

UNIT-IV

Measurements using DC and AC Bridges: Detectors and Generators for bridges. Wheatstone Bridge, Kelvin Bridge, Maxwell, Hay, Schering, Anderson Bridges. Wagner' ground connection,

UNIT –V

Transducers: Classification, Strain gauges: Bonded, unbounded. Resistance Thermometers, LVDT, Thermocouples, Piezoelectric Transducers, Variable Capacitance Transducers, MEMS.

Measurement of Physical Parameters: Flow, displacement, Liquid level, Velocity, Force, Pressure, temperature. Data Acquisition Systems.

TEXT BOOKS:

1. Electronic Measurements and Instrumentation- K. Lal Kishore, Pearson Education 2010.
2. Electronic Instrumentation: H.S.Kalsi - TMH. Z'a Edition 2004.

REFERENCE BOOKS:

1. Modern Electronic Instrumentation and Measurement Techniques:A.D. Helbincs. W.D. Cooper: PHI 56 Edition 2003.
2. Electronic Measurements and Instrumentation: B.M. Oliver, J.M. Cage TMH Reprint 2009.
3. Industrial Instrumentation: T.R. Padmanabham Springer 2009.

Course Outcomes:

After completing the course, students should be able to

- Describe the measuring concepts and instrumentation systems.
- Explain the operation of oscilloscopes
- Use and various generators and analyzers
- Apply the measuring concepts using AC and DC bridges
- Calculate physical parameters.

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II-Year B.Tech-ECE-I-Semester	**L**	**T/P/D**	**C**
	3	**0/0-**	**3**

SIGNALS AND SYSTEMS

Prerequisite: MATHEMATICS-I

Course Objectives:

- To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series
- To get the idea of signal representation in Fourier transforms domain and sampling
- To understand operation of linear systems and corresponding responses of system
- To present the concepts of convolution and correlation integrals and make the foundation for advanced courses.
- To analyze the system using Laplace and Z-transforms

UNIT-I: Signal Analysis and Fourier Series:

Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

UNIT-II: Fourier Transforms and Sampling

Deriving Fourier Transform from Fourier Series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function,

Sampling theorem–Graphical and analytical proof for Band Limited Signals,Types of Sampling -Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples.

UNIT-III: Signal Transmission Through Linear Systems: Linear System, Impulse response, Response of a Linear System, Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI system, Filter characteristics of Linear Systems, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics,.

UNIT-IV: Convolution and Correlation of Signals: Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation of functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem, Power density spectrum, Relation between Auto Correlation function and Energy/Power spectral density function.

UNIT-V: Laplace Transforms and Z-Transforms

Review of Laplace Transforms (L.T), Partial fraction expansion, Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Constraints on ROC for various classes of signals, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Fundamental difference between Continuous and Discrete time signals, Discrete time signal representation using Complex exponential and Sinusoidal components, Periodicity of Discrete time signal using complex exponential signal, Concept of Z-Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

TEXT BOOKS

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.1997.

REFERENCES

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition,2008.

2. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.

3. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, Pearson education.3rd Edition, 2004.Publications, 2nd Edition, 2005.

Course Outcomes:

After completing the course, students should be able to

- Represent any arbitrary signals in terms of complete sets of orthogonal functions and understands the principles of impulse functions, step function and signum function.
- Express periodic signals and non-periodic signals in terms of Fourier transform and representation of the spectrum and to design a system for sampling a signal.
- Understand the principle of linear system, filter characteristics of a system and its band width,
- Understand the concepts of auto correlation and cross correlation and power Density Spectrum.
- Find Laplace transform and Z-transform of various signals and response of the system using Laplace transform and Z-transform

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II-Year B.Tech-ECE-I-Semester	**L**	**T/P/D**	**C**
	3	**0/0-**	**3**

PROBABILITY THEORY AND STOCHASTIC PROCESS

Course Objectives:

- To provide mathematical background and sufficient experience so that the student can read, write, and understand sentences in the language of probability theory, as well as solve probabilistic problems in signal processing and Communication Engineering.
- To introduce students to the basic methodology of "probabilistic thinking" and to apply it to problems;
- To understand basic concepts of probability theory and random variables, how to deal with multiple random variables, Conditional probability and conditional expectation, joint distribution and independence, mean square estimation.
- To understand the difference between time averages and statistical averages Analysis of random process and application to the signal processing in the communication system.
- To apply sums and integrals to compute probabilities, means, and expectations.

UNIT- I :PROBABILITY: Probability Introduced through Sets and Relative Frequency, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events.

UNIT II :RANDOM VARIABLE AND OPERATIONS ON ONE RANDOM VARIABLE RANDOM VARIABLE : Definition of a Random Variable, Types of Random Variables, Conditions for a Function to be a Random Variable, Distribution and Density functions, and their Properties- Binomial, Poisson, Uniform ,Gaussian, Conditional Distribution, Conditional Density, Properties.
Introduction, Expected Value of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Non monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

UNIT III:MULTIPLE RANDOM VARIABLES AND OPERATIONS ON MULTIPLE RANDOM VARIABLES MULTIPLE RANDOM VARIABLES: Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions and its Properties, Conditional Distribution and Density , Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected).
OPERATIONS ON MULTIPLE RANDOM VARIABLES: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV:STOCHASTIC PROCESSES- TEMPORAL CHARACTERISTICS: The Stochastic Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-Order and Wide-Sense Stationary, Nth Order and Strict-Sense Stationary, Time Averages and Ergodicity, MeanErgodic Processes, Correlation-Ergodic Processes Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance and Its Properties, Gaussian Random Processes, Poisson Random Process.

UNIT V:RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: Power Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, Cross-Power Density Spectrum and its Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

TEXT BOOKS

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.TMH.
2. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002.

REFERENCES

1. Probability and random processes with stochastic processes- Mallikarjuna Reddy Cengae Learning,4th edition,2013.
2. Probability and Random Processes with Application to Signal Processing – Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Probability Methods of Signal and System Analysis. George R. Cooper, Clave D. MC Gillem, Oxford, 3rd Edition, 2012.
4. Statistical Theory of Communication - S.P. Eugene Xavier, New Age Publications, 2003.

Course Outcomes:

After completing the course, students should be able to

- Apply Concepts of probabilities using an appropriate sample space.
- Apply Simple probabilities and expectations from probability density functions (pdfs) Likelihood ratio tests from pdfs for statistical engineering problems. Least -square & maximum likelihood estimators for engineering problems.
- Analyze Correlation Properties of Various Signals.
- Analyze Statistical Properties such as Mean and covariance functions for simple random processes.
- Analyze Cross-Power Density Spectrum and and Cross-Correlation Function of Random Process.

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II-Year B.Tech-ECE-I-Semester	**L**	**T/P/D**	**C**
	3	**0/0/-**	**3**

JAVA PROGRAMMING

Prerequisites: Any programming language

Course Objectives:

- To understand the concept of OOP and learn the basic syntax and semantics of the Java language and programming environment
- To be familiar with the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
- To understand Exceptional handling and multithreading concepts
- To be familiar with GUI applications.

UNIT -I

Java Basics: History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, static keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, Strings.

UNIT- II

Inheritance –Introduction, forms of inheritance- specialization, specification, construction, extension, limitation, combination, Member access rules, super uses, using final with inheritance

polymorphism- method overriding, abstract classes, Object class Packages and Interfaces : Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, File, Byte Streams, Character Streams

UNIT- III

Exception handling - Concepts of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Package java.util- The Collection Interface, list interface, Queue interface, The Collection class: Linked List Class, Hash Set Class. Tree Set Class, String Tokenizer, Date, Random, Scanner.

Multi threading: Differences between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication.

UNIT- IV

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. Text Book1:Ch22)

AWT: class hierarchy, component, container, panel, window, frame, canvas, graphics, Layout Manager – layout manager types – boarder, grid, flow, card and grib bag.

UNIT- V

AWT controls: Labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – dialogs, menu bar.

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, create applets, passing parameters to applets.

JDBC Connectivity: JDBC Type 1 to 4 Drivers, connection establishment, Query Execution

Text Books

1. Java- The Complete Reference, Seventh Edition, Herbert Schildt, Tata McGraw Hill
2. Database Programming with JDBC&JAVA, Second Edition, George Reese, O'Reilly Media

Reference Books

1. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.
2. Thinking in Java Fourth Edition, Bruce Eckel
3. Introduction to Java programming, Y. Daniel Liang, Pearson Education

Course Outcomes:

After completing the course, students should be able to

- Explain the Object Oriented Programming concepts(L2)
- Design programs using package and interfaces.(L6)
- Apply the concepts of Exceptions and multithreading.(L3)
- Develop GUI applications and AWT using Frames (L6)
- Design the programs using Applet and JDBC Concepts(L6)

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II-Year B.Tech-ECE-I-Semester	**L**	**T/P/D**	**C**
	2	**0/0-**	**1**

JAVA PROGRAMMING LAB

Prerequisites: Data structures and a parallel course on java programming

Course Objectives:

- To understand the concept of OOP and learn the basic syntax and semantics of the Java language and programming environment
- To be familiar with the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
- To understand Exceptional handling and multithreading concepts
- To be familiar with GUI applications

List of Experiments:

1) Write a Java Program to define a class, define instance methods for setting and retrieving values of instance variables and instantiate its object
2) Write a program to find total, average of given two numbers by using static keyword and this keyword?
3) Write a program to illustrate types of constructors and constructor overloading
4) Write a java program to illustrate Method overloading
5)Write a Java program to practice using String class and its methods.
6) Write a program to illustrate parameter passing Techniques.
7) Write a program to illustrate Array Manipulation
8) Write a java program to illustrate Recursion and nested class
9) Write a program to illustrate types of inheritance.
10) Write a program to illustrate the use of creation of packages.
11) Write a java program to demonstrate the concept of polymorphism.
12) Write a java program to illustrate Method Overriding?
13) Write a program to illustrate Interfaces
14) Write a program to illustrate Files
15) Write a program to illustrate try, catch, throw, throws and finally keywords
16) Write a program to implement the concept of User defined Exceptions.
17) Write a program to illustrate String Tokenizer, Date, Random and Scanner classes?
18) Write a program to illustrate collection classes and interfaces
19) Write a program to illustrate Multithreading?
20) Write a program to illustrate thread priorities.
21) Write a program to illustrate Thread Synchronization
22) Write a program to illustrate Inter Thread Communication
23) Write a program to illustrate applet concept.
24) Write a program to illustrate passing parameters to applet
25) Write a program to illustrate Event Handling (keyboard, Mouse events)
26) Write a program to illustrate AWT controls.
27) Write a program to develop a calculator application using AWT
28) Write a program to illustrate JDBC.

Requirements:

1. PC: P-IV
2. Operating system: Windows XP or Higher version
3. JDK 8.0

Course Outcomes:

After completing the course, students should be able to

- Explain Java Environment and use of Java Development Kit for the creation and execution of java programs
- Develop programs on various concepts like data abstraction & data hiding, encapsulation, inheritance, polymorphism.
- Develop the programs using interfaces and packages
- Create and use threads and handle exceptions
- Develop GUI applications using Applet and JDBC programs.

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II-Year B.Tech-ECE-I-Semester	**L**	**T/P/D**	**C**
	0	**0/3-**	**1.5**

ANALOG DEVICES AND CIRCUITS LAB

Course Objectives:

- To operate and characterize the behaviour of devices and circuits.
- To understand the functionality of semiconductor devices.
- To design and test rectifiers with and without filters
- To design and test amplifiers circuits.
- To design and test oscillator circuits

PART A: (Only for Viva-voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C, Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's

2. Identification, Specification and Testing of Active Devices, Diodes, BJT's LOW power JFET's, MOSFET's, Power Transistors, LED's, SCR, UJT.

3. Study and operation of

- Multi-meters (Analog and Digital)
- Regulated Power Supplies
- Function Generator
- CRO

PART B (For Laboratory Examination – Minimum of 10 experiments)

List of Experiments:

1. Forward & Reverse Bias Characteristics of PN Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Half Wave Rectifier with & without filters.
4. Full Wave Rectifier with & without filters
5. Input &output characteristics of Transistor in CB Configuration.
6. Input &output Characteristics of Transistor in CE Configuration.
7. FET characteristics.
8. Measurement of h- parameters of transistor in CB, CE, CC configurations
9. Frequency Response of CC Amplifier.
10. Frequency Response of CE Amplifier.
11. Frequency Response of FET Amplifier (Common source).
12. SCR Characteristics
13. UJT Characteristics.

Requirements:

1. Regulated power supplies (RPS)
2. CRO's : 0-20MHZ
3. Function Generator : 0-1 MHZ
4. Multimeters
5. Decade Resistance Boxes / Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital) : 0-20μA, 0-50μA, 0-100μA, 0-200μA,0-10 mA
8. Voltmeters (Analog or Digital) : 0-50V,0-100V, 0-250V
9. Electronic Components : Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, diodes Ge& Si type, Transistors NPN, PNP type

Course Outcomes:

After completing the course, students should be able to

- Understand electronic test equipment to characterize the behaviour of devices and circuits.
- Plot the characteristics of semiconductor devices to understand their functionality.
- Design and test rectifiers with filters
- Design and test amplifier circuits and interpret the results.
- Design and test oscillator circuits and interpret the results.

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BASIC SIMULATION LAB

List of Experiments (12 Experiments to be done):

Course Objectives:

- To be able to describe signals mathematically and understand how to perform mathematical operations on signals. The operations should include operations on the dependent as well as independent variables.
- To understand system properties - linearity, time invariance, presence or absence of memory, causality, bounded-input bounded-output stability, and invertability. Be able to identify whether a given system exhibits these properties and its implication for practical systems.
- To be able to perform the process of convolution between signals and understand its implication for analysis of linear time-invariant systems. Understand the notion of an impulse response.
- To be able to solve a linear constant coefficient differential equation using Laplace transform techniques.
- To develop basic problem-solving skills and become familiar with formulating a mathematical problem from a general problem statement.

Write programs in MATLAB or equivalent software and to simulate the following functions

List of Experiments:

1. Basic operation on matrices.
2. Generation of various signals and sequences(periodic),such as unit impulse, unit step, square, sawtooth, triangular, sinusoidal, ramp, sinc.
3. Operation on signal and sequence such as addition, multiplication scaling, folding, computation of energy and average power.
4. Finding the even and odd parts of signals/sequence and real and imaginary part of signals.
5. Convolution between signals and sequences.
6. Auto correlation and cross correlation between signals and sequences.
7. Verification of linearity and time invariance properties of a given continues /discrete system.
8. Computation of unit sample, unit step and sinusoidal response of the given LTI system and verifying its physical realization and stability properties.
9. Gibbs phenomenon.
10. Finding the fourier transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform synthesis using Laplace transform.
12. Locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane for the given transfer function..
13. Sampling theorem verification.
14. Removal of noise by auto correlation/ cross correlation.

Requirements:

For the basic simulation lab.

i) Computer System with latest specifications.
ii) Connected in LAN (Optional)

iii) Operating system (Windows XP or higher)
iv) MATLAB or equivalent software

v) Operating system (Windows XP or higher)
vi) MATLAB or equivalent software

Course Outcomes:

After completing the course, students should be able to

- Describe the basics of MATLAB syntax, functions and programming.
- Generate and characterize various continuous and discrete time signals.
- Perform the basic operations on the signals.
- Design and analyze linear time-invariant (LTI) systems and compute its response.
- Analyze the spectral characteristics of signals using Fourier analysis, Laplace transform and Z-transform.

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SOFT SKILLS FOR SUCCESS LAB

Introduction:

The primary focus of the course is to highlight various categories and applications of Soft Skills through various cases taken from the real field and other research case studies. The fundamental concepts and distinctions between Soft Skills and Hard Skills are discussed. The course is tailored very effectively to introduce various Soft Skill application examples.

Objectives:

To identify and participate in meaningful conversations

Unit-I

Soft Skills Development: An Introductory Overview - Self-Discovery & Goal Setting - Johari Window

Unit-II

Personality Development - Body Language - Etiquette & Manners

Unit-III

Presentation Skills (Individual & Team) Oral & Written - Teamwork & Leadership Qualities

Unit-IV

Debates - Group Dynamics - Dos & Don'ts - Techniques to Participate and Conclude

Unit-V

Emotional Intelligence - Conflict Management - Stress Management

Minimum requirements of infrastructural facilities for "Soft Skills for Success" Laboratory:

A spacious room with movable chairs, a Public Address System, and a Digital Stereo-Audio & Video system

References:

1. **Soft Skills for Everyone** by Butterfield, Jeff. New Delhi: Cengage Learning. 2010.
2. **Soft Skills** by Chauhan, G.S. & Sangeeta Sharma. New Delhi: Wiley. 2016.
3. **Working with Emotional Intelligence** by Goleman, Daniel. London: Banton Books. 1998.
4. **Theories of Personality** by Hall, Calvin S. et al. New Delhi: Wiley. 2011.
5. **Corporate Conversations** by Holtz, Shel. New Delhi: PHI. 2007.

Course Outcomes:
After completing the course, students should be able to

- Exhibit communication skills in various situations
- Handle the emotions with peers and classmates
- Demonstrate respect for the opinions, personal space, and beliefs of others
- Connect and work with others to achieve a set task
- Assess and identify the requirements and strengths within the team

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ENVIRONMENTAL STUDIES

PREREQUISITES: Engineering Chemistry

COURSE OBJECTIVES:

- To introduce the knowledge about Environment.
- To introduce students to the concepts of pollution, Biodiversity
- To develop an awareness about global Environmental problems.
- To learn to protect environment and awareness on legal issues
- To learn about importance of sustainable development and role of IT in environment.

UNIT – I:

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance– Need for Public Awareness.

Ecosystems: Concept of an ecosystem–Classification, structure and function of different ecosystems - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids.

Biodiversity and its conservation: Introduction - Definition: genetic, species and eco system diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. ICUN categories of biodiversity and RED DATA book - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – II:

Natural Resources: Renewable and non-renewable–Natural resources and associated problems: Forest resources – Use and over – exploitation, deforestation,– Timber extraction, mining, dams and other effects on forest and tribal people: Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources: Equitable use of resources for sustainable lifestyles.

UNIT – III:

Environmental Pollution: Definition, Cause, effects and control measures of different kinds of pollution (Air, Water, Soil, Marine, Noise, Thermal, Nuclear, e –Waste)

Carbon Capture & Sequestration – different storage sources, major disadvantages, environmental effect**s**

Social Issues and the Environment: From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, and watershed management. -Climate change, global warming, ozone layer depletion, nuclear accidents and holocaust.

UNIT – IV:

Waste management technology: Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution, Disaster management: floods, earthquake, cyclone and landslides.

Waste water and sewage treatment technology: primary, secondary and tertiary treatments. Bioremediation, Phyto-remediation, ZLD (zero liquid discharge), membrane technology. Application of GIS and GPS system in environmental science.

