R22 B.TECH ECE
III YEAR SYLLABUS

COURSE STRUCTURE

III – Year I Semester

S.No	Course Code	Course Title	L	T	P	C
1.	22EC3111	Microcontrollers	3	1	0	4
2.	22EC3112	Data Communications and Networks	3	0	0	3
3.	22EC3113	Control Systems	3	1	0	4
4.	22EC3114	Antenna and Wave Propagation	3	0	0	3
5		**Professional Elective-I**				
	22EC3171	Cellular & Mobile Communications	3	0	0	3
	22EC3172	Machine Learning and Computer Vision Applications				
	22EC3173	Electronic Measurements and Instrumentation				
6.	22EC3151	Microcontrollers Lab	0	0	2	1
7.	22EC3152	Digital System Design through Verilog Lab	0	0	2	1
8.	22EC3153	Data Communications and Networks Lab	0	0	2	1
9.	22MC0005	Intellectual Property Rights	3	0	0	0
Total			**18**	**2**	**6**	**20**

III – Year II Semester

S.No	Course Code	Course Title	L	T	P	C
1.	22MB3211	Business Economics and Financial Analysis	3	0	0	3
2.	22EC3211	Digital Signal Processing	3	0	0	3
3.	22EC3212	CMOS VLSI design	3	0	0	3
4.		**Professional Elective-II**				
	22EC3271	Computer Organization & Operating Systems	3	0	0	3
	22EC3272	Data Science and Data Analytics				
	22EC3273	Network Security and Cryptography				
5.		**Open Elective - I**	3	0	0	3
6.	22EC3251	Digital Signal Processing Lab	0	0	2	1
7	22EC3252	CMOS VLSI-design Lab	0	0	2	1
8	22HS3251	Advanced English Communication Skills lab	0	0	2	1
9	22EC3281	Industrial Oriented Mini Project	0	0	4	2
10	22MC0002	Environmental Science*	3	0	0	0
Total			**18**	**0**	**10**	**20**

***Note: Environmental Science in III year II sem should be registered by lateral entry students only**

22EC3111: MICROCONTROLLERS

B.Tech. III Year I Sem. **L T P C**

3 1 0 4

Course Objectives:

1. To familiarize the architecture of microprocessors and microcontrollers.
2. To develop assembly language programming of 8086 using various modes and instructions
3. To understand 8051 microcontrollers and its real time applications.
4. To provide the knowledge about interfacing techniques of bus & memory.
5. To understand the concepts of ARM processors and instruction set.

Course Outcomes: Upon completing this course, the student will be able

1. To understand the internal architecture, organization and assembly language programming of 8086 processors.
2. To apply the knowledge of instruction set and assembly language programming of 8086 processors.
3. To understand the internal architecture, organization and assembly language programming of 8051 microcontrollers.
4. To extend the knowledge of interfacing using 8051
5. To understand the internal architecture and functional description of ARM processor

UNIT -I:

8086 Architecture: 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

UNIT -II:

Instruction Set and Assembly Language Programming of 8086: Maximum mode and minimum mode, Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT –III:

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

UNIT –IV:

I/O And Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232, USB.

UNIT – V:

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions, Introduction to Cortex processor.

TEXT BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Rayand K. M. Bhurchandani, TMH, 2nd Edition 2006.
2. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012

REFERENCE BOOKS:

1. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed,2004.
2. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition2006.
3. The 8051 Microcontrollers, Architecture and Programming and Applications -K. Uma Rao, Andhe Pallavi, Pearson, 2009

22EC3112:DATA COMMUNICATIONS AND NETWORKS

B.Tech. III Year I semester **L T P C**

3 0 0 3

Pre-requisite: Digital Communications

Course Objectives:

1. To introduce the Fundamentals of data communication networks
2. To demonstrate the Functions of various protocols of Data link layer.
3. To demonstrate Functioning of various Routing protocols.
4. To introduce the Functions of various Transport layer protocols.
5. To understand the significance of application layer protocols

Course Outcomes: Upon completing this course, the student will be able to

1. Know the Categories and functions of various Data communication Networks
2. Design and analyze various error detection techniques.
3. Demonstrate the mechanism of routing the data in network layer
4. Know the significance of various Flow control and Congestion control Mechanisms
5. Know the Functioning of various Application layer Protocols.