Environmental policy, Rules and regulations. EIA (Environmental Impact Assessment) &EMP (ENVIRONMENTAL Management Plan) – Environment Protection Act. - Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act –Forest Conservation Act.-Public awareness. Global environmental problems and global efforts.

UNIT – V:

Towards sustainable future: concept of sustainable development, threats of sustainability, population and its explosion, over exploitation of resources, strategies for achieving sustainable development. Environmental education, Conservation of resources. Urban sprawl, sustainable cities and sustainable communities, human health. Role of IT in environment, environmental ethics, concept of green building, Basic principles of Green engineering, clean development mechanism (CDM), Low carbon life cycle, Polluters-pay principle.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha, University Press Private Limited, Reprinted in 2005.

2. Environmental Studies: From Crisis to Cure by R.Rajagopalan, Oxford University Press, 2nd Edition, 2005

REFERENCES:

1. Environmental Science: Towards a Sustainable Future by Richard T.Wright. PHL Learning Private Ltd .New Delhi, 2008
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P.Ela. PHI Learning Pvt. Ltd. 4th edition, 2008

Course Outcomes:

After completing the course, students should be able to

- Understand fundamental physical and biological principles that govern natural processes.
- Understand fundamental concepts from the social sciences and humanities underlying environmental thought and governance
- Integrate and apply perspectives from across the natural sciences, social sciences, and the humanities in the context of complex environmental problems.
- Communicate integrated perspectives on complex environmental problems in the form of written and oral argument to both professional and lay audiences.
- Design and conduct independent research that contributes to environmental thought and/or problem solving.

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MATHEMATICS-III

Course Objectives:

- To determine the approximate solution of algebraic and transcendental equations using iterative methods and Interpolate the values for the given data.
- To learn the concepts of Numerical Differentiation to find the higher order derivatives for the tabulated values and finding integration of given data points with various step sizes by using Numerical methods.
- To determine the solution of linear first order initial value problems using single and multistep methods.
- To formation of PDE's and solution of linear and non-linear PDE's using various methods.
- To classification of PDE's and Solving One Dimensional Heat and Wave equations.

UNIT-I:
Solution of Non- linear Equations:

Solution of Algebraic and Transcendental Equations – The Bisection Method – The Method of False Position – Newton-Raphson Method.

Interpolations:

Introduction- Finite differences (Forward Differences, Backward differences and divided difference) Lagrange's Interpolation formula, Newton divided, Newton's forward and backward difference interpolation formulae - Problems.

UNIT-II:
Numerical Differentiation using interpolation formulae.
Numerical integration: Newton's cotes quadrature formulae,Trapezoidal rule, Simpson's 1/3rd and 3/8 rules.

UNIT-III:
Numerical solution of Ordinary Differential Equations: Solution by Taylor's series-Picard's Method of successive Approximations- Euler and modified Euler's methods -Runge-Kutta Method.

UNIT-IV: Partial differential equations of First Order

Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (Standard type) equations, Charpits Method.

UNIT-V: Partial differential equations of Second Order

Method of separation of Variables for second order equations. Classification of general second order partial differential equations. Applications of Partial Differential Equations-One dimensional wave equation, Heat equation.

Textbooks/References:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
3. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

References:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. Ian Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1964.

Course Outcomes:

After completing the course, students should be able to

- Solve the algebraic and transcendental equations using numerical methods and also finding the polynomial using given set of tabulated values and estimation of the functional value within the data by Interpolation.
- Apply the method of Numerical Differentiation and Numerical Integration for engineering problems.
- Solve the first order initial value problems using Taylors, Euler and Runge-Kutta methods.
- Using concepts of partial differential equations to solve linear and non-linear problems.
- Solve Heat conduction and wave equations by using method of separation of variables and identify the consistent solution.

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	3	**1/0-**	**4**

Electromagnetic Theory and Transmission Lines

Prerequisites: Applied Physics

Course Objectives:

- To understand the Maxwell's equations and applying boundary conditions to the different material interfaces.
- To conceptualize the wave propagation characteristics for different media.
- To learn the basic parameters of Transmission lines
- To introduce the principle of radiation and radiation characteristics of an antenna

UNIT – I

Maxwell's Equations- Basics of Vectors, Vector calculus, Basic laws of Electromagnetics, Maxwell's Equations, Boundary conditions at Media Interface.

UNIT – II

Uniform Plane Wave- Uniform plane wave, Propagation of wave, Wave-polarization,Wave propagation in lossless and conducting medium, phase and group velocity, Power flow and Poynting vector, Surface current and power loss in a conductor

UNIT-III

Plane Waves at a Media Interface- Plane wave in arbitrary direction, Reflection and refraction at dielectric interface, Total internal reflection, wave polarization at media interface, Reflection from a conducting boundary.

UNIT-IV

Transmission Lines- Equations of Voltage and Current on TX line, Propagation constant and characteristic impedance, and reflection coefficient and VSWR, Impedance Transformation on Loss-less and Low loss Transmission line, Power transfer on TX line, Smith Chart, Admittance Smith Chart, Applications of transmission lines: Impedance Matching, use transmission line sections as circuit elements.

UNIT-V

Antenna basics**:** Introduction, Basic Antenna Parameters-patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain - Resolution, Antenna Apertures, Effective Height, Fields from oscillating dipole, Field zones, shape-impedance considerations, Antenna Temperature, Front to back ratio, Antenna Theorem.Wave Propagations **-** Introduction, Definitions, categorizations and general classifications, different modes of wave propagation

Text Books:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 4th ed., 2001.
2. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill India, 2005
3. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech.India Publications), New Delhi, 2001.
4. Antennas and wave propagation – John D. Kraus, Ronald J. Marhefka and Ahmad S. Khan, TMH 4th Edn.,(Special Indian edition) 2010.

Reference Books:

1. E.C. Jordan & K.G. Balmain, Electromagnetic waves & Radiating Systems, Pearson, 2nd Edition 2015
2. Narayana Rao, N: Elements of Engineering Electromagnetics, Pearson, 6th Edition 2006.
3. Engineering Electromagnetic – Nathan Ida, Springer (India) Pvt. Ltd., New Delhi, 2nd ed., 2005.
4. Networks, Lines and Fields – John D. Ryder, PHI, 2nd ed.,2003.
5. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.

Course Outcomes:

After completing the course, students should be able to

- Apply Maxwell's equations to solve equations of EM fields
- Characterize uniform plane waves and wave propagation
- Calculate reflection and transmission of waves at media interface
- Explain the characteristics and wave propagation on high frequency transmission lines
- Describe the principle of radiation and radiation characteristics of an antenna

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ANALOG AND DIGITAL COMMUNICATION

Prerequisite: Signals and Systems

Course Objectives:

- To know the need for modulation in radio communication system.
- To learn about various analog modulation techniques like AM, FM and PM
- To study about AM transmitters, receivers and their performance.
- To analyze the noise performance of analog Modulation systems.
- To understand various pulse digital modulation techniques such as PCM, DPCM and DM and Band pass modulation techniques such as ASK, FSK, PSK, QPSK...Etc.

UNIT I: **AMPLITUDE MODULATION**: Introduction to communication system, modulation--Need for modulation, Amplitude Modulation: Definition, Time domain and frequency domain description, power relations in AM waves, Generation of AM wave: square law Modulator,
Demodulation of AM wave: Envelope detector, Concept of DSB-SC modulation, Generation of DSB-SC Wave: Balanced Modulator, Demodulation of DSB-SC wave: Synchronous detector, Costas Receiver, Concept of SSB-SC Modulation, Generation of SSB-SC wave: Phase discrimination method, Demodulation of SSB-SC wave, Comparison of AM, DSB-SC and SSB-SC techniques.

UNIT II: **ANGLE MODULATION:** Frequency and Phase modulation: definition, Time domain and frequency domain description- Narrow Band and Wide band FM – Modulation index, Spectra, Power relations and Transmission Bandwidth - FM generation –Direct and Indirect methods, FM Demodulation techniques: FM Discriminator - PLL as FM Demodulator, Comparison of AM and FM.

UNIT-III NOISE

AM and FM Transmitters, Super heterodyne receiver, Types of noises, External noise, Internal noise, Signal to noise ratio, Noise in AM,DSB-SC,SSB-SC and FM Systems, Threshold effect in Angle Modulation system, Pre-emphasis & De-emphasis

.UNIT- IV: DIGITAL COMMUNICATION SYSTEM & BASEBAND TRANSMISSION

Model of digital communication System, Digital representation of analog signal, certain issues in digital transmission, Advantages of Digital Communication Systems, Bandwidth-S/N tradeoff, Hartley shannon law

Baseband transmission: Pulse code modulation**,** PCM generation and reconstruction, Quantization noise, Non-uniform quantization and companding, Differential PCM Systems (DPCM), Delta modulation and its draw backs, Adaptive Delta Modulation, Noise in PCM and DM.

UNIT-V:DIGITAL MODULATION TECHNIQUES: ASK, ASK modulator, Coherent ASK detector, non-Coherent ASK detecto, FSK, Band width and frequency spectrum of FSK, Coherent FSK detector, non-Coherent FSK detector, FSK detection using PLL,BPSK, Coherent PSK detection, QPSK, differential PSK.

TEXT BOOKS:
1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe. TMH, 2007 3rd Edition
2. Digital Communication, by Simon Haykin, Edition: Wiley India Edition. Reprint 2010.

3. Digital Communications - John G. Proakis. Masoud Salehi – 5th Edition, McGraw-Hill, 2008.

REFERENCE BOOKS:
1. Electronics& Communication System - George Kennedy and Bernard Davis, 4th Edition TMH 2009
2. Analog Communications- KN Hari Bhat & Ganesh Rao, Pearson Publications, 2nd Edition 2008.
3. Communication Systems Second Edition - R.P. Singh. SP Sapre, TMH, 2007
4. Communication Systems - B.P Lathi, BS Publication, 2006.

COURSE OUTCOMES
After completing the course, students should be able to

- Explain the need for modulation and to analyze the characteristics of AM, DSB-SC, and SSB-SC techniques
- Apply and relate analog modulation techniques such as FM and PM to real time applications such as Radio broadcasting etc.
- Describe the noise performance of AM, DSB-SC, SSB-SC and FM techniques
- Explain the Baseband data transmission techniques such as PCM, DPCM, DM and ADM.
- Apply and relate digital modulation techniques to the real time applications.

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	3	**0/0-**	**3**

SWITCHING THEORY AND LOGIC DESIGN

Prerequisite: ANALOG DEVICES & CIRCUITS

Course Objectives:

This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits.
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.

UNIT-1: NUMBER SYSTEMS AND CODES:

Review of number systems binary arithmetic, binary weighted and non-weighted codes. Error detecting and error correcting codes.

BOOLEAN ALGEBRA:

Postulates and theorems: representation of switching functions, SOP and POS forms Karnaugh Map representations, minimization using K Maps.

UNIT- II: DESIGN OF COMBINATIONAL CIRCUITS:

Tabular minimization – design of single output and multi output functions design using conventional AND, OR, NOT, NAND, NOR & EX-OR gates. Design using MSI & LSI devices, digital multiplexer/selector, decode demultiplexer, design of 4 bit adder, carry look-ahead adder, magnitude comparator, BCD converter. Logic implementations using ROM, PAL & PLA.

Unit-III: INTRODUCTION TO SEQUENTIAL CIRCUITS:

Combinational versus sequential circuits, asynchronous versus synchronous circuits, state table and state diagram, state assignment, memory elements and their excitation functions, T flip flop, RS flip flop, JK flip flop and their excitation requirements. Design of synchronous sequential circuits like sequence detectors and binary counters.

UNIT-IV: CAPABILITIES AND MINIZATION OF SEQUENTIAL MACHINES:
Melay and Moore machines, capabilities and limitations of finite state machine, state equivalence and machine minimization.

UNIT-V: ALGORITHIMIC STATE MACHINES:

ASM chart, timing considerations, control implementation, design with multiplexers and PLA control. Introduction to unite functions and threshold logic.

Text Books:

1. Switching And Finite Automata Theory – By Zvi Kohavi, TMH Edition,3rd edition,2009.
2. Digital Logic Computer Design – By M. Morris Mano, PHI.1979
3. Digital Logic Design Principles – By Norman Balbamian and Breadly, John Wiley,2001.

References:

1. Introduction to Switching Theory and Logic Design- By F. J. Hill and Peterson, John Wiley Publications,1974.
2. Digital Logic – Applications & Design – By- John M. Yarbroough, Vikas Publications, 1997.
3. Digital Systems Principles, Applications– By Ronald J. Tocci, Pearson Education/Phil,2011.

Course Outcomes:

After completing the course, students should be able to

- Understand numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.
- Apply simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Design sequential circuits by using sequential functions/building blocks to build larger more complex circuits.
- Design and analyze the circuits using Finite state machines and minimization of state machines.
- Analyze the complex circuits and design with multiplexers and PLA controls

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	3	**0/0-**	**3**

ANALOG CIRCUIT ANALYSIS

Prerequisite: ANALOG DEVICES AND CIRCUITS
Course objectives:

- To classify the single stage amplifiers and to understand the distortion in amplifiers and to analyze the amplifiers at Low Frequencies using Approximate Hybrid Model.
- To learn the concepts of frequency response and analyze the BJT Amplifiers at High Frequencies using Hybrid –Pi Model.
- To classify and Analyze the multistage amplifiers.
- To classify the Large signal amplifiers and determine the efficiency of each one.
- To classify and analyze the Tuned amplifiers.

Unit-I : SINGLE STAGE AMPLIFIERS : Classification Of Amplifiers, Distortion In Amplifiers, Analysis Of CB, CE And CC Configurations Using Simplified (Approximate) Hybrid Model, Millers Theorem And Its Dual, Analysis Of CE Amplifier With Emitter Resistor, Design Of Single Stage RC Coupled Amplifier Using BJT.

Unit-II: BJT AMPLIFIERS - FREQUENCY RESPONSE: Logarithms, Decibels, General Frequency Considerations- Frequency Response Of BJT Amplifiers, Analysis At Low And High Frequencies, Effect Of Coupling and Bypass Capacitors, Hybrid Pi Model For CE Transistor, CE Short Circuit Current Gain, Current Gain With Resistive Load, Single Stage CE Transistor Amplifier Response, Alpha, Beta Cut-Off Frequencies, Gain Bandwidth Product , Emitter Follower At High Frequencies

Unit-III : MULTI STAGE AMPLIFIERS: Analysis Of Cascaded RC Coupled BJT Amplifiers, Cascode Amplifiers, Darlington Pair, Different Coupling Schemes Used In Amplifiers- RC Coupled Amplifiers, Transformer Coupled Amplifiers And Direct Coupled Amplifiers.

Unit – IV: LARGE SIGNAL AMPLIFIERS: Classification, Class A Large Signal Amplifiers, Transformer Coupled Class A Audio Power Amplifiers, Efficiency of Class A Amplifier, Class B Amplifier, Efficiency of Class B Amplifier, Class B Push-Pull Amplifier, Complementary Symmetry Class B Push-Pull Amplifier, Distortion In Power Amplifiers, Thermal Stability And Heat Sinks

Unit –V: TUNED AMPLIFIERS: Introduction- Factor, Small Signal Tuned Amplifiers, Effect Of Cascading Single Tuned & Double Tuned Amplifier on Bandwidth, Stagger Tuned Amplifiers, Stability Of Tuned Amplifiers

TEXT BOOKS:

1. Integrated electronic- jacob millman &christor c halkias, 2 ed.,2008, tmh

2. Electronic devices and circuits - -s.salivahana, n. Suresh kumar, a vallavaraj, 2ed.,2011

3. Design of analog cmos integrated circuits – behzad razavi, 2008, tmh.

References:

1. Introductory electronic devices and circuits- robert t. Paynter, 7ed.,2009, pel.

2. Electronic circuit analysis- k.lal kishore , 2004, bsp.

3. Electronic devices & circuit –david a bell-5ed,.Oxford university press,1999.

Course outcomes:

After completing the course, students should be able to

- Design and analyze the single stage amplifiersat Low Frequencies using Approximate Hybrid Model.
- Analyze the BJT Amplifiers at High Frequencies using Hybrid –Pi Model and determine α and β cutoff frequencies.
- Describe the importance of Multi stage amplifiers and to analyze them to find frequency parameters.
- Explain the application of Large signal amplifier and the usage of heat sinks.
- Analyze the effect of cascading Single tuned and double tuned amplifiers on Bandwidth and understand the stability of the tuned amplifiers.

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ANALOG CIRCUIT ANALYSIS LAB

List of Experiments (12 Experiments to be done):

Objectives:

- To design and test the various amplifier circuits.
- To understand the operation of the amplifier circuits by plotting the frequency response curve.
- To operate and test the feedback amplifier circuits and interpret the results.
- To generate the signals for the desired frequency using oscillator circuits.
- To operate the large signal amplifiers and find the efficiency.

I) Design and Simulation in Simulation Laboratory using any Simulation Software. (Any 6 Experiments):

1. Common Emitter Amplifier.
2. Common Source Amplifier.
3. Two Stage RC Coupled Amplifier.
4. Current shunt and Voltage Series Feedback Amplifier.
5. Cascode Amplifier.
6. Wien Bridge Oscillator using Transistors.
7. RC Phase Shift Oscillator using Transistors.
8. Class A Power Amplifier (transformer less).
9. Class B Complementary Symmetry Amplifier.
10. Common Base (BJT) / Common Gate (JFET) Amplifier.

II. Testing in the Hardware Laboratory (6 Experiments)

1. A) Any Three circuits simulated in simulation laboratory

B) Any Three of the following

2. Class A Power Amplifier (with transformer load)
3. Class C Power Amplifier.
4. Single Tuned Voltage Amplifier.
5. Hartley &Colpitt's Oscillators.
6. Darlington Pair.
7. MOS Amplifier.

Requirements:

1. For software simulation of Electronic circuits.
i) Computer System with latest specifications.
ii) Connected in LAN (Optional)
iii) Operating system (Windows XP)
iv) Suitable Simulations Software.
2. For Hardware simulations of Electronic Circuits
i) Regulated Power Supply (0-30V)
ii) CRO's
iii) Function Generators
iv) Millimeters
v) Components.

Course outcomes:

After completing the course, students should be able to

- Design and test various amplifier circuits and to find the gain.
- Calculate the lower and upper 3 dB frequencies and Bandwidth of the amplifier circuits.
- Design and test the feedback amplifier circuits and interpret the results.
- Design and test the oscillator circuits and interpret the results.
- Design and test the large signal amplifier circuits and interpret the results.

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ANALOG AND DIGITAL COMMNICATION LAB

Note: Minimum 12 experiments should be conducted.

Objectives:

- To generate and detect different analog modulated signals such as AM,DSB-SC and SSB-SC and FM and to calculate Bandwidth
- To Study the operation of time division multiplexing and demultiplexing
- To study the operation of Pre-emphasis and De-emphasis
- To generate and detect different baseband modulated signals such as PCM,DPCM &DM.
- To generate and detect different pass band modulated signals such as ASK,FSK,PSK&QPSK and to calculate Bandwidth.

LIST OF EXPERIMENTS:

PART-A ANALOG COMMUNICATIONS LAB (ANY 6 EXPERIMENTS):

1. Amplitude Modulation & Demodulation.
2. DSB-SC Modulator & Detector
3. SSB-SC Modulator & Detector (Phase shift method).
4. Frequency Modulation & Demodulation.
5. Time Division Multiplexing & De-Multiplexing
6. Pre- emphasis & De-emphasis.
7. Frequency Synthesizer

PART-B DIGITAL COMMUNICATIONS LAB (ANY 6 EXPERIMENTS):

1. PCM Generation and Detection
2. Differential Pulse Code Modulation
3.Delta Modulation
4.Amplitude Shift Keying: Generation and Detection
5.Frequency shift Keying: Generation and Detection
6. Phase Shift Keying: Generation and Detection
7.QPSK: Generation and Detection

Requirements:

i) CRO's - 0-20 M Hz, 0-60M Hz
ii) Function Generators - 0- 1 M Hz
iii) Trainer kits
iv) TV Receiver Demo kit

Outcomes:

After completing the course, students should be able to

- Generate different analog modulated signals such as AM, DSB-SC, SSB-SC & FM and to know their performance regarding Bandwidth and power relations.
- Describe the operation of time division multiplexing and de-multiplexing.
- Explain the requirement of pre-emphasis and de-emphasis circuits in FM communication system.
- Generate different base band modulated signals such as PCM, DPCM and DM and to study their performance
- Generate different pass band modulated signals such as ASK,PSK,FSK and QPSK and to know their performance regarding Bandwidth

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SWITCHING THEORY AND LOGIC DESIGN LAB

Course Objectives:

- To learn basic digital circuit equipments.
- To design and verify basic gates.
- To implement combinational logic circuits.
- To implement sequential logic circuits.
- To design and verify FSM

Note: Any SIX of the above experiments from each part are to be conducted.

I. Design all the experiment and verify by using hard ware Trainer kits/equipment's

1. Introduction to Digital Laboratory equipment's and tools
2. Design basic gates and verify their truth tables.
3. Design and implement multiplexer.
4. Design and implement encoder and decoder
5. Design a Half adder, full adder & verify its truth table.
6. Design and construct basic flip-flops.
7. Design and construct of 4bit binary Counter.
8. Design and construct universal 4-bit shift register.
9. Finite State Machine design

II. Write a Verilog HDL for all the below experiments and simulate the same using Cad tools

1. Verilog HDL code to realize all the logic gates.
2. Verilog HDL code to realize8 to 1 multiplexer.
3. Verilog HDL code to realize3 to 8 decoder and implement on FPGA
4. Verilog HDL code to realize a Half adder, full adder.
5. Verilog HDL code to realize basic flip-flops.
6. Verilog HDL code to realize a 4bit binary Counter.
7. Verilog HDL code to realize an universal 4-bit shift register.
8. Verilog HDL code to realize Finite State Machine

Requirements:

1. Hardware Trainer Kits
2. FPGA Trainer Kits
3. Computer System with latest specifications
4. Software HDL Verilog (Xilinx)

Course Outcomes:

After completing the course, students should be able to

- Explain the basic digital circuit equipments.
- Design and verify basic gates.
- Implement combinational logic circuits.
- Implement sequential logic circuits.
- Design and verify FSM

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GENDER SENSITIZATION

Course Objectives:

- To develop students sensibility with regard to issues of gender in contemporary India
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.

UNIT-I

UNDERSTANDING GENDER:

Gender: Why should we study it? (Towards a world of equals: Unit-1)
Socialization: Making Women, Making Men (Towards a world of equals: Unit-2)
Introduction, Preparing for womanhood. Growing up male. First lesson in caste. Different Masculinities.
Just Relationships: Being Together as Equals (Towards a world of equals: Unit-12)
Mary Kom and Onler. Love and acid just do not mix. Love Letters. Mothers and Fathers. Further reading: Rosa Parks-The Brae Heart.

UNIT-II

GENDER AND BIOLOGY:

Missing Women: Sex Selection and its Consequences (Towards a world of equals: Unit-4)
Declining Sex Ration. Demographic Consequences.
Gender Spectrum: Beyond The Binary (Towards a world of equals: Unit-10)
Two or many? Struggles with Discrimination.
Additional Reading: Our Bodies, Our Health (Towards a world of equals: Unit-13)

UNIT-III

GENDER AND LABOUR:

Housework: The invisible Labour (Towards a world of equals: Unit-3)
"May Mother doesn't work". "Share the Load".
Women's work: its politics and economics (Towards a world of equals: Unit-7)
Fact and Fiction. Unrecognized and unaccounted work. Further Reading: Wages and Conditions of Work.

UNIT-IV

ISSUES OF VIOLENCE:

Sexual Harassment: Say No! (Towards a world of equals: Unit-6)
Sexual Harassment, not Eve-teasing-coping with everyday Harassment-Further Reading: "Chupulu".
Domestic Violence: Speaking out (Towards a world of equals: Unit-8)
Is Home a Safe Place? – When Women Unite [Film]. Rebuilding Lives. Further Reading: New Forums for Justice.

Thinking about sexual Violence (Towards a world of equals: Unit-11)
Blaming the Victim- "I Fought for my life….." – Further reading: The Caste Face of Violence.

UNIT-V
GENDER STUDIES:
Knowledge: Through the lens of gender (Towards a world of equals: Unit-5)
Point of View.Gender and the Structure of Knowledge. Further Reading: unacknowledged Women artists of Telangana.
Whose History? Questions for Historians and others (Towards a world of equals: Unit-9)
Reclaiming a past.Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

TEXT BOOKS:

1. " Towards a world of Equals; A Bilingual Textbook on Gender" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasantha, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deep Sreenivas and Susie Tharu.

2. Sen, Amartya. "More than one million Women are Missing". New York review of books 37.20 (20 December 1990). Print. ' We Were Making History….' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women 1989.

REFERENCES:

1. Tripti Lahari. "By the numbers: Where Indian Women Work. "Women's studies journal (14 November 2012) Available online at: http://blogs.wsj.com/indiarealtime/2012/11/14/by the numbers where Indian women work/ >.
2. K. Satyanarayana & Susie Tharu (ed.) Steel are sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada hhttp://herpercollins.co.in/Bookdetail.asp? Book _code = 3732.
3. Monon, Nivedita, Seeing like a Feminist, New Delhi: Zubaan-Penguin Bokks, 2012.
4. Virginia Woolf: A Room of One's Own. Oxford: Black swan. 1992.

Course Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be identify the basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will analyze a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.

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PULSE AND DIGITAL CIRCUITS

Prerequisite: ANALOG DEVICES & CIRCUITS

Course Objectives:

- To understand the applications of diode as Integrator, differentiator, clipper and clamper circuits.
- To learn various switching devices such as diode and transistor.
- To differentiate between logic gates and sampling gates.
- To design Multivibrators for various applications.
- To analyze synchronization techniques and design sweep circuits.

UNIT I: LINEAR WAVE SHAPING:
High pass, Low pass RC circuits and their responses for sinusoidal, step voltage, pulse, square
wave and ramp inputs. High pass RC networks as Differentiator, Low pass RC as an Integrator, Attenuators and their applications in CRO probe. RL and RLC circuit their response for step input, Ringing circuit.

UNIT II: NON-LINEAR WAVE SHAPING:
Diode clippers, Transistor clippers, Clipping at two independent levels, Emitter coupled Clipper, Diode comparators, Diode differentiator. Applications of voltage comparators, Clamping operation, Clamping circuits using Diodes with different inputs, Clamping circuit theorem, Practical clamping circuits, Effect of Diode characteristics on clamping voltage.SWITCHING CHARACTERISTICS OF DEVICES**:** Diode as a switch, Piecewise Linear Diode Characteristics, Transistor as a switch. Design of a transistor switch, Transistor-switching times.

UNIT III: MULTIVIBRATORS:
Analysis and Design of Bistable, Monostable and Astable Multivibrator using Transistors, Schmitt trigger using transistors.

UNIT IV: TIME BASE GENERATORS:
General features of Time Base Signal, Methods of Generating a Time Base Waveform, Voltage sweeps, Bootstrap and Miller circuits, linear current sweep, and Application in T.V. Synchronization. SYNCHRONISATION AND FREQUENCY DIVISION**:**
Principles of Synchronization, Synchronization of Astable Multivibrator, Phase Delay and Phase Jitters.

UNIT V: SAMPLING GATES:
Basic Operating Principles of Sampling Gates, Unidirectional and Bi-directional sampling gates, Application of Sampling Gates. BLOCKING OSCILLATORS: Mono Stable Blocking oscillator (Base timing & Emitter timing).Astable blocking oscillator (Diode Controlled), Applications of Blocking oscillators.

TEXT BOOKS:
1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, and Mothiki S.Prakash Rao, 2ed., 2008, TMH..
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002

REFERENCES:
1. Pulse and Digital Circuits-A. Anand Kumar, PHI, 2005.
2. Fundamentals of Pulse and Digital Circuits – Ronald J. Tocci, 3ed., 2008.
3. Pulse and Digital Circuits – Motheki S.Prakash Rao, 2006, TMH.

Course Outcomes:

After completing the course, students should be able to
- Design linear and non-linear wave shaping circuits.
- Apply the switching and logic concepts in digital circuits.
- Design the Multivibrators for various applications.
- Analyze synchronization techniques and time base circuits.
- Design non-sinusoidal wave form generators

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MICROPROCESSORS AND MICROCONTROLLERS

Prerequisite: Switching theory and logic design

Course Objectives:

The student will be able to

- To understand the concepts of microprocessors, different addressing modes and programming of 8085.
- To understand the basic concepts of 8086.
- To Study about interrupt structure, communication standards and Serial communication and programming of 8086.
- To understand the basic concepts of 8051.
- To interface 8051 with realtime applications.

UNIT-I:8085 Microprocessor: Evolution of microprocessors, The 8085 Microprocessor, Microprocessor communication and bus timings, Generating control signals, 8085 MPU and its architecture and pin diagram, Decoding and Executing an Instruction, Instruction set and Assembly Language programming.

UNIT–II:8086 Microprocessor: 8086 architecture, register organization, memory segmentation, programming model, memory Addresses, physical memory organization, signal descriptions of 8086, timing diagrams.

UNIT–III: Instruction set and Assembly Language programming of 8086: Addressing modes, assembler directives, macros, simple programs involving logical, arithmetic expressions and string manipulations. Interrupt structure of 8086, Serial communication standards, 8251 USART architectures and interfacing, RS-232C. I/O Interface with 8255-PPI, various modes of operation and interfacing to 8086, 8257 DMA controller to 8086, Memory interfacing to 8086.

UNIT-IV: **8051 Microcontroller:** Architecture, I/O ports, register set, Memory organization, Addressing modes and Instruction set of 8051, Interrupts in 8051, Interrupt Priority in the 8051.

UNIT–V: 8051 Interface: Timers/Counters and Serial communication registers in 8051, Interface with Keyboard & Displays, Serial data communication and Timer/Counter Interfacing program.

Text Books:

1. Ramesh S Goankar, "Microprocessor Architecture Programming and Applications with the 8085, Penram International Pvt.Ltd.2013.
2. A.K. Ray & Bhurchandi Advanced Microprocessors and peripherals –, TMH publications,2012.

Reference Books:

1. Kenneth Ayala and Dhanunjay Gadre, 'The 8051 microcontroller' Penram International/ Thomson,2008.
2. Douglas V Hall, "Microprocessors and Interfacing: Programming and Hardware", 2nd, TMH publications,1992.
3. 8086 Micro Processor -Kenneth J. Ayala, Penram International/ Thomson,1995.

Course Outcomes:

After completing the course, students should be able to

- Write the assembly language programs of 8085 for simple applications.
- Write assembly language programs for different addressing modes of 8086.
- Apply the knowledge of interrupt structure of 8086, communication standards and Serial communication in 8086 interfacing.
- Write the assembly language programs of 8051 for simple applications.
- Design 8051 interfacing with different peripherals.

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DIGITAL SIGNAL PROCESSING

Prerequisite: Signals and Systems

Course Objectives:

- To define and use Discrete Fourier Transforms (DFTs)
- To use Z - transforms and filter structure to analyze a digital system function
- To understand simple IIR filters
- To learn the design procedures used for filter bank and FIR filter
- To learn to program a DSP processor to filter signals

UNIT-I: DFT & FFT: DFS representation of periodic sequences, Properties of discrete Fourier series, Discrete Fourier transforms: Properties of DFT, Linear convolution of sequences using DFT, Computation of DFT, Relation between Z-transform and DFT

Fast Fourier transform (FFT)-Radix-2 decimation intime and decimation in frequency FFT Algorithms.

UNIT- II: REALIZATION OF DIGITAL FILTERS: Review of Z-transform,Application of Z-transforms, Solution of difference equations of digital filters, Block diagram representation of linear constant coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function.

UNIT-III: IIR DIGITAL FILTERS: Analog filter approximations-Butter worth andChebyshev, Design of IIR Digital filters from analog filters, Impulse Invariant and Bilinear methods, Analog-Digital transformations.

UNIT-IV: FIR DIGITAL FILTERS & MULTIRATE DSP : Characteristics of FIR Digital Filters, Frequency response,Design of FIR digital filters using Window techniques, Frequency sampling technique, Comparison of IIR&FIR filters,Decimation, Interpolation, Samplingrate conversion, Implementation of sampling rate conversion.

UNIT–V: INTRODUCTION TO DSP PROCESSORS: Introduction to programmableDSPs , Multiplier and Accumulator, Modified Bus Structures and Memory, Access, schemes in DSPs, Multiple access memory, Multiport memory, VLSI Architecture, Pipelining, Special addressing, Architecture of TMS 320C5X-Introduction,Bus structure, Central Arithmetic Logic unit, Auxiliary registrar, Index Registrar, Auxiliary Register, Compare Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, Program controller, Some flags in the status registers, On-chip registers, On-chip peripherals.

TEXT BOOKS:

1. Digital Signal P Processing, principles,Algorithms,andApplications:JohnG.Proakis, DimitrisG.Manolakis,Pears on Education/PHI,2007

2.Digital Signal Processing-Architecture, Programming and Applications, B.venkataramani, M.Bhaskar, TATA McGraw Hill,2002

REFERENCE BOOKS:

1. Digital Signal Processing: AndreasAntoniou,TATA McGraw Hill,2006
2. Digital Signal Processing: MHHayes, schaum's Outlines,TATAMc-Graw Hill,2007
3. DSP Primer-C. Britton Rorabaugh,Tata McGraw Hill,2005
4. Fundamentals DSP using Matlab-Robert J.Schilling,Sandra L.Harris,Thomson,2007
5. Digital Signal Processing-Alan V.Oppenheim, RonaldW. Schafer,PHI Ed.,2006
6. Discrete Time signal processing-A.V Oppenheim and R.W.Schaffer,PHI,2007.

Course Outcomes:

After completing the course, students should be able to

- Understand the spectra of signals that are to be processed by a discrete time filter, and to compute the DFT by various algorithms.
- Analyze and Implement a digital filter structures
- Design and realize IIR by butterworth and chebyshev methods
- Design and realize FIR by windowing methods
- Apply signal processing algorithms in DSP processor

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INTEGRATED CIRCUITS AND APPLICATIONS

Prerequisite: Analog Circuit Analysis

Course Objectives:

- To introduced the basic building blocks of linear integrated circuits.
- To understand the linear and non – linear applications of operational amplifiers.
- To introduce the concepts of waveform generation and introduce some special function ICs.
- To understand the theory and applications of PLL, and design ADC and DAC.
- To understand and implement the working of basic digital circuits

UNIT I:

INTEGRATED CIRCUITS: Introduction: Classification. Chip Size and Circuit Complexity, Ideal and Practical Op-Amp, Op-amp characteristics-DC and AC Characteristics. 741 Op-Amp and its Features, Modes of operation-inverting, non-inverting, differential.
Applications: Basic Applications of Op-Amp, Instrumentation Amplifier, V to I and I to V Converters, Sample & Hold Circuits, Differentiators and Integrators, Comparators, Schmitt Trigger, Multi-vibrators. Introduction to Voltage Regulators.

UNIT II:

ACTIVE FILTERS & OSCILLATORS: Active Filters: First Order and Second Order Low Pass, High Pass and Band Pass Filters. Active Band Reject and All Pass Filters.
Oscillators: Principle of Operation and Types of Oscillators – RC, Wien Bridge and quadrature type. Waveform Generators – Triangular, Saw Tooth, Square Wave.

UNIT III:

555 TIMER & PLL : Introduction to 555 Timer: Functional Diagram, Monostable and Astable Operations and Applications, Schmitt Trigger.
PLL: Introduction, Block Schematic, Principles and Description of individual Blocks of 565, VCO.

UNIT IV

D-A & A- D Converters: Introduction, Basic DAC Techniques - Weighted Resistor Type, R-2R Ladder Type, Inverted R-2R Type. Different types of ADCs - Parallel Comparator Type, Counter Type, Successive Approximation Register Type and Dual Slope Type, DAC/ADC Specifications.

UNIT V:

DIGITAL INTEGRATED CIRCUITS INTRODUCTION: Classification of Integrated Circuits, Standard TTL NAND Gate-Analysis & Characteristics, TTL Open Collector Outputs, Tristate TTL, MOS & CMOS Open Drain and Tristate outputs, Comparison of Various Logic Families. IC interfacing- TTL driving CMOS & CMOS driving TTL.

Combinational Circuit ICs: Use of TTL-74XX Series & CMOS 40XX Series ICs,
Sequential Circuit ICs: Commonly Available 74XX & CMOS 40XX Series ICs.

TEXT BOOKS:
1. Linear Integrated Circuits -D. Roy Choudhury, New Age International (p)Ltd, 3" Ed., 2008.
2. Digital Fundamentals - Floyd and Jain, Pearson Education,8th Edition, 2005.
3. Op-Amps and Linear Integrated Circuits - Concepts and Applications by James M.Fiore, Cengage/ Jaicc, 2/e, 2009.

REFERENCE BOOKS:
1. Modern Digital Electronics - RP Jain - 4/e - TMH, 2010.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 2004.

Course Outcomes:
After completing the course, students should be able to

- Design various applications of Op-Amps.
- Design the circuits using special ICs like 555 timer, 723 voltage regulator and 565 PLL.
- Design A/D and D/A Converters using ICs.
- Design digital circuits using digital ICs.
- Design different families of digital integrated circuits and their characteristics.

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BIO-MEDICAL INSTRUMENTATION

OBJECTIVES:

- To study the different types of transducers, electrodes and signal conditioning circuits.
- To study the basic characteristics of biomedical measurement system.
- To be familiar with bio potential and electrodes
- To understand blood flow and heart rate measurement principle
- To study about monitoring of vital parameters using patient monitoring system

UNIT - I:

Components of Medical Instrumentation System: Bioamplifier. Static and dynamic characteristics of medical instruments.Biosignals and characteristics. Problems encountered with measurements from human beings.