UNIT - I:

Introduction to Data Communications: Components, Data Representation, Data Flow, Networks- Distributed Processing, Network Criteria, Physical Structures, Network Models, Categories of Networks Inter connection of Networks, The Internet-A Brief History, The Internet Today, Protocol and Standards -Protocols, Standards, Standards Organizations, Internet Standards. Network Models, Layered Tasks, OSI model, Layers in OSI model, TCP/IP Protocol Suite.

UNIT - II:

Data Link Layer: Links, Access Networks, and LANs- Introduction to the Link Layer, The Services Provided by the Link Layer, Types of errors, Redundancy, Detection vs Correction, Forward error correction Versus Retransmission Error-Detection and Correction Techniques, Parity Checks, Check summing Methods, Cyclic Redundancy Check (CRC) , Framing, Flow Control and Error Control protocols , Noisy less Channels and Noisy Channels, HDLC, Multiple Access Protocols, Random Access ,ALOHA, Controlled access, Channelization Protocols. Introduction to 802.11 architecture a-g, IEEE 802.11 Frame

UNIT - III:

The Network Layer: Introduction, Forwarding and Routing, Network Service Models, Virtual Circuitand Datagram Networks-Virtual-Circuit Networks, Datagram Networks, Origins of VC and DatagramNetworks, Inside a Router-Input Processing, Switching, Output Processing, Queuing, The Routing Protocol, The Internet Protocol(IP):Forwarding and Addressing in the Internet-Datagram format, Ipv4 Addressing, Internet Control Message Protocol(ICMP),IPv6

UNIT - IV:

Transport Layer: Introduction and Transport Layer Services : Relationship Between Transport and Network Layers, Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing, Connectionless Transport: UDP-UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer-Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N(GBN), Selective Repeat(SR), Connection Oriented Transport: TCP - The TCP Connection, TCP Segment Structure, Round Trip Time Estimation and Timeout, Reliable Data Transfer, Flow control, TCP Connection Management, Principles of Congestion Control-The Cause and the Costs of Congestion, Approaches to Congestion Control

UNIT - V:

Application Layer: Principles of Networking Applications – Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the File Transfer: FTP,- FTP Commands and Replies, Electronic Mail in the Internet- STMP, Comparison with HTTP, DNS-The Internet's Directory Service – Service Provided by DNS, Overview of How DNS Works, DNS Records and messages.

TEXTBOOKS:

1. Computer Networking A Top-Down Approach–Kurose James F,KeithW, 6th Edition, Pearson.
2. Data Communications and Networking Behrouz A. Forouzan 4 Edition McGraw-Hill Education

REFERENCES:

1. Data communication and Networks - Bhusan Trivedi, Oxford university press, 2016.
2. Computer Networks -- Andrew S Tanenbaum, 4th Edition, Pearson Education Understanding Communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning

22EC3113: CONTROL SYSTEMS

B.Tech. III Year I Sem.

L	T	P	C
3	1	0	4

Pre-requisites: Signals and Systems

Course objectives:

The main objectives of the course is to

1. Analyze closed-loop control systems for stability and steady-state performance
2. Learn the type of System, dynamics of physical systems, classification of control system, analysis and design objective.
3. Understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response and assess the system performance using time domain analysis.
4. Assess the system performance using frequency domain analysis and techniques for improving the performance
5. Design various controllers and compensators to improve system performance

Course Outcomes: At the end of this course, students will demonstrate the ability to

1. Identify open and closed loop control systems.
2. Formulate mathematical model for physical systems
3. Use standard test signals to identify performance characteristics of first and second-order systems.
4. Apply root locus technique for stability analysis.
5. Analyze performance characteristics of system using Frequency response methods

UNIT-I:

Introduction: Concepts of Control Systems- Open loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed- Back characteristics, Effects of feedback. Mathematical models – Differential equations - Impulse Response and transfer functions – Electrical systems. Block diagram algebra and system representations – Signal flow graphs - Mason's gain formula. Introduction of Servo motors.

UNIT-II:

Time Response Analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems

- Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems, PID system

UNIT-III:

Stability Analysis: The concept of stability - Routh stability criterion – qualitative stability and conditional stability. Root Locus Technique: The root locus concept - construction of root locus-Root locus analysis.

Frequency domain Analysis: Introduction, Frequency domain specifications-Bode diagrams- Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT-IV:

Stability Analysis In Frequency Domain: Polar Plots, Nyquist Plots and applications of Nyquistcriterion to find the stability - Effects of adding poles and zeros to G(s)H(s) on the shape of the Nyquist diagrams.