UNIT - II:

Organisation of cell: Nernst equation for membrane Resting Potential Generation and Propagation of Action Potential, Conduction through nerve to neuromuscular junction.
Bio Electrodes: Biopotential Electrodes-External electrodes, Internal Electrodes. Biochemical Electrodes.

UNIT - III:

Mechanical function: Electrical Conduction system of the heart. Cardiac cycle.Relation between electrical and mechanical activities of the heart.
Cardiac Instrumentation: Blood pressure and Blood flow measurement. Specification of ECG machine.Einthoven triangle, Standard 12-lead configurations, Interpretation of ECG waveform with respect to electro mechanical activity of the heart.

UNIT - IV:

Neuro-Muscular Instrumentation: Specification of EEG and EMG machines. Electrode placement for EEG and EMG recording.Intrepretation of EEG and EMG.

UNIT - V:

Therapeutic equipment: Pacemaker, Defibrillator, Shortwave diathermy. Haemodialysis machine.
Respiratory Instrumentation: Mechanism of respiration, Spirometry, Pnemuotachograph Ventilators.

TEXT BOOKS:

1. Hand-book of Biomedical Instrumentation – by R.S. Khandpur, McGraw-Hill, 2003.
2. Medical Instrumentation, Application and Design – by John G. Webster, John Wiley.

REFERENCES:

1. Principles of Applied Biomedical Instrumentation – by L.A. Geoddes and L.E. Baker, John Wiley and Sons.
2. Biomedical Equipment Technology – Carr & Brown, Pearson.
3. R. S. Khandpur "Handbook of Bio-Medical Instrumentation", 2ndEdition, Tata McGraw Hill, 2003.
4. Leslie Cromwell, Fred J Weibell, Erich A Pfeiffer "BiomedicalInstrumentation and Measurements'', Prentice Hall of India, 2011.

Course Outcome:

After completing the course, students should be able to

- Explain the instruments used in Heath care .
- Describe the electrodes and various measurement systems
- Apply the knowledge in blood flow and heart rate measurement principle
- Analyze various physiological parameters recording
- Explain the biomedical equipment and respiratory instruments

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COMPUTER ORGANIZATION AND OPERATING SYSTEM

Prerequisites: Switching Theory and Logic Design

Course Objectives:

- To understand instruction format, life cycle and CPU Architecture and Organization
- To understand and analyze various issues related to memory hierarchy
- To apply process scheduling and synchronization related issues.
- To understand the detection and avoidance of dead lock.
- To familiar the system protection and security.

Unit -I:

Instruction: Instruction Definition, instruction cycle, flow chart for instruction cycle, instruction storage, types of instruction formats (Zero, one, two and three address). Addressing modes: mode field, implied, immediate register, register direct, register indirect, auto increment, decrement, indexed, relative, base address mode, Numerical examples and problems.

Unit -II:

Memory Hierarchy, Main memory, memory address map, memory connection to CPU; auxiliary memory, Magnetic disks, magnetic tapes; cache memory, hit and miss ratio, direct, associative and set associative mapping; Micro-programmed control: control memory, address sequencing.

Unit III:

Operating Systems Overview and Process Management -Introduction-What operating system do, Operating system structure (uni-programmed and multi programmed), Operating system operations, Operating system services, System calls, Types of System calls.

Process Scheduling and Synchronization-Process Scheduling – Basic concepts, Scheduling criteria, Scheduling algorithms, Thread scheduling.

Unit- IV:

Deadlocks-System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Detection and avoidance, Recovery from deadlock.

Memory Management-Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual memory management - Demand paging, copy-on-write, page-replacement, Thrashing.

Unit –V:

File System, System Protection and Security-Storage management – File concept, Access methods, Directory and disk structure, File-system mounting. System protection- Goals of protection, principles of protection, Domain of protection, Access matrix.
System Security – Security problem, Program threats, System and Network threats.

Text Books:

1. M. Morris Mano, Computer System Architecture, Third Edition, Pearson/PHI, 2011.
2. Douglas V Hall, Microprocessor and Interfacing, Second Edition, TATA McGraw Hill, 2006.
3. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 9th edition, John Wiley, 2016.

Reference Books:

1. Carl Hamacher, ZvonksVranesic, SafeaZaky, Computer Organization, 5th Edition, McGraw Hill, 2002.
2. William Stallings, Computer Organization and Architecture, 6th Edition, Pearson/PHI, 2007.
3. D.M. Dharmdhere, Operating Systems – A Concept based Approach, 2nd Edition. TMH, 2007.
4. Andrew S Tanenbaum, Modern Operating Systems, 3rd Edition, PHI, 2008.
5. Behrouz A. Forouzan,Richard F. Gilberg, Unix and shell programming, Cengage Learning 2009.

Course Outcomes:

After completing the course, students should be able to

- Understand the basic organization of computer and different instruction formats and addressing modes.
- Summarize operating system and apply process scheduling and synchronization related issues.
- Understand Deadlock prevention, avoidance, detection, recovery mechanisms.
- Analyze effectively memory management concepts
- Illustrate various protection and security measures.

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COMPUTER NETWORKS

Course Objectives:

- To understand OSI & TCP/IP models.
- To understand Data link layer Protocols
- To explain Different routing protocols.
- To mention Transport layer protocols.
- To outline Application layer.

Unit I:

Network Models-Layered Tasks, OSI model, Layers in the OSI model, TCP/IP protocol Suite, Addressing. Data Link Layer: Error detection and Correction-Check Sum, CRC. Data Link Control-Framing, Flow and Error Control.

Unit II:

Data Link Layer: Protocols, Noiseless Channels, Noisy Channels, HDLC. Medium Access Control: Multiple Access -Random Access, Controlled Access, Channelization.

Unit III:

Network Layer: Internetworking: IPV4, IPV6, Transition from IPv4 to IPv6, Delivery, Forwarding and Routing- Delivery, Forwarding, Routing Protocols: static routing protocols, dynamic routing protocols, unicast routing protocols.

Unit IV:

Transport Layer: TCP, UDP, SCTP, Congestion Control and Quality of Service-Data Traffic, Congestion Control, Quality of Service, Techniques to improve QoS.

Unit V:

Application Layer: DNS in Internet, Resolution, Domain Name Space (DNS) Messages, Electronic Mail, FTP, HTTP.

Text books:

1) Behrouz A Forouzan ,"Data Communications and Networking",4th Edition, McGraw-Hill.

Reference Books:

1) Andrew S. Tanenbaum, Computer Networks, Third Edition.
2) William Stallings, Data Communications, Eight Editions. Pearson Publishers.

Course Outcomes:

After completing the course, students should be able to

- Analyze TCP/IP and OSI models and various protocols.
- Identify suitable multiple access protocol for different networks.
- Analyze various Routing Protocols.
- List Techniques to improve QoS
- Evaluate various responsibilities of application layer.

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PULSE AND DIGITAL CIRCUITS LAB

Course Objectives:

- To design the various wave shaping circuits.
- To demonstrate generation of various non-sinusoidal waveforms.
- To demonstrate functionality of various logic gates.
- To analyze dynamic response of electronic switch.
- To design UJT Relaxation Oscillator.

Minimum 12 experiments to be conducted:

1. Linear wave shaping. (**USING LABVIEW/MULTISIM soft ware**)
2. Non Linear wave shaping- Clippers. (**USING LABVIEW/MULTISIM soft ware**)
3. Non Linear wave shaping –Clampers. (**USING LABVIEW/MULTISIM soft ware**)
4. Transistor as a switch. (**USING LABVIEW/MULTISIM soft ware**)
5. Study of Logic Gates & some applications.
6. Study of Flip- Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap Sweep Circuit.

Requirements:

1. Regulated Power Supply - 0-30 V
2. CRO - 0-20 M Hz
3. Function Generators - 0- 1 M Hz
4. Components
5. Multi Meters
6. Labview/multisim soft ware

Course Outcomes:

After completing the course, students should be able to

- Design linear and non linear wave shaping circuits.
- Create various wave forms such as Square, Pulse and Sweep.
- Design electronic switch.
- Design simple applications such as counters and flip-flops.
- Design logic gates.

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	0	**0/3/-**	**1.5**

MICROPROCESSORS & MICROCONTROLLERS LAB

Course objectives:

- To understand the fundamentals of assembly level programming of microprocessors.
- To understand the concepts of Assembly language programming and its applications.
- To learn to develop the assembly level programming using 8086 instruction set.
- To learn to develop the assembly level programming using 8051 instruction set.
- To learn to interface peripherals with 8086 and 8051.

LAB Note: Minimum of 12 experiments to be conducted.

List of Experiments: The Following programs/experiments are to be written for assembler and execute the same with 8086 Microprocessor and 8051 microcontroller.

1. Programs for 16 bits arithmetic operations for 8086 (using Various Addressing Modes).

2. Program for sorting an array and to generate Fibonacci series for 8086.

3. Programs for string manipulations for 8086.

4. Program for digital clock design using 8086.

5. Interfacing ADC and DAC to 8086.

6. Parallel communication between two microprocessors using 8255.

7. Interfacing to 8086 and programming to control stepper motor using.

8. To interface Seven Segment Display using 8086

9. Programming using arithmetic, logic and bit manipulation instructions of 8051.

10. Program and verify Timer / Counter in 8051.

11. Program and verify Interrupt handling in 8051.

12. UART Operation in 8051.

13. LCD interface with 8051.

14.Keypad Interface with 8051.

Course outcomes:

After completing the course, students should be able to

- Build a program on a microprocessor using instruction set of 8086.
- Analyze the problems and apply a combination of hardware and software to address the problem
- Contrast how different I/O devices can be interfaced to processor and will explore several techniques of interfacing.
- Experiment with standard microprocessor interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters
- Design 8051 microcontroller interface with I/O peripherals.

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L	T/P/D	C
0	0/2/-	1

Advanced English Communication Skills Lab

Course Objectives:

- The Language Lab focuses on using computer-aided multimedia instruction for language development to achieve following targets:
- To improve the student's fluency in English, through a well-developed vocabulary.
- To enable them to listen to English spoken at normal conversational speed by educated English Speakers.
- To respond appropriately in different socio-cultural and professional contexts.
- To communicate their ideas relevantly and coherently.

1. **Vocabulary Building** – synonyms and antonyms, Word Roots, One-Word Substitutes, Prefixes and Suffixes, Study of Word Origin, Analogy, Idioms and Phrases.

2. **Reading Comprehension –** Reading for Facts, Guessing meanings from context, Scanning, Skimming, Inferring Meaning, and Critical Reading.

3. **Writing Skills** –Structure and presentation of different types of writing - Resume Writing /E-Correspondence/Statement of Purpose.

4. **Technical Writing**- Technical Report Writing, Research Abilities/Data Collection/Organizing Data/Tools/Analysis.

5. **Group Discussion** – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Coherence.

6. **Presentation Skills** – Oral presentations (individual and group) through JAM sessions/Seminars, Written Presentations through Projects/ PPTs/e-mails etc.

7. **Interview Skills** – Concept and Process, Pre-Interview Planning, Opening Strategies, Answering Strategies, Interview through Telephone and Video-Conferencing.

Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

- Clarity Pronunciation Power – part II
- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech.

- TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- The following software from _train2success.com‘
  i. Preparing for being Interviewed,
  ii. Positive Thinking,
  iii. Interviewing Skills,
  iv. Telephone Skills,
  v. Time Management
  vi. Team Building,
  vii. Decision making
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Text Books:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
3. English Language Communication : A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
4. English Vocabulary in Use series, Cambridge University Press 2008.
5. Management Shapers Series by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
7. Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
10. English for Technical Communication for Engineering Students, Aysha Vish hwamohan, Tata Mc Graw-Hil 2009.
11. Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron‘s/DELTA/Cambridge University Press.
12. International English for Call Centres by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

Course Outcomes

After completing the course, students should be able to

- Use effective vocabulary for academic and general purposes.
- Analyze the passages of Reading comprehension.
- Evaluate their verbal and Non-verbal communication skills in activities like Group Discussion and seminar presentations.
- Investigate and interpret the collected data to prepare the technical/project reports.
- Plan how to prepare an effective resume and face real time interviews successfully

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	3	**0/0/-**	**3**

PROJECT MANAGEMENT

Course objectives:

- Students will be able to understand the various stages of project management and its portfolios.
- To apply project planning methods for selecting a project.
- To analyze various techniques in project execution.
- To lead project teams for function cooperation.
- To evaluate the performance management of a project.

UNIT-I

Introduction: Meaning, Need, Principles Project Lifecycle and its Phases, Project Management Research in brief, Project Management today, Organization strategy and structure and culture, Format of organization structure, Stake holder Management, Organization Culture, creating a culture for Project Management.

UNIT-II

Project Identification and Planning: Defining the project, Project Identification Process, Approaches to Project Screening and Selection, Project Planning, Work Breakdown Structure, Financial Module, Getting Approval and Compiling a Project Charter, setting up a Monitoring and Controlling Process.

UNIT-III

Project Execution: Initiating the Project, Controlling and Reporting Project Objectives, Conducting project evaluation, Risk, Risk Management Factors, Project Management, Four Stage Process, Risk Management an Integrated Approach, Cost Management, Creating a Project Budget.

UNIT-IV

Leading Project Teams: Building a Project Team, Characteristics of an effective Project Team, achieving Cross- Functional Co-operation, Virtual Project Teams, Conflicts Management, Negotiations.

UNIT-V

Performance Measurement and Evaluation: Monitoring Project Performances , Project Control Cycles, Earned Value Management, Human factors in Project Evaluation and Control, Project Termination, Types of Project Terminations, Project Follow-up. Current and Future Trends in Project Management.

REFERENCES

1. Gray, Larson, Project Management, Tata McGraw Hill,2015
2. Jeffery K.Pinto, Project Management,Pearson Education,2015
3. EnzoFrigenti, Project Management,Kogan, 2015
4. R. Panneerselvam& P. Senthil Kumar, Project Management, PHI, 2015
5. Thomas M.Cappels, Financially Focused Project Management, SPD,2008.

Course outcomes:

After completing the course, students should be able to

- Manage the selection and initiation of individual projects and of portfolios of projects in the enterprise.
- Conduct project planning activities that accurately forecast project costs, timelines, and quality.
- Demonstrate effective project execution and control techniques that result in successful projects.
- Conduct project closure activities and obtain formal project acceptance.
- Demonstrate effective organizational leadership and change skills for managing projects, project teams, and stakeholders

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LOGICAL REASONING, VERBAL AND QUANTITATIVE ABILITY

(OE-1)

Pre requisites: Basic Mathematics, Statistics and English

Course Outcomes:

1. Enhance the problem solving ability of the students with focusing on basic concepts of arithmetic, algebra, geometry data analysis.
2. Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

Unit I:

Number Systems: Classification of numbers, Squares, Fractions, Simplifications, Divisibility Test, Power Cycle, Reminder Cycle, Factors, LCM, HCF, Application of LCM & HCF

Ratio and Proportion: Tricks to solve ratio, proportions, continuous proportions, Variations, Ages

Percentages: Percentage Increase/ Decrease , Results on population , Results on Depreciation, Simple Interest , Principal , Interest , Amount , Application of Simple Interest, Compound Interest , Compound Annually , Compound Half-yearly , Compound Quarterl, Difference between Compound Interest and Simple Interest

Unit II:

Geometry: Lines , Properties of lines , Triangles, Properties of Triangles, Angles , Sectors , Chords , Planes , Quadrilateral

Mensuration: Area & Perimeter of Triangle, Quadrilateral, Rectangle, Square, Parallelogram, Trapezium, Surface Area & Volume of 3D Figures

Data Interpretation: Table Charts, Pie Charts, Bar Graphs, Line Graphs

Data Sufficiency: Problems On all quant and Logical topics

Unit III:

Seating Arrangement: Circular arrangement, row arrangement, column arrangement, Square arrangement, Double row arrangement

Syllogisms: Two Statements & Conclusion, Three Statements & Conclusion, Six Statements

Unit IV:

Number Series: Letter Series, Number Series, Letter & Number Series

Analogy: Simple Analogy, Double Analogy, Word Analogy, Number Analogy, Choosing Analogy Pairs

Coding & Decoding: Letter Coding, Number Coding, Symbol Coding, Letter - Number Coding, Letter - Symbol Coding, Direct Coding, Indirect Coding

Blood Relations: Based on Dialogue or conversation, Based on puzzles

Unit V:

Nouns: Types of nouns, rules, usages and error spotting

Pronouns: Types of nouns, rules, usages and error spotting

Articles: Definite and indefinite articles, Omission of articles, rules, usage and error spotting

Adjectives and Adverbs: Types of nouns, rules, usages and error spotting

Preposition: Types of nouns, rules, usages and error spotting

Text Books:

1. Verbal and Non Verbal Reasoning - *R.S.Agarwal*.
2. Quantitative Aptitude - *R.S.Agarwal*.
3. Quantitative Aptitude - *Abhijit Guha*.

Course Outcomes:

After completing the course, students should be able to

- Formulate the problem quantitatively and use appropriate arithmetical, and/or statistical methods to solve the problem.
- Recall Formulae.
- Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
- Interpret quantitative information (i.e., formulas, graphs, tables, models, and schematics) and draw implications from them.
- Critically evaluate various real life situations by resorting to analysis of key issues and factors

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DATABASE MANGEMENT SYSTEM

Prerequisites: Any programming language.

Course Objectives:

- To provide a sound introduction to Database management systems, Databases and its applications,
- To familiarize the participant to give a good formal foundation on the relational model of data
- To present SQL and procedural interfaces to SQL comprehensively
- To give an introduction to systematic database design approaches conceptual design, logical design ,schema refinement and physical design
- To introduce the concepts of transactions and transaction are processing and the issues and techniques relating to concurrency and recovery manager.

Unit -I:

Introduction to Database System Concepts: Database-System Applications, Purpose of Database Systems, View of Data, Database Language, Database Design, Database Architecture, Database Users and Administrators.

Introduction to the Relation Models and Database Design using ER Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features,

Unit -II:

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions Nested Sub queries, Modification of the Database.

Intermediate and Advanced SQL: Join Expressions, Views , Integrity Constraints, SQL Data Types, Authorization. Functions and Procedures, Triggers

Unit -III:

Formal Relational Query Languages: The Relational Algebra, Tuple Relational Calculus, The Domain Relational Calculus.

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Decomposition Using Multi valued Dependencies, More Normal Forms.

Unit -IV:

Indexing and Hashing: Basic Concepts, Ordered Indices, B+-Tree Index Files, B+-Tree Extensions, Multiple-Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.

Transactions: Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels.

Unit -V:

Concurrency Control: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols.

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, ARIES, Remote Backup Systems.

Text Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Sixth Edition, Tata McGraw-Hill 2006.

2. Raghu Rama Kirshna, Johannes Gchrke, Database Management System, Third Edition, TATA MC Graw Hill, 2003.

Reference Books:

1. Peter Rob & Carlos Coronel, Data base Systems design, Implementation and Management ,7th Edition, 2007.

2. RamezElmasri, Shamkanth B. Navrate, Fundamentals of Database Systems, Pearson Education, 2008.

3. C.J. Date ,Introduction to Database Systems, Pearson Education

Course Outcomes:

After completing the course, students should be able to

- Design Entity-Relationship Model for enterprise level databases.
- Develop the database and provide restricted access to different users of database and formulate the Complex SQL queries.
- Analyze various Relational Formal Query Languages and various Normal forms to carry out Schema refinement
- Use of suitable Indices and Hashing mechanisms for real time implementation.
- Analyze various concurrency control protocols and working principles of recovery algorithms.

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DATA SCIENCE AND ANALYTICS

Course Objectives:

- To gain a foundational understanding of data science.
- To understand the data exploration analysis in data science.
- To understand and use basic machine learning algorithms for predictive modeling.
- To understand and use the various graphics in R and Tableau for data visualization.
- To understand the ethical and privacy issues in data science.

Unit I:
INTRODUCTION TO DATA SCIENCE
Introduction: What is Data Science,Big Data and Data Science hype – and getting past the hype, Why now? – Datafication, Current landscape of perspectives, Skill sets needed, Statistical Inference, Populations and samples, Statistical modeling, probability distributions, fitting a model, Introduction to R.

Unit II:
EXPLORATORY DATA ANALYSIS AND THE DATA SCIENCE PROCESS
Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process, Case Study.

Unit III:
BASIC MACHINE LEARNING ALGORITHMS
Linear Regression, k-Nearest Neighbours (k-NN), k-means, Motivating application: Filtering Spam, Why Linear Regression and k-NN are poor choices for Filtering Spam, Naive Bayes and why it works for Filtering Spam.

Unit IV:
DATA VISUALIZATION
Basic principles, ideas and tools for data visualization, Examples of inspiring (industry) projects, Introduction to Tableau. Creating own visualization of a complex dataset.

Unit V:
DATA SCIENCE AND ETHICAL ISSUES
Discussions on privacy, security, ethics, A look back at Data Science, Next-generation data scientists.

Text Books:

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.
2. Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. ISBN 1449361323. 2013.

Reference Books:

1. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Elements of Statistical Learning, Second Edition.ISBN 0387952845. 2009.
2. Jiawei Han, MichelineKamber and Jian Pei. Data Mining: Concepts and Techniques, Third Edition. ISBN 0123814790. 2011.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012.

Course Outcomes:

After completing the course, students should be able to

- Describe what Data Science is and the skill sets needed to be a data scientist.
- Explain the significance of exploratory data analysis (EDA) in data science.
- Apply basic machine learning algorithms for predictive modeling.
- Learn to persuade effective visualization of given data.
- Find the Reason around ethical and privacy issues in data science conduct and apply ethical practices.

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	3	**0/0/-**	**3**

CONTROL SYSTEMS

Course Objectives:

- To study mathematical models of physical system
- To study the response of different order systems using standard test signals
- To analyze the stability of the system in time domain and in frequency domain
- To study the controllers used for various control system applications
- To determine the stability analysis of the system using State Space Analysis

Unit -I: Introduction to Control System

Industrial Control examples. Mathematical models of physical systems. Transfer function models of linear time-invariant systems.

Feedback Control: Open-Loop and Closed-loop systems. Benefits of Feedback. Block diagram algebra.– Representation by Signal flow graph - Reduction using Mason's gain formula

Unit -II: Time Response Analysis

Standard test signals. Time response of first and second order systems for standard test inputs.Application of initial and final value theorem. Design specifications for second-order systems based on the time-response.

Concept of Stability.Routh-Hurwitz Criteria.Relative Stability analysis.Root-Locus technique.Construction of Root-loci.

Unit- III: Frequency-Response Analysis

Relationship between time and frequency response, Polar plots, Bode plots. Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin. Closed-loop frequency response.

Unit – IV: Classical Control Compensation Design Techniques

P,PI,PD and PID controllers determination of coefficient's.

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain

Unit- V: State Variable Analysis

Concepts of state variables.State space model.Diagonalization of State Matrix.Solution of state equations.Eigenvalues and Stability Analysis.Concept of controllability and observability.

Text Books:

1. Control Systems Engineering – I.J.Nagrath and M.Gopal, New Age International (P) Limited, Publishers, 2nd edition, 2009.
2. Automatic Control Systems - B. C. Kuo, John wiley and son's., 8th edition, 2003.

Reference Books:

1. Modern Control Engineering –Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems - N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems – A. Nagoor kani, Published June 2006 by RBA Publications

Course Outcomes:

After completing the course, students should be able to

- Model linear-time-invariant systems using transfer function
- Analyze state-space representations.
- Apply the concept of stability and its assessment for linear-time invariant systems.
- Design simple feedback controllers.
- Describe the concept of simple compensators

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	3	**1/0/-**	**4**

VLSI DESIGN

Course objectives:

- To give exposure to different steps involved in the fabrication of ICs using MOS transistor, CMOS/BICMOS transistors and passive components
- To explain electrical properties of MOS and Bi-CMOS devices to analyze the behavior of inverters designed with various loads.
- To give exposure to the design rules to be followed to draw the layout of any logic circuit.
- To provide concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- To provide design concepts to design building blocks of data path of any system using gates.
- To understand basic programmable logic devices and testing of CMOS circuits.

UNIT- I- Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & Bi-CMOS Technologies- Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Probe testing, Integrated Resistors and Capacitors, CMOS Nanotechnology.

Basic Electrical Properties : Basic Electrical Properties of MOS and Bi-CMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, g_m, g_{ds}, figure of merit ωo; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT- II- VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Logic Gates, Scaling of MOS circuits.

UNIT- III- Gate Level Design : Complex gates, Switch logic, Alternate gate circuits, Time Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers.
Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

UNIT- IV- Array Subsystems: SRAM, DRAM, ROM, Serial Access Memory, Content addressable memory
Semiconductor Integrated Circuit Design: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.

UNIT- V-CMOS Testing : CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques, System-level Test Techniques, Layout Design for improved Testability.

TEXTBOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A.Pucknell, PHI, 2005 Edition
2. VLSI Design – K.Lal Kishore,V.S.V.Prabhakar,I.K Imternational,2009.
3. Modern VLSI Design – Wayne Wolf, Pearson Education, 3rd Edition, 2002.

REFERENCES:

1. CMOS logic circuit Design- John P.Uyemura, Springer, 2007.
2. CMOS VLSI Design – A circuits and systems perspective,Neil H.E Weste,David Harris,Ayan Banerjee,pearson,2009.
3. VLSI Design-A. Albert Raj, Latha, PHI, 2008.
4. Introduction to VLSI-Mead & Convey, BS Publications, 2010.
5. VLSI Design-M.Micheal Vai, CRC Press, 2009.

Course Outcomes:

After completing the course, students should be able to

- Utilize knowledge about the fabrication process of integrated circuit using MOS transistors.
- Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit.
- Design building blocks of data path using different types of logic gates.
- Design simple memories using MOS transistors and can understand design of large memories.
- Explain the different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.

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EMBEDDED SYSTEMS

Prerequisite: Microprocessors and microcontrollers

Course Objectives:

- To know basic concepts of Embedded System, its History and Classification.
- To understand the role of embedded systems and its interfacing.
- To study Various Reset Circuits & Embedded Software Development Tools.
- To know basic concepts of Real Time Operating System & their Kernel objects .
- To understand concepts of device driver.

UNIT -I

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT -II

Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT –III

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT -IV

RTOS Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT -V

Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

TEXT BOOKS:

1. Shibu K.V, "Introduction to Embedded Systems", McGraw Hill, edition 2,2016.

REFERENCE BOOKS:

1. Raj Kamal, "Embedded Systems", TMH,2nd edition, 2008.

2. Frank Vahid, Tony Givargis, "Embedded System Design", John Wiley, 3rd Edition, 2006.

3. Lyla, "Embedded Systems", Pearson, 2013

4. David E. Simon, "An Embedded Software Primer", Pearson Education, Reprint 2005.

Course Outcomes:

After completing the course, students should be able to

- Explain the basics of Embedded Systems.
- Apply basic concepts in designing Embedded Systems.
- Describe Different Embedded Systems Development tools in designing Embedded Systems.
- Utilize the techniques used in debugging an embedded software.
- Apply the concepts of RTOS to design device driver.

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	3	**0/0/-**	**3**

ADVANCED MICROCOTROLLERS

Course Objectives

- To understand fundamental operating concepts behind microcontrollers.
- To understand the advantages in using RISC architecture in engineering applications
- To familiarize the instruction set of ARM processor and its programming
- To design microcontroller based solutions to real time problems
- To apply this knowledge to more advanced structures like MSP430 microcontroller.

Unit-I: ARM Processor Fundamentals:

Registers, CPU, Pipeline, Exceptions, Interrupts, Vector table, Core extensions, ARM architecture, Architecture revisions, ARM organization, ARM Processor families

Unit-II: High Performance RISC Architecture and Programming:

Data Process instruction, Branch and Load instruction, Software interrupts, Thumb instruction set, Thumb register usage, ARM thumb network, Stack instructions, Basic ARM Assembly language programs, Binary sorting

UNIT_III: Memory Management

Memory Hierarchy, Coprocessor and Cache memory, Memory management, ARM CPU cores,
NuvoTon Cortex M0(Nu-LB-NUC140) Architecture and supporting tools.

Unit–IV: MSP430 Microcontroller Overview

Functional Block diagram of MSP430F2003-Memory Mapped, CPU, Exceptions, Architecture of MSP430 Processor, A simple tour of MSP430- Light LED in C and Assembly Language, Read input from switch

Unit-V: Instruction Set and Addressing Modes of MSP430

Addressing Modes of MSP430, Instruction Set, Function, Interrupts, Digital in-outs, Timer, Communication

Text books:

1. K. M. Bhurchandi and A. K. Ray, "*Advanced Microprocessors and Peripherals-with ARM and an Introduction to Microcontrollers and Interfacing* ", Tata McGraw Hill, 3rd edition 2015.

2. Andrew N. Sloss, Dominic Symes, Chris Wright and John Rayfield, *"ARM System Developer's Guide, Designing and Optimizing System Software"*, Elsevier, 2004.
3. John H. Davies, *"MSP430 Microcontroller Basics"*, Elsevier, 2008.
4. Manuel Jimenez, Rogelio Palomera, IsidoroConvertier, "*Introduction to Embedded systems using Microcontrollers and the MSP430",* Springer 2014.

Course Outcomes:

After completing the course, students should be able to

- Write the assembly level and embedded C programming using 8051.
- Write the assembly level programming using low powered MSP430.
- Explain the Keil µVision-3/4 and IAR Embedded Workbench tools.
- Design circuits for various applications using microcontrollers.
- Apply the concepts on real- time applications.

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III-Year B.Tech-ECE-II-Semester	**L**	**T/P/D**	**C**
	3	**0/0/-**	**3**

Real Time Operating System

Prerequisites: Computer Organization and Operating System, Embedded system

Course Objectives:
- To deals with issues in real time operating systems,
- To learn the importance of deadlines and concept of task scheduling.
- To understand and design real time operating systems
- To apply the concepts of RTOS in embedded industry.

UNIT – I : Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O,(open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT – II : Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT – III : Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT – IV : Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT – V : Case Studies of RTOS: RT Linux, Micro C/OS-II, Vx Works, Embedded Linux, and Tiny OS.

TEXT BOOK:
- Qing Li, “Real Time Concepts for Embedded Systems”, 2011, Elsevier.
-

REFERENCE BOOKS:
- Rajkamal, “Embedded Systems- Architecture, Programming, and Design”, 2007, TMH.
- W. Richard Stevens, Stephan A. Rago, “Advanced UNIX Programming”, 2006, 2nd Edition, Pearson.
- Dr. Craig Hollabaugh, “Embedded Linux: Hardware, Software and Interfacing”, 2008, 1st Edition, Pearson.

Course outcomes:

After completing the course, students should be able to

- Summarize the issues in real time computing
- Explain and give examples of real time operating systems.
- Solve scheduling problems and can apply them in real time applications in industry.
- Design an RTOS and will be able to interpret the feasibility of a task set to accomplish or not.
- Analyze the situation of fault occurrence and will be able to apply solutions accordingly

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DIGITAL SIGNAL PROCESSING LAB

Course Objectives:

- To verify properties of a discrete system.
- To practice various transforms on digital signals.
- To implement the design of digital filters.
- To verify basic properties of multi rate systems.

List of Experiments

A).The program shall be done in MATLAB or equivalent(Minimum 8 Experiments to be conducted)

1. Generation of Sinusoidal waveform / signal based on recursive difference equations.
2. To find DFT and IDFT of given sequence using FFT function
3. To find frequency response and Impulse response of a given system (Transfer Function / Differential equation form)
4. Determination of Power Spectrum of a given signal(s).
5. Implementation of LP and HP IIR filter for a given sequence
6. Implementation of LP and HP FIR filter for a given sequence.
7. Generation of Sinusoidal signal through filtering.
8. Generation of DTMF signals.
9. Implementation of Decimation, Interpolation and I / D sampling rate converters.

B). The program shall be done in DSP Processors or equivalent (Minimum 4 Experiments to be conducted)

1. Generation of Sinusoidal waveform
2. Verify linear convolution
3. Implementation of FFT and IFFT of given sequence.
4. Compute Power Spectrum Density of a sequence
5. Implementation of LP and HP IIR filter for a given sequence
6. Implementation of FIR filter using Windowing Technique

Course Outcomes:

After completing the course, students should be able to

- Describe and develop of various signal processing applications
- Analyze various signals in transform domain
- Perform simulation of digital filter algorithms
- Analyze and implement multirate signal processing applications
- Design and develop various filter based on DSP Processors.

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EMBEDDED SYSTEMS LAB

Course Objectives:

- To know basic concepts of Embedded System, its History and Classification.
- To understand the role of embedded systems and its interfacing.
- To study Various Reset Circuits & Embedded Software Development Tools.
- To know basic concepts of Real Time Operating System & their Kernel objects .
- To understand concepts of device driver.

Note: Minimum of 12 experiments to be conducted.
List of Experiments: The following embedded systems are to be developed using appropriate ARM7 micro controller. Programming in Assembly Language/ embedded C
1. Programming using arithmetic, logic and bit manipulation instructions.
2. Program and verify Timer / Counter.
3. Program and verify Interrupt handling.
4. UART Operation.
5. LCD interface
6. Keypad Interface
7. Transfer of data (text) from PC terminal to embedded system kit for display on LCD.
8. From keyboard on embedded system kit to PC terminal.
9. To acquire data through different sensors and process the data for control of external devices through actuators, relays etc.
10. To sort RTOS on to ARM7 microcontroller and verify execution of 2 or 3 tasks simultaneously using SDK.
11. To accept input from touch screen and control external devices.
12. A Line following ROBOT.
13. A robotic application for controlling devices with MEMS.
14. A patient monitoring system.

Requirements:

1. Computer Systems with OS
2. Softwares: Keil u vision 3&4, Flash Magic, Term 51E
3. ARM/Arduino/Raspberri Pi Kits
4. External Peripherals: Assorted

Course Outcomes:

After completing the course, students should be able to

- Explain the basics of Embedded Systems.
- Apply basic concepts in designing Embedded Systems.
- Describe the different Embedded Systems Development tools in designing Embedded Systems.
- Utilize the techniques used in debugging an embedded software.
- Apply the concepts of RTOS to design device driver.

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	0	**0/3/-**	**1.5**

ADVANCED MICROCONTROLLERS LAB

Course Objectives:

- To introduce the basics of microcontroller and its applications.
- To provide in depth knowledge of ARM and MSP 430 programming.
- To expertise working with Keil compiler and embedded C programming.
- To impart the I/O interfacing concepts for developing real time embedded systems.
- To encourage the students in building real time applications.

Note: Minimum of 12 experiments to be conducted.

List of Experiments:

The following embedded systems are to be developed using appropriate ARM & MSP430 micro controller. Programming in Assembly Language/ embedded C

1. Program to Blink an LED using ARM.
2. LCD Interface.
3. Keypad Interface.
4. Transfer of data (text) from PC terminal to embedded system kit for display on LCD.
5. From keyboard on embedded system kit to PC terminal.
6. To acquire data through different sensors and process the data for control of external devices through actuators, relays etc.
7. To sort RTOS on to ARM7 microcontroller and verify execution of 2 or 3 tasks simultaneously using SDK.
8. To accept input from touch screen and control external devices.
9. A Line following ROBOT.
10. A robotic application for controlling devices with MEMS.
11. A patient monitoring system.
12. Programming using Data Transfer and Arithmetic Instructions of MSP430.
13. Moving a Data from one location to another location.
14. Sorting.
15. Program to find Even and Odd Numbers in an array.

Requirements:

i) Computer Systems with Operating system (Windows XP)
ii) Software's – Keil µVision 3&4, Flash Magic, IAR EMBEDDED WORKBENCH.
iii) ARM and MSP430 Trainer kits.
iv) External Peripherals: Assorted.

Course Outcomes:

After completing the course, students should be able to

- Write the assembly level and embedded C programming using 8051.
- Write the assembly level programming using low powered MSP430.
- Utilize the Keil µVision-3/4 and IAR Embedded Workbench tools.
- Design circuits for various applications using microcontrollers.
- Apply the concepts on real- time applications.

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Real Time Operating System Lab
(Any12 Experiments)

Course Objectives:
- Todeals with issues in real time operating systems,
- To learn the importance of deadlines and concept of task scheduling.
- To understand and design real time operating systems
- To apply the concepts of RTOS in embedded industry.

Experiments: Perform Experiments to execute
1.Shell scripting basics
2.Program for basic commands in Linux
3.Creating process and raising signals
4. Creating named pipes
5. Interprocesscommunication through message queues and semaphores
6. Multithreading
7. Socketprogramming
8. Building image and kernel patching9. Implementationof concepts in rtlinux
10. Moduledevelopment
11.Application development in rtlinux
12.Portingof chibiOs
13. Application development using chibiOs
14. Python programming
15.Settingup raspbianos in raspberry pi
16. Establishingssh protocol in rpi16. GPIO Interfacing
17. Serial communication with Rasberry pi.

Requirements:
1.CPU
2.Linux/Unix Software orEquivalent software
3.Rasberry-Pi

Course outcomes:
After completing the course, students should be able to
- Summarize the issues in real time computing
- Explain and give examples of real time operating systems.
- Solve scheduling problems and can apply them in real time applications in industry.
- Design an RTOS and will be able to interpret the feasibility of a task set to accomplish or not.
- Analyze the situation of fault occurrence and will be able to apply solutions accordingly

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	0	**0/2/-**	**1**

INTEGRATED CIRCUITS & APPLICATIONS LAB

Course Objectives:

- To describe the IC package types , specifications and its uses.
- To analyze the operational amplifiers, timers and their applications in electrical and electronics circuits.
- To analyze different conversion techniques (DC and DAC)
- To acquire the knowledge on Digital IC families, its specifications and applications.
- To distinguish linear and digital ICs for different applications

Note: Minimum 12 experiments should be conducted 6 from each part

List of Experiments

PART –1 TO VERIFY THE FOLLOWING FUNCTIONS.