Compensation techniques – Lag, Lead, and Lead Lag Controllers design in frequency Domain.

UNIT-V:

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant stateEquations- State Transition Matrix and its Properties. Controllability and Observability.

TEXT BOOKS:

1. Control Systems Engineering, I. J. Nagrath and M. Gopal, 5th edition, New Age International (P) Limited, Publishers, 2009.
2. Automatic Control Systems, B. C. Kuo, 8th edition, John wiley and sons, 2003.

REFERENCE BOOKS:

1. Control Systems, N. K. Sinha, 3rd Edition,New Age International (P) Limited Publishers, 1998.
2. Problems and solutions of control systems with essential theory, A.K Jairath, 5th Edition, CBS Publishers & Distributors, 2015.

22EC3114: ANTENNAS AND WAVE PROPAGATION

B.Tech. III Year I Sem. **L T P C**

3 0 0 3

Course Objectives: The course objectives are:

1. To understand the concept of radiation, antenna definitions and significance of antenna parameters, to derive and analyze the radiation characteristics of thin wire dipole antennas and solve numerical problems.
2. To analyze the characteristics and design relations of UHF, VHF and Microwave Antennas.
3. To identify the antenna array requirements, to determine the characteristics of ULAs and estimate the patterns of BSA, EFA, and Binomial Arrays.
4. To understand the concepts and set-up requirements for microwave measurements, and familiarize with the procedure to enable antenna measurements.
5. To define and distinguish between different phenomenon of wave propagation (ground wave, space wave and sky wave), their frequency dependence, and estimate their characteristics, identifying their profiles and parameters involved.

Course Outcomes: Upon completing this course, the student will be able to

1. Explain the mechanism of radiation, definitions of different antenna characteristic parameters and establish their mathematical relations.
2. Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF, UHF and Microwave antennas.
3. Carry out the Linear Array Analysis, estimate the array factor and characteristics and sketch the pattern for 2-element array, N-element BSA, EFA, modified EFA, Binomial Arrays.
4. Specify the requirements for microwave measurements and arrange a setup to carryout the antenna far zone pattern and gain measurements in the laboratory.
5. Classify the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved.

UNIT - I

Antenna Basics: Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height. Fields from Oscillating Dipole, FieldZones, Front - to-back Ratio, Antenna Theorems, Radiation, Retarded Potentials – Helmholtz Theorem, Thin Linear Wire Antennas – Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area and Effective Height, Natural Current Distributions, Far Fields and Patterns of Thin Linear Centre-fed Antennas of Different Lengths.

Loop Antennas - Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small Loops (Qualitative Treatment).

UNIT - II

Antenna Arrays: Point Sources – Definition, Patterns, arrays of 2 Isotropic Sources - Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire

Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Non-uniform Amplitude Distributions – General Considerations and Binomial Arrays.
Arrays with Parasitic Elements, Folded Dipoles and their Characteristics, Yagi-Uda Array

UNIT - III:

VHF, UHF and Microwave Antennas: Helical Antennas – Helical Geometry, Helix Modes, Practical Design Considerations for Monofilar Helical Antenna in Axial and Normal Modes, Horn Antennas – Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns. **Paraboloidal Reflectors** – Geometry and general properties of parabola, Patterns of large circular aperture with uniform illumination, Feed Methods, Reflector Types – Related problems

UNIT - IV

Microstrip Antennas– Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry and Parameters, Radiation pattern and feed methods.

Antenna Measurements: Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods).

UNIT - V:

Wave Propagation - Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts,

Ground Wave Propagation –Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections.

Space Wave Propagation –Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super Refraction, M-Curves and Duct Propagation, Scattering Phenomena, Troposphere Propagation.

Sky Wave Propagation –Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and Skip Distance, Multi-hop Propagation.

TEXT BOOKS

1. Antennas and Wave Propagation – J.D. Kraus, R.J. Marhefka and Ahmad S. Khan, TMH, NewDelhi, 4th ed., 2010. (Special Indian Edition)
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd ed., 2000.
3. Antenna Theory- C.A. Balanis, John Wiley & Sons, 2nd ed., 2001.