1. Adder, Subtractor, Comparator using IC 741 Op-Amp.
2. Integrator and Differentiator using IC 741 Op-Amp.
3. Active Low Pass & High Pass Butterworth (second order).
4. RC Phase Shift and Wien Bridge Oscillators using 741 Op-Amp.
5. IC 555 timer in monostable operation.
6. Schmitt trigger circuits using IC 741 & IC 555.
7. IC 565-PLL applications.
8. Voltage regulator IC 723, three terminal voltage regulators-7805, 7809,7912.
9. Sample and Hold LF 398 IC.

PART- 2: TO VERIFY THE FUNCTIONALITY OF THE FOLLOWING 74 SERIES TTL IC'S,CMOS IC'S

10. D Flip (74LS74) and JK Master-Slave Flip-Flop (74LS73).
11. Decade counter (74LS90) and UP –Down Counter (74LS192).
12. Universal Shift registers – 74LS194/195.
13. 3-8 decoder – 74LS138.
14. 4 bit comparator 74LS85.
15. 8X1 Multiplexer- 74151 and 2X4 Demultiplexer-74155.
16. RAM (16X4) – 74189 (read and write operations)
17. Stack and Queue implementation using RAM, 74189
18. Design an inverter using NMOS, PMOS, CMOS

Requirements:

1. Regulated Power Supply - 0-30 V
2. CRO - 0-20 M Hz
3. Function Generators - 0- 1 M Hz
4. Multi Meters.

Course Outcomes:

After completing the course, students should be able to

- Use of operational Amplifier (741).
- Design circuits using operational amplifiers for various applications.
- Design various combinational circuits using various Digital Integrated IC's.
- Describe the differences between Linear and Digital Integrated IC's.
- Demonstrate their knowledge by designing analog circuits& digital circuits.

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	3	**1/0/-**	**4**

MICROWAVE AND RADAR ENGINEERING

Prerequisite: Electromagnetic Theory and Transmission Lines

Course Objectives:

- To develop knowledge on waveguides, waveguide components and their applications radar fundamentals and analysis of the radar signals.
- To understand and analyze the operation of microwave tubes like klystron ,magnetron TWT etc. and different radars like CW radar, pulse radar ,MTI radar etc.
- To analyze the operation of microwave solid state devices and radar systems like tracking radars.
- To understand the concepts of microwave junctions ,scattering parameters and detection of radar signals in presence of noise.
- To analyze microwave test bench for measuring different parameters like attenuation ,power, VSWR etc. and the radar receivers.

Unit-I: Introduction to microwaves-characteristic features, advantages and applications, waveguide basic concepts.TE/TM mode equations in Rectangular Waveguides.Microwave power flow and Power Losses. Micro strip Lines–Z_o Relations. Effective Dielectric Constant, Losses. Cavity Resonators- Q factor. Illustrative Problems.

Waveguide Components and Applications: construction and working of microwave components:-Coupling Mechanisms, Waveguide windows, Tuning Screws and Posts, Waveguide Attenuators and Phase Shifters, Waveguide Multiport Junctions. Illustrative Problems.

UNIT-II: Scattering Matrix for: E plane and H plane Tees, Magic Tee, directional coupler,.Illustrative Problems.

Microwave Tubes: Limitations and Losses of conventional tubes at microwave frequencies. Basic construction and operation of: 2- Cavity Klystron, Reflex Klystron, TWT and Magnetron. Illustrative Problems.

UNIT-III:Microwave Solid State Devices: Classification, Construction and working of TEDs and ATDs –GunnDiode. Introduction to Avalanche Transit Time Devices.

Microwave Measurements: Description of Microwave Bench, Microwave Power Measurement – Bolometer. Measurement of Attenuation, Frequency, low and high VSWR and Impedance.

UNIT-IV: Introduction to radars: Radar range equation, radar frequencies and applications, PRF, unambiguous range, Radar cross section, integration of Radar pulses. Construction and working of: CW radar, CW radar with non-zero IF, FM CW radar, MTI and Pulse Doppler Radar. Delay Line Canceller, Blind Speeds, Staggered PRFs.
UNIT-V: Tracking Radar : Tracking with Radar, basic principle and operation of -Sequential Lobbing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two- coordinates).

Radar Receivers: Noise Figure and Noise Temperature, Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes. Types of Radar Antennas.

TEXT BOOKS:

1. Microwave Devices and Circuits – Samuel Y. Liao, Pearson , 3rd Edition,2003.
2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.
3. Introduction to Radar Systems-Merrill I. Skolnik, Second Edition, Mcgraw-Hill, 206
4. Introduction to Radar Systems-Merrill I. Skolnik, Third Edition, Mcgraw-Hill, 2001
5. Radar :Principles,Technology,Applications-Byron Edde,Pearson Education,2004.
6. Radar Principles- Peebles, Jr. P. Z. Wiley, New York,1998.

REFERENCES:

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 2012.
3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.
5. Elements of Microwave Engineering – R. Chatterjee, Affiliated East-West Press Pvt. Ltd., New Delhi, 2016.
6. Micro Wave and Radar Engineering – M. Kulkarni, Umesh Publications, 2008.

Course Outcomes: After completing the course, students should be able to

- Describe the significance of waveguides, microwave components, radar fundamentals and signals.
- Analyze the working and characteristics of microwave tubes and different radars.
- Explain and analyze operations of microwave solid state devices and radar systems.
- Apply and analyze concepts of microwave junctions ,scattering parameters for different components and radar signals detection.
- Analyze and evaluate microwave measurements and radar receivers.

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	3	**0/0/-**	**3**

DIGITAL IMAGE PROCESSING

Prerequisite: Signals and Systems, Digital Signal Processing

Course objectives:

- To provide student with the fundamentals of digital image processing.
- To design and implement frequency domain filtering
- To evaluate the different denoising techniques
- To apply segmentation techniques to isolate the object
- To build various compression algorithms

UNIT – I- Digital Image Fundamentals & Image Transforms: Digital Image fundamentals, Sampling and quantization, Relationship between pixels. Image Transforms: 2-D FFT, properties, Walsh transform, Hadamard Transform, Discrete Cosine Transform, Haar transform, Slant transform, Hotelling transform.

UNIT – II- Image Enhancement(spatial Domain): Introduction, Image Enhancement inspatial domain, enhancement through point operation, types of point operation, histogram manipulation, linear and non-linear gray level transformation, local or neighborhood operation, median filter, spatial domain high-pass filtering.

Image Enhancement (Frequency Domain): Filtering in frequency domain, obtainingfrequency domain filters from spatial filters. Generating filters directly in the frequency domain, low-pass (smoothing) and High pass (sharpening) Filters in Frequency Domain.

UNIT – III- Image Restoration: Degradation model, Algebraic approach to restoration,Inverse filtering, least mean square filters, Constrained Least Squares Restoration.

UNIT – IV - Image Segmentation: Detection of discontinuities, Edge linking and boundarydetection, Thresholding, Region oriented segmentation.

Morphological Image Processing: Dilation and Erosion, Dilation, Structuring ElementDecomposition, The strel function, Erosion. Combining Dilation and Erosion: Opening and closing, the hit or miss Transformation, Overview of Digital Image Watermarking Methods.

UNIT – V- Image Compression: Redundancies and their removal methods, Fidelity criteria,Image compression models, source encoder and decoder. Error free compression, Lossy compression, JPEG 2000 standards.

Wavelet based Image Processing: Introduction to wavelet Transform, Continuous WaveletTransform, Discrete Wavelet Transform, Filter banks, Wavelet based Image compression, Wavelet based denoising and wavelet thresholding methods.

TEXT BOOKS:

1. Digital Image Processing – Rafael C. Gonzalez. Richard E. Woods, 3 rd edition, Pearson, 2008

2. Digital Image Processing – S. Jayaraman, S. Esakkirajan, T. Veerakumar- TMH, 2010

REFERENCES:

1. Digital Image Processing using MATLAB – Rafael C. Gonalez, Richard E. Woods and Steven L. Eddings, 2nd Edition, TMH, 2010.

2. Fundamentals of Digital Image Processing – A.K. Jain PHI, 2015

3. Digital Image Processing and Computer vision – Somka, Hlavac, Boyle- Cengage learning(Indian edition) 2008.

4. Introductory Computer vision Imaging Techniques and Solutions – Adrian low, 2008, 2nd Edition.

5. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC Press. 2010

Course Outcomes:

After completing the course, students should be able to

- Describe the fundamental knowledge in digital image processing
- Analyze the images in frequency domain and time domain
- Evaluate the existing techniques in image denoising
- Perform various morphological operations like opening and closing
- Categorize different compression techniques

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	3	**0/0/-**	**3**

SATELLITE COMMUNICATION

Prerequisite: Analog & Digital Communication

Course objectives:

- To analysethe Satellite parameters and derive the equations of orbit studying the procedures of launching.
- To study about space segment and components and link design procedures.
- To study about Earth Segment and Test equipment measurements.
- To evaluate various analog and digital modulations, multiplexing and multiple access techniques and design communication link budget accordingly.
- To study of Satellite applications & specialized services

UNIT-I- Introduction: Origin Of Satellite Communications, Historical Back-Ground, Basic Concepts of Satellite Communications, Frequency Allocations For Satellite Services, Applications, Future trends of Satellite Communications.

Orbital Mechanics and Launchers: Orbital Mechanics, Look angle determination, Orbital Perturbations, Orbit determination. Launches and Launch Vehicles, Orbital effects in Communication Systems Performance.

UNIT-II -Satellite Subsystems: Attitude and Orbit Control System, Telemetry, Tracking, Command and Monitoring, Power Systems, Communication Subsystems, Satellite Antennas, Equipment Reliability and Space Qualification.

Satellite Link Design: Basic Transmission Theory, System Noise Temperature and G/T ratio , Design Of Down Links, Up Link Design, Design Of Satellite Links For Specified C/N, System Design Examples

UNIT-III -Multiple Access: Frequency Division Multiple Access (FDMA), Intermodulation, Calculation of C/N Time Division Multiple Access (TDMA), Frame Structure, Examples. Satellite Switched TDMA Onboard Processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.

Earth Station Technology: Introduction, Transmitters, Receivers, Antennas, Tracking Systems.Terrestrial Interface, Primary Power Test Methods.

UNIT-IV- Low Earth Orbit and Geo-Stationary Satellite Systems: Orbit Considerations, Coverage And Frequency Consideration, Delay And Throughput Considerations, System Consideration Operational NGSO Constellation Designs.

UNIT-V- Satellite Navigation & Global Positioning System: Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes, GPS Receiver Operation, GPS C/A Code Accuracy, Differential GPS, VSAT, Mobile satellite services: GSM, Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Specialized services – Video conferencing, Internet.

TEXT BOOKS :

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.

2. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 2001.

REFERENCES :

1. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed,2006.
2. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
3. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

Course outcomes:

After completing the course, students should be able to

- Learn about orbital mechanics and launch methodologies
- Describe and Design satellite subsystems & link power budget for satellites
- Learn Explain various satellite access techniques
- Analyze the propagation effects on LEO and GEO on communication satellites
- Demonstrate the impacts of GPS, Navigation, DTH, etc,.

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ANALOG VLSI DESIGN

Course Objectives:

- To learn MOS Devices and its modeling
- To design various CMOS current mirrors
- To design various CMOS amplifiers
- To design various CMOS Operational amplifiers and measurement techniques
- To design CMOS comparators and oscillators

Unit - I

MOS Devices and Modeling: The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

Unit - II

Analog CMOS Sub-Circuits: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

Unit - III

CMOS Amplifiers: Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

Unit - IV

CMOS Operational Amplifiers: Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

Unit - V

Comparators: Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators,Oscillators.

Text Books

1. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition, 2010.
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
3. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition,2002.

Reference Books

1. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn, 2013.
2. Baker, Li and Boyce, “CMOS: Circuit Design, Layout and Simulation”, PHI.1964.

Course Outcomes

After completing the course, students should be able to

- Explain the MOS Device behavior and its modeling
- Design various CMOS current mirrors
- Design and analyze various CMOS amplifiers
- Analyze various CMOS Operational amplifiers and measurement techniques
- Design CMOS comparators and oscillators

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3	0/0/-	3

OPTICAL COMMUNICATION

Course Objectives:

- To realize the significance of optical fibre communications.
- To understand the construction and characteristics of optical fibre cable.
- To develop the knowledge of optical signal sources and power launching.
- To identify and understand the operation of various optical detectors.
- To understand the design of optical systems and WDM

UNIT-I- Overview of Optical fiber communication: Historical development, the general system, advantages of optical fiber communications, Optical fiber wave guides – Introduction, Ray Theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical Fibers – Modes, Vnumber, Mode Coupling, Step Index fibers, Graded Index fibers. Single Modes fibers – Cut Off wavelength, Mode Field Diameter, Effective Refractive Index. Fiber Materials – Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers – Attenuation, Absorption, Scattering and Bending Losses, Core and Cladding Losses.

UNIT-II- Information: capacity determination, Group delay, Types of Dispersion – Material dispersion, Wave – guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening. Optical fiber Connectors – Connector types, Single mode fiber connectors, Connector return loss. Fiber Splicing – Splicing techniques, Splicing single mode fibers. Fiber alignment and joint loss – Multimedia fiber joints, single mode fiber joints,.

UNIT-III- Optical Sources : LED's, Structures, Materials, Quantum efficiency, Power Modulation, Power bandwidth product. Injection Laser Diodes – Modes, Threshold conditions, External quantum efficiency, laser Diode rate equations, Resonant frequencies. Reliability of LED & ILD.Source to fiber power launching – Output patterns, Power Coupling, power launching, Equilibrium Numerical Aperture, Laser Diode to fiber coupling.Transmission distance, Line coding in Optical Links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye Pattern.

UNIT-IV- Optical detectors: Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors. optical Amplification and demodulation: Semiconductor optical amplifier, Erbium Doped fiber Amplifier(EDFAs),Raman optical amplifier, LED Analog and Digital modulation, LASER Diode modulation. Optical receiver operation – Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

UNIT-V- Optical system design: Considerations, Component Choice, Multiplexing. Point – to – point links, System Considerations, Link power budget with examples. Overall fiber dispersion in Multi Mode and Single Mode Fibers, Rise time budget with examples.

TEXT BOOKS:

1. Optical Fiber Communications – Gred Keiser, McGraw Hill International edition, 3 rd edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd edition, 2002.

REFERENCES:

1. Fiber Optic Communications – D. K. Mynbaev, S. C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fiber Communication and Its Applications – S. C. Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P Agarwal, John Wiley, 3rd edition, 2004.
4. Fiber Optic Communication Systems – Joseph C. Palais, 4th edition, Pearson Education, 2004.

Course Outcomes:

After completing the course, students should be able to

- Explain and analyze the constructional parameters of optical fibers.
- Design an optical system.
- Estimate the losses due to attenuation, absorption, scattering and bending
- Compare various optical detectors and choose suitable one for different applications
- Explain and analyze analogue and digital links. Describe the various criteria viz. power loss wavelength to be considered for point to point link in digital link system

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CELLULAR & MOBILE COMMUNICATION

Prerequisite: Analog and Digital Communication

Course Objectives:

- To understanding of the cellular concept, frequency reuse and handoff strategies.
- To analyze and understand wireless and mobile cellular communication systems over a stochastic fading channel.
- To understanding of co-channel and non-co-channel interferences.
- To understanding of cell coverage for signals and traffic, diversity techniques and mobile antennas.
- To understanding of frequency management, channel assignment and types of handoff.

UNIT- I- Introduction to Cellular Mobile Radio Systems: Limitations of Conventional Mobile Telephone Systems, Introduction to cellular mobile system, Generations of cellular wireless systems, Performance criteria. Uniqueness of mobile radio environment – Long term fading, Short term fading & Factors influencing short term fading, Parameters of mobile multipath fading – Time dispersion parameters, coherence bandwidth, Doppler Spread and coherence time, Types of Small scale fading.

UNIT- II-Elements of Cellular Radio System Design: Operation of cellular systems, Concept of frequency reuse, Co-channel Interference, Reduction Factor, Desired C/I from a normal case in a omnidirectional Antenna system, System Capacity, Trunking & Grade of Service, Improving Coverage & Capacity in cellular systems - Cell splitting, Sectoring, Microcell Zone Concept.
Interference Co-Channel Interference: Diversity Techniques – Space diversty, Polarization diversity, Frequency diversity, Time diversity .

UNIT- III- Non-cochannel interference: Adjacent channel interference, Near end Far end interference, Cross-talk, Effects of Coverage & Interference by applying Power Decrease, Antenna Height Decrease.
Cell Coverage For Signal And Traffic: Signal reflections in flat and hilly terrain, Effect of human made structures, Phase difference between direct and reflected paths, Constant standard deviation, Straight line path loss slope.

UNIT- IV- Frequency Management And Channel Assignment: General formula for mobile propagation over water and flat open area, Near and Long distance propagation, Path Loss a point to point prediction model in different conditions, Merits of Lee Model.
Numbering and grouping, Setup access and Paging channels, Channel assignments to cell sites and mobile units, Channel sharing and Borrowing, Sectorization, Overlaid cells, Non fixed channel assignment.

UNIT –V- Handoffs & Dropped Calls: Handoff Initiation, Advantages of handoff, Types of handoff, delayed handoff, forced handoff, Power difference Handoff, mobile assisted handoff, Intersystem handoff, Introduction to dropped call rates and their evaluation.

Text Books:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.
2. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

REFERENCES :

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2001
2. Modern Wireless communications- Simon Haykin, Michael Moher, Pearson Education, 2005.
3. Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007.
4. Wireless Communications – Andrea Goldsmith, Cambridge University Press, 2005.

Course outcomes:

After completing the course, students should be able to

- Explain the impairments due to multipath fading channel.
- Apply the fundamental techniques to overcome the different fading effects.
- Describe the co-channel and Non-co-channel interferences.
- Familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.
- Learn of frequency management, channel assignment and types of handoff

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IV-Year B.Tech-ECE-I-Semester

L	T/P/D	C
3	0/0/-	3

MIXED SIGNAL DESIGN

Course Objectives:

- To understand the Switched capacitors Circuits and Operation and Analysis, PLLS.
- To study Data Converter Fundamentals, Nyquist Rate A/D Converters.
- To study and analyze the Oversampling Converters and Continuous-Time Filters.
- To learn the concepts of Continuous-Time Filters, CMOS Transconductors using Triode and Active Transistors and MOSFET-C Filters.

UNIT-I: Switched Capacitor Circuits: Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, biquad filters.
UNIT-II: Phased Lock Loop (PLL): Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non- idealities, Jitter in PLLs, Delay locked loops, applications.
UNIT-III: Data Converter Fundamentals: DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters
UNIT-IV: Nyquist Rate A/D Converters: Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.
UNIT-V: Oversampling Converters: Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multi-bit quantizers, Delta sigma D/A.

Text Books

1. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition, 2002
2. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013

Reference Books

1. CMOS Mixed-Signal Circuit Design – R. Jacob Baker, Wiley Interscience, 2009.
2. CMOS Analog Circuit Design –Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

Course Outcomes:

After completing the course, students should be able to

- Explain the concepts of Switched Capacitor circuits.
- Describe the fundamentals of Data converter circuits.
- Design and analysis of Nyquist Rate A/D Converters.
- Extend the Mixed Signal Design to Different Applications.
- Concepts of Oversampling Converters and Continuous-Time Filters

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IV-Year B.Tech-ECE-I-Semester

L	T/P/D	C
3	0/0/-	3

Physical System Design

Course Objectives:

- To learn about layout and design rules
- To learn about various fabrication steps and related issues
- To learn how circuits are hierarchically interconnected and about NP-hardness
- To learn about partitioning, and standard partition algorithms
- To learn about Floor planning and pin assignment

UNIT - I

VLSI Physical Design Automation: VLSI Design Cycle, Physical Design Cycle, Design Styles, System Packaging Styles, Historical Perspectives, Existing Design Tools

Design and Fabrication of VLSI Devices: Fabrication Materials, Transistor Fundamentals, Fabrication of VLSI Circuits, Design Rules,Layout of Basic Devices

UNIT –II

Fabrication Process and its Impact on Physical Design: Scaling Methods, Status of Fabrication Process, Issues Related to the Fabrication Process, Future of Fabrication Process, Solutions for Interconnect Issues, Tools for Process Development.

UNIT - III

Data Structure and Basic Algorithms: Basic Terminology, Complexity Issues and NP-hardness, Basic Algorithms, Basic Data Structures, Graph Algorithm for Physical Design

UNIT - IV

Partitioning: Problem Formulation, Classification of Partitioning Algorithms, Group Migration Algorithm, Simulated Annealing and Evolution, Other Partitioning Algorithms, Performance Driven Partitioning

UNIT – V

Floor Planning and Pin assignment: Floor Planning, Chip Planning, Pin Assignment, Integrated approach.

Placement: Problem Formulation, Classification of Placement Algorithms, Simulation Based Placement Algorithms, Partitioning Based Placement Algorithms.

Text Books:

Naved A. Sherwani, Algorithms for VLSI Physical Design Automation, 3rd Edn., Springer (India) Pvt. Ltd., 2005.

Reference Books:

Gerez, Algorithms for VLSI Design Automation, Wiley India Pvt. Ltd., New Delhi.2006.

Course Outcomes:

After completing the course, students should be able to

- Explain the concepts of layout and design rules
- Apply various fabrication steps and related issues
- Analyze circuits which is hierarchically interconnected and learn about NP-hardness
- Design partitioning, and standard partition algorithms
- Make Floor planning and pin assignment

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ADHOC WIRELESS SENSOR NETWORKS

Course Objectives:

- To understand the design issues in ad hoc and sensor networks.
- To learn the different types of MAC protocols.
- To familiarize with different types of adhoc routing protocols.
- To expose to the TCP issues in adhoc networks.
- To learn the architecture and protocols of wireless sensor networks.

UNIT- I INTRODUCTION Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) :concepts and architectures. Applications of AdHoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS: Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS: Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS: Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies - MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT V WSN ROUTING, LOCALIZATION & QOS: Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

TEXTBOOK:

1. C. Siva Ram Murthy, and B. S. Manoj, “Ad Hoc Wireless Networks: Architectures and Protocols “, Prentice Hall Professional Technical Reference, 2008.

REFERENCES:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication – 2002.
3. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005
4. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007.
5. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

Course Outcomes:

After completing the course, students should be able to

- Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks
- Analyze the protocol design issues of ad hoc and sensor networks
- Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
- Explain the Hardware and software components of a sensor networks
- Evaluate the QoS related performance measurements of ad hoc and sensor networks

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	3	**0/0/-**	**3**

BIO-MEDICAL SIGNAL PROCESSING AND TELE MEDICINE

Course Objectives:

- To understand the fundamentals of biomedical signals
- To impart knowledge about the biomedical data compression
- To apply adaptive filtering techniques for cardiological signal processing
- To provide a deep knowledge about the neurological signal processing and analysis
- To make student understand tele medical technology

UNIT – I: Introduction to BiomedicalSignals and Electrocardiography: The nature of Biomedical Signals, Examples of Biomedical Signals, Objectives and difficulties in Biomedical analysis.Basic electrocardiography, ECG lead systems, ECG signal characteristics

UNIT – II: Data Compression Techniques: Lossy and Lossless data reduction Algorithms. ECG data compression using Turning point, DCT and the K L transform. Cardiological Signal Processing: Pre-processing. QRS Detection Methods.Rhythm analysis.Arrhythmia detection Algorithms.Automated ECG Analysis. ECG Pattern Recognition.Heart rate variability analysis.

UNIT – III: Adaptive Noise Cancelling: Principles of Adaptive Noise Cancelling. Adaptive Noise Cancelling with the LMS adaptation Algorithm. Noise Cancelling Method to Enhance ECG Monitoring.Fetal ECG Monitoring.

UNIT – IV: Neurological Signal Processing: Modellingof EEG Signals. Detection of spikes and spindles Detection of Alpha, Beta, and Gamma Waves. Auto Regressive (A.R.) modellingof seizure EEG. Sleep Stage analysis. Inverse Filtering.Least squares and polynomial modeling. Original Prony's Method.Prony's Method based on the Least Squares Estimate.Analysis of Evoked Potentials and PCG.

UNIT -V :Telemedicine and Health: History and Evolution of telemedicine, Functional diagram of telemedicine system, Telemedicine, Tele health, Tele care, Organs of telemedicine, Global and Indian scenario, Ethical and legal aspects of Telemedicine - Confidentiality, Social and legal issues, Safety and regulatory issues, Advances in Telemedicine.

TEXT BOOKS:

1. Rangaraj M. Rangayyan – Biomedical Signal Analysis. IEEE Press, 2001.
2. D. C. Reddy, Biomedical Signal Processing- principles, and techniques, Tata McGraw-Hill, 2005.
3. Biomedical Digital Signal Processing, Willis J. Tompkins, PHI,

REFERENCE BOOKS:

1. Weitkunat R, Digital Bio signal Processing, Elsevier, 1991.
2. Akay M , Biomedical Signal Processing, Academic: Press 1994
3. Cohen.A, Biomedical Signal Processing -Vol. I Time & Frequency Analysis, CRC Press, 1986.
4. Norris, A.C. Essentials of Telemedicine and Telecare. Wiley (ISBN 0-471-53151-0), 2002
5. Wootton R. Craig, J., Patterson, V. (Eds.), Introduction to Telemedicine. Royal Society of Medicine Press Ltd (ISBN 1853156779), 2006

Course Outcomes:

After completing the course, students should be able to

- Describe the nature of biomedical signals and patterns
- Apply data compression techniques for biomedical signals
- Apply adaptive noise canceling for ECG signals
- Evaluate signal processing techniques for EEG signals
- Explain the importance of telemedicine principles and its applications

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IV-Year B.Tech-ECE-I-Semester	**L**	**T/P/D**	**C**
	3	**0/0/-**	**3**

ARTIFICIAL INTELLIGENCE

Course Objectives:

- To study Neural Network for an application of your choice using an available tool
- To analyse different algorithms for an application of your choice
- To apply typical clustering algorithms
- To design and implement Neural net and genetic learning type of application
- To identify applications suitable for different types of machine learning with suitable Justification

Unit 1:

Introduction to AI Definitions, Goals of AI, AI Approaches, AI Techniques, Branches of AI, Applications of AI. Problem Solving, Search and Control Strategies : General problem solving, Search and control strategies, Exhaustive searches, Heuristic search techniques, Constraint satisfaction problems (CSPs) and models

Unit 2:

Knowledge Representations Issues, Predicate Logic, Rules: Knowledge representation, KR using predicate logic, KR using rules. Reasoning System - Symbolic, Statistical: Reasoning - Over view, Symbolic reasoning, and Statistical reasoning. Game Playing: Overview, Mini-Max search procedure, Game playing with Mini-Max, Alpha-Beta pruning.

Unit 3:

Learning Systems: Rote learning, Learning from example: Induction, Explanation Based Learning (EBL), Discovery, Clustering, Analogy, Neural net and genetic learning, Reinforcement learning. Expert Systems: Knowledge acquisition, Knowledge base, Working memory, Inference engine, Expert system shells, Explanation, Application of expert systems.

Unit 4:

Fundamentals of Neural Networks : Research history, Model of artificial neuron, Neural networks architectures, Learning methods in neural networks, Single-layer neural network system, Applications of neural networks. Fundamentals of Genetic Algorithms: Search optimization algorithm, Evolutionary algorithm, Encoding, Operators of genetic algorithm, Basic genetic algorithm.

Unit 5 :

Natural Language Processing: Introduction, Syntactic processing, Semantic and Pragmatic analysis. Common Sense: Introduction, Formalization of common sense reasoning, Physical world, Common sense ontologism, Memory organization

TEXT BOOKS:

1."Neural Network, Fuzzy Logic, and Genetic Algorithms - Synthesis and Applications", by S. Rajasekaran and G.A. Vijayalaksmi Pai, (2005), Prentice Hall,

2. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig, (2002), Prentice Hall.

REFERENCE BOOKS:

1. "Computational Intelligence: A Logical Approach", by David Poole, Alan Mackworth, and Randy Goebel, (1998), Oxford University Press,

2. "Artificial Intelligence: Structures and Strategies for Complex Problem Solving", by George F. Luger, (2002), Addison-Wesley,

3. "AI: A New Synthesis", by Nils J. Nilsson, (1998), Morgan Kaufmann Inc

4. "Artificial Intelligence: Theory and Practice", by Thomas Dean, (1994), Addison-Wesley,

Course Outcomes:

After completing the course, students should be able to

- To implement a Neural Network for an application of your choice using an available tool
- To implement different algorithms for an application of your choice and analyze the results
- To implement typical clustering algorithms for different types of applications
- To design and implement Neural net and genetic learning type of application
- To identify applications suitable for different types of machine learning with suitable Justification

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	3	**0/0/-**	**3**

IOT & CLOUD COMPUTING

(OPEN ELECTIVE-I)

Prerequisite: Database management system and computer networks.

Course Objectives:

- To learn about the evolution of Cloud computing that enables provisioning of computing resources and applications of cloud computing.
- To understand Virtualization technology and its application in creating Virtual computing, storing and networking resources.
- Learn about the types of services available in Cloud computing and the management of these services
- To understand the basic concept of how internet is used for interconnecting Things(devices)' , besides computers across the globe.
- To learn the different levels and means of connecting Things to net and cloud for differ rentapplications.
- To learn about the innumerable domain specific IOT systems which are revolutionizing every aspect of human endeavour.

UNIT-I .Introduction to cloud computing: Evolution of cloud concepts and technologies: Parallel and Distributed Computing, grid computing, pay as you services, Data centers ,**Cloud Computing features:** NIST Model,Properties of Cloud, Characteristics, types of cloud models, types of services offered on cloud, advantages and disadvantages of Cloud computing.**Cloud computing Applications**: in Industry, Health, Education, Scientific Applications, Business and Consumer Applications

Unit 2:Cloud Computing Architecture:Cloud computing stack, virtualization and Virtual machines,**Service Models:** Infrastructure as a Service(IaaS),Platform as a Service(PaaS),Software as a Service(SaaS).**Deployment Models** : public, private, community and hybrid Cloud**.Popular Cloud service providers and services provided by them:** Amazon Web Services, Microsoft Azure, Google, IBM.

Unit3: 3.Service Management in Cloud Computing: Service Level Agreements(SLAs),Cloud Economics, Resource Management in Cloud Computing. **Data Management in Cloud Computing**: introduction to Big Data, Scalability large scale Data Storage and data processing in Cloud. Introduction to Hadoop & MapReduce

Unit 4:Introduction to Internet of Things (IoT): Internet, Cloud and Definition and characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels and Deployment Templates.

Unit 5: Domain Specific IoTs : Home Automation, smart cities, Environment monitoring, Energy management, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.**M2M:**Introduction to M2M, Difference between IoT and M2M. Introduction to python.

Text Books:

1. Cloud Computing : Raj Kumar Buyya , James Broberg, andrzej Goscinski, 2013 Wiley
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.
3. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014, University Press.
4. Cloud computing: Dr Kumar Saurab Wiley India 2011.
5. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547 References: 1. Code in the Cloud: Mark C.Chu-Carroll 2011, SPD.(Second part of IV UNIT) 2. Essentials of cloud computing: K Chandrasekharan CRC Press. 3. Cloud Computing: John W. Rittinghouse, James Ransome, CRC Press.

References:

1.Code in the Cloud: Mark C.Chu-Carroll 2011, SPD.(Second part of IV UNIT)
2. Essentials of cloud computing: K Chandrasekharan CRC Press,2014.
3. Cloud Computing: John W. Rittinghouse, James Ransome, CRC Press,2010.

Course Outcomes:
After completing the course, students should be able to

- Compare and contrast different cloud architecture
- Describe& Implement Virtualization Identify and design the new models for market strategic interaction
- Analyze various protocols for IoT
- Design a middleware for IoT
- Analyze and design different models for network dynamics

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	3	**0/0/-**	**3**

MACHINE LEARNING

Prerequisites: Data Structures, Probability and statistics.

Course Objectives:

- To understand the need for machine learning for various problem solving
- To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning
- To understand the latest trends in machine learning
- To design appropriate machine learning algorithms for problem solving

UNIT I :
INTRODUCTION
Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II :
NEURAL NETWORKS AND GENETIC ALGORITHMS

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III :
BAYESIAN AND COMPUTATIONAL LEARNING

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV :
INSTANT BASED LEARNING
K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

UNIT V :
ADVANCED LEARNING
Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

TEXT BOOK:

1. Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCES:

1. EthemAlpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.

Course Outcomes:

After completing the course, students should be able to

- Differentiate between supervised, unsupervised, semi-supervised machine learning approaches
- Discuss the decision tree algorithm and identity and overcome the problem of overfitting
- Apply the back propagation algorithm and genetic algorithms to various problems
- Usage of Bayesian concepts to machine learning
- Analyse the appropriate machine learning approaches for various real time problems

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	0	**0/3/-**	**1.5**

MICROWAVE & ADVANCED COMMUNICATION LAB

Course objectives:

- To establish in micro wave bench and understand, analyze the functionality of different microwave components and devices
- To understand and analyze the functionality of different optical components and devices
- To operate and characterized the behavior of micro wave and optical sources
- To measure and evaluate different micro wave parameters and quantities
- To measure and evaluate different optical parameters and antennas.

Note: Minimum of 12 Experiments to be conducted

PART –A: **MICROWAVE ENGINEERING (Any 8 Experiments):**

1. Reflex Klystron Characteristics
2. Gunn Diode Characteristics
3. Directional Coupler Characteristics
4. VSWR Measurement
5. Measurement of Waveguide Parameters
6. Measurement of Impedance of a given load
7. Measurement of Scattering parameters of a Magic Tee
8. Measurement of Scattering parameters of a Circulator
9. Attenuation Measurement
10. Microwave Frequency Measurements.

PART-B:**OPTICAL COMMUNICATION AND ANTENNAS LAB (Any 4 Experiments):**

1. DC Characteristics of light sources LED and LASER diodes.
2. Measearment of losses and numerical Aperture for fiber optic cable.
3. Analog and Digital communication link using optical fiber.
4. Intensity Modulation of Light Sources through an Optical Fiber.
5. Measurement of Directivity and Gain of Different Antennas.
6. Radiation Pattern of Horn Antenna.

REQUIREMENTS:

1. Klystron power supplies
2. Gun Power supplies
3. Reflex Klystron benches
4. Gunndiode benches
5. Optical trainer kits
6. CROs
7. Function Generators
8. Multimeters

Course outcomes:

After completing the course, students should be able to

- Establish and evaluate microwave test bench, micro wave components and devices
- Describe and evaluate different optical components and devices
- Operate and analyze the characteristics of micro wave and optical sources
- Measure and evaluate different micro wave parameters and quantities
- Measure and evaluate different optical parameters and antennas

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	0	**0/3/-**	**1.5**

VLSI DESIGN LAB

Course Objectives:

To design combinational circuits using HDL
To design sequential circuits using HDL
To design and analyse combinational circuits using Cadence/mentor graphics
To design and analyse sequential circuits using Cadence/mentor graphics

List of Experiments:

Note: All experiments from each cycle are to be conducted.

E-CAD programs:
Programming can be done using any complier. Down load the programs on FPGA/CPLD boards and performance testing may be done by simulation using XILINX or equivalent front end tools.

Cycle -1

1. HDL code to realize all the logic gates
2. Design of full adder using 3 modeling styles
3. Design of flip flops: SR, D.
4. Design of 4 bit binary counter

Cycle -2

VLSI Experiments:

Experiments can be done using CADENCE or Equivalent CAD tools

Draw the schematic, Layout and perform physical verification, of the following.

1. CMOS inverter
2. CMOS NAND NOR, gates
3. CMOS AND, OR, gates
4. CMOS XOR and MUX gates
5. CMOS 1-bit Full Adder
6. CMOS SR and D Flip Flops
7. Pass Transistor
8. Design of 4 bit binary counter

Requirements:

1. PC: P-IV
2. Operating system: Windows XP or Higher version
3. Software: XILINX, Cadence/Mentor Graphics
4. Kits: FPGA Spartan 3 & ZED Boards.

Course Outcomes:

After completing the course, students should be able to

- Realize all logic gates
- Design combinational circuits
- Design Sequential circuits
- Explain Combinational Circuits Design using Cadence tool
- Analyze combinational, sequential circuits using CAD Tool.

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	0	**0/2/-**	**1**

ARTIFICIAL INTELLIGENCE LAB

Course Objectives:

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning. To be able to apply machine learning algorithms to solve problems of moderate complexity.
- To be able to read current research papers and understands the issues raised by current research.

List of Experiments

1. Implementation of Python for Data Analysis-NumPy
2. Implementation of Python for Data Analysis-Pandas
3. Implementation of Python for Data Visualization-Seaborn
4. Implementation of Python for Data Visualization-Plotly and Cufflinks
5. Implementing Simple & Multiple Linear Regression with Python
6. Implementing Logistic Regression with Python
7. Implementing Decision Trees using Python
8. Implementing Random Forests using Python
9. Implementation of Real Estate Price Predictionusing Linear Regression
10. Identifying Good and Bad Customers for Granting Credit Using Decision Trees

Course Outcomes:

After completing the course, students should be able to

- To implement a Neural Network for an application of your choice using an available tool
- To implement different algorithms for an application of your choice and analyze the results
- To implement typical clustering algorithms for different types of applications
- To design and implement Neural net and genetic learning type of application
- To identify applications suitable for different types of machine learning with suitable Justification

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L	T/P/D	C
0	0/2/-	1

IOT & Cloud Computing LAB

Course Objectives:

- To learn about the evolution of Cloud computing that enables provisioning of computing resources and applications of cloud computing.
- To understand Virtualization technology and its application in creating Virtual computing, storing and networking resources.
- Learn about the types of services available in Cloud computing and the management of these services
- To understand the basic concept of how internet is used for interconnecting Things(devices)' , besides computers across the globe.
- To learn the different levels and means of connecting Things to net and cloud for different applications.
- To learn about the innumerable domain specific IOT systems which are revolutionizing every aspect of human endeavour.

List of Experiments:

1. Get input from two switches and switch on corresponding LEDs
2. Flash an LED at a given on time and off time cycle, where the two times are taken from a file.
3. Flash an LED based on cron output (acts as an alarm)
4. Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.
5. Access an image through a Pi web cam.
6. Control a light source using web page.
7. Implement an intruder system that sends an alert to the given email.
8. Get the status of a bulb at a remote place (on the LAN) through web.
9. Get an alarm from a remote area (through LAN) if smoke is detected.
10. Find procedure to install storage controller and interact with it.
11. Find procedure to set up the one node Hadoop cluster.
12. Mount the one node Hadoop cluster using FUSE.
13. Write a program to use the API's of Hadoop to interact with it.
14. Write a wordcount program to demonstrate the use of Map and Reduce tasks.

Requirements:

1. Computer Systems with OS
2. Arduino/Raspberri Pi Kits
3. External Peripherals: Assorted

Course Outcomes:

After completing the course, students should be able to

- Compare and contrast different cloud architecture
- Learn & Implement Virtualization Identify and design the new models for market strategic interaction
- Analyze various protocols for IoT
  - Design a middleware for IoT
  - Analyze and design different models for network dynamics

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IV-Year B.Tech-ECE-I-Semester	**L**	**T/P/D**	**C**
	0	**0/2/-**	**1**

MACHINE LEARNING LAB

Course Objectives:

- To understand the concepts of machine learning
- To understand supervised and unsupervised learning and their applications
- To understand the theoretical and practical aspects of Probabilistic Graphical Models
- To appreciate the concepts and algorithms of reinforcement learning
- To learn aspects of computational learning theory

List of Experiments

1. Implementation of Python for Data Analysis-NumPy
2. Implementation of Python for Data Analysis-Pandas
3. Implementation of Python for Data Visualization-Seaborn
4. Implementation of Python for Data Visualization-Plotly and Cufflinks
5. Implementing Simple & Multiple Linear Regression with Python
6. Implementing Logistic Regression with Python
7. Implementing Decision Trees using Python
8. Implementing Random Forests using Python
9. Implementation of Real Estate Price Predictionusing Linear Regression
10. Identifying Good and Bad Customers for Granting Credit Using Decision Trees

Course Outcomes:

After completing the course, students should be able to

- To implement a Neural Network for an application of your choice using an available tool
- To implement probabilistic discriminative and generative algorithms for an application of your choice and analyze the results
- To use a tool to implement typical clustering algorithms for different types of applications
- To design and implement an HMM for a sequence model type of application
- To identify applications suitable for different types of machine learning with suitable Justification

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IV-Year B.Tech-ECE-II-Semester

L	T/P/D	C
3	0/0/-	3

DEEP LEARNING

Prerequisites: Machine Learning

Course Objectives:

- To understand the overview of machine learning
- To know the basic techniques of optimization methods.
- To understand different stages of convolutional layers.
- To familiarize with the ideas of. auto encoders
- To understand the deep learning concepts in computer vision

UNIT 1 Introduction

Overview of machine learning, types of learning, linear classifiers, loss functions , back-propagation ,clustering algorithms

UNIT II OPTIMIZATION METHODS

Gradient descent, stochastic, conjugate gradient,SGD,momentum method,Adaptive first order methods,batch normalization,polyak averaging

UNIT IIICONVOLUTIONAL NETWORKS

Activation functions, initialization, regularization, batch normalization, model selection, ensembles. Convolutional neural networks Fundamentals, architectures, pooling, visualization deep learning for spatial localization transposed convolution, efficient pooling, object detection, semantic segmentation.

UNIT IVAUTO ENCODERS

Basics of auto encoder, comparison between auto encoder and PCA.variational auto encoders, denoising auto encoder, sparse auto encoder,vanilla auto encoder**.**multilayer autoencoder.convolutional autoencoder. regularized auto encoder

UNIT V APPLICATIONS OF DEEP LEARNING TO COMPUTER VISION

Image segmentation, object detection, automatic image captioning, Image generation with Generative adversarial networks, video to text with LSTM models. Attention models for computer vision tasks.

TEXT BOOKS

1. Goodfellow, Y. Bengio, A. Courville, Deep Learning, MIT Press, 2016. http://www. deeplearningbook.org.

2. K. P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012.

3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.

REFERENCE BOOKS

1) Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
2) Golub, G.,H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
3) Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

Course Outcomes:

After completing the course, students should be able to

- Describe the basic types of classifiers and loss functions.
- Analyze the various minimization algorithms
- Analyze the concept of convolutional networks
- Explain and analyze various issues related to auto encoder
- Examine the various application of deep learning

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ROBOTICS

PRE REQUISITES: Kinematics of Machinery, Dynamics of Machinery

Course Objectives:

- To knowledge in various robot structures and performing spatial transformations associated with rigid body motions.
- To develop skills in performing kinematics analysis of robot systems using forward and inverse kinematics.
- To develop skills in using Jacobians for analyzing velocities associated with different joints of manipulator.
- To provide some knowledge in robot dynamics and analysis skills associated with trajectory planning.
- To provide some knowledge and skills associated with robot actuation, sensing and control.

UNIT – I

Introduction: Automation and Robotics – An over view of Robotics – classification by coordinate system and control systems – Components of the industrial Robotics: Degrees of freedom – End effectors; Mechanical gripper – Magnetic – Vaccuum cup and other types of grippers – General consideration on gripper selection and design.

UNIT – II

Motion Analysis: Basic rotation matrices – Composite rotation matrices – Euler Angles – Equivalent Angle and Axis – Homogeneous transformation – Problems.

Manipulator Kinematics: D-H notations – joint coordinates and world coordinates – Forward and inverse kinematics – problems.

UNIT – III

Differential Kinematics: Differential kinematics of planar and spherical manipulators – Jacobians – Problems.

UNIT – IV

Robot Dynamics: Lagrange – Euler formulations – Newton - Euler formulations – Problems on planar two link manipulators.

Trajectory Planning: Joint space scheme – cubic polynomial fit – Avoidance of obstacles – Types of motion: Slew motion – joint interpolated motion – straight line motion – problems.

UNIT – V

Robot Actuators and Feed Back Components: Actuators; Pneumatic and Hydraulic actuators, Electric Actuators: DC servo motors – stepper motors.

Feed Back Components: position sensors – potentiometers, resolvers and encoders – velocity sensors – Tactile sensors- Robot Application in Manufacturing: Material handling – Assembly inspection.

TEXT BOOKS:

1. Industrial Robotics / Groover M.P / Pearson Edu.
2. Introduction to Robotic Mechanics and control by JJ Craig, Pearson, 3rd edition.
3. Robotics by AshitavaGhoshal,Oxford

REFERENCE BOOKS:

1. Robotics / Fu K.S / McGraw Hill.
2. Robotic Engineering / Richard D. Klafter, Prentice Hall
3. Robot Analysis and intelligence / Asada and Slotine / Wiley inter Science.
4. Robot Dynamics & Control – Mark W. Spong and M.Vidyasagar / John Wiley & sons (ASIA) Pte. Ltd..
5. Robotics and control / Mittal R.K &Nagrath I.J / TMH.

Course Outcomes:

After completing the course, students should be able to

- Decide how to select a Gripper and End Effectors & their Design
- Analyze Robot motion using Forward and Inverse kinematics of Robots, and D-H representation of Robot kinematics
- Solve differential kinematics problems using Jacobians.
- Analyze Robot dynamics and Forces using Lagrangian mechanics andunderstand the methods of path and trajectory planning.
- Identify Internal and External sensors, encoders, and different types of Robot Actuators and motors for different material handling applications.

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Renewable Energy Technology

Course Objectives:

- To learn about photovoltaic energy conversion & its basics.
- To understand solar panels such as flat plate collectors, dish collectors and converter systems.
- To learn Renewable energy sources, like Wind Energy & Bio-Mass.
- To understand about geothermal, ocean, tidal and wave energy & concepts of DEC.
- To learn about various converter topologies for Wind Power Generation.

Unit – I: Solar Radiation and Solar Energy Collection

Principles of Solar Radiation: Role and potential of new and renewable source, the solar energy option, photovoltaic energy conversion, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Unit – II:Solar photovoltaic

Technologies-Amorphous, monocrystalline, polycrystalline; V-I characteristics of a PV cell, PV module, array, Power Electronic Converters for Solar Systems, Maximum Power Point Tracking (MPPT) algorithms. Converter Control.

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Unit-III: Wind Energy and Bio-Mass

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, tip speed ratio stall & Pitch Control performance characteristics, Betz criteria.

Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking.

Unit-IV: Geothermal, Ocean, Tidal and Wave Energy

Geothermal Energy: Methods of harnessing the energy.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants.

Tidal and Wave energy: Potential and conversion techniques.

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, principles of DEC. Seebeck effect, MHD generators (Ideal and Practical).

Unit-V: Wind Generator Topologies

Review of modern wind turbine technologies, Fixed and Variable speed wind turbines, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent-Magnet Synchronous Generators, Power electronics converters. Generator-Converter configurations, Converter Control.

Text Books:

1. Non-Conventional Energy Sources – G.D. Rai, Khanna Publishing House, 2011.
2. Renewable Energy Technologies – Ramesh &Kumar , Narosa Publishing House.

Reference Books:

1. Non-Conventional Energy Systems – K Mittal, Wheeler Publishing Co.
2. Renewable energy resources- Tiwari and Ghosal, Narosa Publishing House, 2007.
3. Non-Conventional Energy – Ashok V Desai,Wiley Eastern Ltd, New Delhi, 2003.

Course Outcomes:

After completing the course, students should be able to

- Describe Renewable energy sources, generating systems, its performance characteristics and potential in India
- Explain about solar photovoltaic energy conversion systems.
- Analyze the Non conventional energy sources like Wind Energy & Bio Mass.
- Illustrate the types of energy generating systems, construction, principle, operation and applications.
- Demonstrate the different topologies of wind energy conversion system.

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BIG DATA

Course Objectives:

- To understand the performance management this interprets the meaning of big data in company databases using pre-determined queries and multidimensional analysis.
- To understand the Data exploration i.e. makes heavy use of statistics to experiment and get answers to questions those managers might not have thought of previously.
- To understand the social analytics measure the vast amount of non-transactional data that exists today.
- To understand the decision science which involves experiments and big data analysis

Unit I:
INTRODUCTION TO BIG DATA
Introduction to BigData ,Characteristics of Big Data, Traits of Big data,Challenges of Conventional Systems, Sources of Big Data, Evolution Of Analytic Scalability, Analytic Processes and Tools, Analysis vs Reporting, Modern Data Analytic Tools, Statistical Concepts: Sampling Distributions –Re-Sampling –Statistical Inference –Prediction Error.

Unit II:
BIG DATA IN ENTERPRISE
Problems with traditional large-scale systems, Big Data in enterprise, Comparison with other systems, Hadoop Frame work.

Unit III:
INTRODUCTION TO HADOOP
History of Hadoop, Data Storage and Analysis,Hadoop –Setup hadoop –Pseudo mode-Cluster mode-Ipv6-Installation of java, hadoop-Configurations of hadoop.

Unit IV:
HDFS The Hadoop Distributed File System-HDFS Design and Architecture-HDFS Concepts-Interacting HDFS using command line-Interacting HDFS using Java APIs-Dataflow-Blocks-Replica-Hadoop Processes-Name node-Secondary name node-Job tracker-Task tracker-Data node.

Unit V:
MAP REDUCE
How MapReduce Works-Anatomy of a Hadoop Cluster-Hadoop Ecosystem Components-Developing Map Reduce Application-Phases in Map Reduce Framework-Map Reduce Input and Output Formats-Introduction to Writing a MapReduce Program-The MapReduce Flow-Examining a Sample MapReduce Program-Basic MapReduce API Concepts-The Driver Code-The Mapper-The Reducer.

Introduction to Languages and Databases
HadoopProgramming languages: Pig, Hive
NOSQL Databases: Cassandra, Mongo, Cloudera, CouchDB, Hbase

Text Books:

1. Bill Franks, “Taming the Big data tidal wave”,SAS , Wiley, 2012.
2. Tom White “ Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2012.

Reference Books:

1. Michael Minelli, Michele Chambers, AmbigaDhiraj,JimStogdill, “BigDataBigAnalytics : Emerging Business Intelligence and Analytic Trends for Today's Businesses”, 1st Edition,Wiley Publications,2013
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012
3. PeteWarden, “Big Data Glossary”, O’Reilly, 2011.

Course Outcomes:
After completing the course, students should be able to

- Learn about sources of BigData and Analyzing Tools.
- Map statistical methods to analyze huge data.
- Find the other frameworks in Distributed File Systems.
- Create cluster in Hadoop distributed file system.
- Apply MapReduction in HDFS.

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PYTHON PROGRAMMING

Prerequisites: Any programming language

Course objectives:

- To understand the basics and function of Python Programming Language.
- To understand the string operation and sequences used in Python Programming Languages.
- To know the classes and objects in Python Programming Language.
- To use the reusability concepts in Python Programming Language.
- To use Exception Handling mechanism in Python Programming Language.

Unit – I

Introduction to Python:

Features of Python Language, Data Types, Operators, Expressions, Control Statement, Standard I/O Operations

Functions and Modules:

Declaration and Definition Function Calling, More on Defining Functions, Recursive Functions, Modules, Packages in Python, Doc Strings, Built-in Functions,

Unit – II

Strings and Regular Expressions:

String Operations, Built-in String Methods and Functions, Comparing Strings, function in Regular Expression.

Sequence:

List, Tuples, Dictionaries.

Unit – III

Implementation of classes and objects in Python:

Classes and Objects, Class Method and Self Argument. The __Init__Method, Class Variables and Object Variables, The _Del__Method, Public and Private Data Members, Private Methods, Buil-in Functions to Check, Get, Set and Delete Class Attributes, Garbage Collection(Destroying Objects).

Unit – IV

Implementation of Inheritance in Python:

Inheriting Classes in Python, Types of Inheritance, Composition/Containership, Abstract Classes and Interfaces, Meta class,

Implementation of Operator Overloading in Python:

Introduction, Implementing Operator Overloading, Overriding Methods

Unit – V

Exception Handling in Python:

Introduction, Handling Exception, Multiple Except Blocks and Multiple Exceptions, Finally Block.

Python Packages:

Introduction to Numpy, Pandas, Matplotlib, Tkinter

Text Books

1. "ReemaThareja", Python Programming using Problem Solving Approach, First Edition, Oxford Higher Eduction.

2 James Payne, Beginning Python using Python 2.6 and Python 3

Suggested / Reference Books

1 Kenneth A.Lambert, Fundamentals of Python

2 Charles Dierach, Introduction to Computer Science using Python

Course Outcomes:

After completing the course, students should be able to

- Identify the differences between scripts and programs
- Solve the problems based on decision control statements
- Develop programs on functions and data structures.
- Write the programs on string operations
- Use of python exceptions and packages

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MECHATRONICS

PREREQUISITE: Basic Electrical Engineering

Course objectives:

- To learn to simulate the model of physical systems.
- To study about the precision mechanical systems.
- To learn about the electronic interface sub systems and electromechanical drives.
- To understand micro controllers and programmable logic controllers.
- To learn about the various programmable motion controllers .

UNIT – I

INTRODUCTION: Definition – Trends – Control Methods; Stand alone, PC Based (Real Time Operating Systems, Graphical User interface, simulation) – Applications; SPM, Robot, CNC, FMS, CIM.

SIGNAL CONDITIONING: Introduction – Hardware – Digital I/O, Analog input – ADC, resolution, speed channels filtering noise using passive components – Resistors, capacitors – Amplifying signals using OP amps – Software – Digital Signals Processing – Low pass, high pass, notch filtering.

UNIT – II

PRECISION MECHANICAL SYSTEMS: Pneumatic Actuation Systems – Electro – pneumatic Actuation Systems – Timing Belts – Ball Screw and Nut – Linear Motion Guides – Linear Bearing – Harmonic Transmission – Bearings – Motor / Drive selection.

UNIT – III

ELECTRONIC INTERFACE SUB SYSTEMS: TTL, CMOS interfacing – Sensor interfacing – Actuator Interfacing – solenoids, motors isolation schemes – opto coupling, buffer IC's-Protection schemes – circuit breakers, over current sencing, reset able fuses, thermal dissipation – Power Supply – Bipolar transistors / mosfets

ELECTROMECHANICAL DRIVES: Relays and Solenoids – Stepper Motors – DC brushed motors – DC brushless motors – DC servo motors – 4 quadrant servo drives, PWM's – Pulse width Modulation – Variable Frequency Drives, Vector Drives – Drive system load calculation.

UNIT – IV

MICROCONTROLLERS OVERVIEW: 8051 Microcontroller, micro processor structure – Digital interfacing – Analog interfacing – Digital to analog convertors – Analog to Digital convertors – Applications, Programming – Assembly, C (LED Blinking, Voltage measurement using ADC)

PROGRAMMABLE LOGIC CONTROLLERS: Basic structure programming; Ladder diagram – Timers internal Relays and counters – Shift registers – Master and jump controls – Data handling – Analog input / output – PLC Selection – Application.

UNIT – V

PROGRAMMABLE MOTION CONTROLLERS: introduction – system transfer function – laplace transform and its application in analyzing differential equation of a control system – feedback devices; Position velocity sensors – optical incremental encoders – Proximity sensors; inductive, capacitive, infrared – continuous and discrete processes – control system performance & turning – digital controllers – P, PI, PID control – control modes – position, velocity and torque – velocity profiles – Trapezoidal – S.Curve – electronic gearing – controlled velocity profile – multi axis interpolation, PTP, Linear, Circular – Core functionalities – home, record position, Go to position – applications; SPM, Robotics.

TEXT BOOKS:

1. Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.

REFERENCES:

1. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton, Pearson Education Press, 3rd edition, 2005.
2. Mechatronics System Design / Devdas shetty/Richard/Thomson.

Course Outcomes:

After completing the course, students should be able to

- Develop a simulation model for simple physical systems and explain mechatronics design process.
- Understand the precision mechanical systems and their applications.
- Understand the electronic interface sub systems and elecromechanical drives.
- Describe the overview of micro controllers and programable logic controllers.
- Understand the different programmable motion controllers and their applications