REFERENCES BOOKS

1. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, NewDelhi, 2001

22EC3171: CELLULAR AND MOBILE COMMUNICATIONS

(Professional Elective-I)

B.Tech III Year I Semester **L T P C**
3 - - **3**

Prerequisite: Basic Communications

Course Objectives:
The course objectives are:
1. To provide the student with an understanding of the Cellular concept, Frequency reuse, Hand-off strategies.
2. To enable the student to analyze and understand wireless and mobile cellular communication systems over a stochastic fading channel
3. To provide the student with an understanding of Co-channel and Non- Co-channel interferences
4. To know the concepts of the cell coverage for signal and Traffic diversity techniques and mobile antennas.
5. To know the concepts of the frequency management, Channel assignment and types of handoff.

Course Outcomes: Upon completing this course, the student will be able to
1. Familiar with fundamental concepts of mobile cellular systems and its Generations, coverage and capacity in cellular systems.
2. Understand Co-channel and Non-Co channel Interference.
3. Understand the fundamental techniques to extend the cell coverage and handling of traffic
4. Understand frequency management, Channel assignment
5. Understand the types of Handoff Techniques.

UNIT -I:
Introduction to Cellular Mobile Radio Systems: Limitations of Conventional Mobile Telephone Systems, Basic Cellular Mobile System, First, Second, Third and Fourth Generation Cellular Wireless Systems, Uniqueness of Mobile Radio Environment- Fading Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time.
Fundamentals of Cellular Radio System Design: Concept of Frequency Reuse, Co Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I From a Normal Case in a Omni Directional Antenna System, System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems- Cell Splitting, Sectoring, Microcell Zone Concept.

UNIT –II
Co-Channel Interference: Measurement Of Real Time Co-Channel Interference, Design of Antenna System, Antenna Parameters and Their Effects, Diversity Techniques-Space Diversity, Polarization Diversity, Frequency Diversity, Time Diversity.
Non-Co-Channel Interference: Adjacent Channel Interference, Near End Far End Interference, Cross Talk, Effects on Coverage and Interference by Power Decrease, Antenna Height Decrease, Effects of Cell Site Components.

UNIT -III:

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, General Formula for Mobile Propagation over Water And Flat Open Area, Near and Long Distance Propagation, Path Loss from a Point to Point Prediction Model in Different Conditions, Merits of Lee Model.

Cell Site and Mobile Antennas: Space Diversity Antennas, Umbrella Pattern Antennas, Minimum Separation of Cell Site Antennas, Mobile Antennas.

UNIT -IV:

Frequency Management and Channel Assignment: 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 and Dropped Calls: Handoff Initiation, Types of Handoff, Delaying Handoff, Advantages Of Handoff, Power Difference Handoff, Forced Handoff, Mobile Assisted and Soft Handoff, Intersystem Handoff, Introduction to Dropped Call Rates and their Evaluation.

TEXT BOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Mc Graw Hill, 2nd Edn. 1989.
2. Wireless Communications - Theodore. S. Rapport, Pearson Education, 2nd Edn. 2002.
3. Mobile Cellular Communication - Gottapu sashibhushana Rao, Pearson, 2012.

REFERENCE BOOKS:

1 Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2nd Edn. 2001.
2 Modern Wireless Communications-Simon Haykin, Michael Moher, Pearson Education, 2005.
3 Wireless Communications Theory and Techniques, Asrar U. H.Sheikh, Springer, 2004.
4 Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007.
5 Wireless Communications – Andrea Goldsmith, Cambridge University Press, 2005.

22EC3172: MACHINE LEARNING AND COMPUTER VISION APPLICATIONS

B.Tech. III Year I Sem. **L T P C**
3 - - 3

Course Objectives:

1. To prepare students for career in computer science & engineering where knowledge of AI & ML techniques leading to the advancement of research and technology.
2. Identify problems where artificial intelligence techniques are applicable.
3. To explore the use of Genetic algorithms and Reinforcement learning.
4. Judge applicability of more advanced techniques.
5. Participate in the design of systems that act intelligently and learn from experience.

Course Outcomes:

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

1. Analyze the supervised learning algorithms and theory of Machine learning
2. Characterize the unsupervised learning algorithms
3. Model the concepts of Artificial Neural Networks
4. Infer Genetic algorithms and Reinforcement learning.
5. Discuss the concepts of image processing and computer vision with its applications

UNIT I

INTRODUCTION TO MACHINE LEARNING: Types of machine learning, application of machine learning.

Supervised Learning: Regression-Linear-Simple, Multiple, Logistic Regression--Case Study

Classification- Naive Bayes Classifier, k-NN classifier, Support Vector Machines -Linear, Non Linear--Case Study

UNIT II

Decision Trees-ID3 (Iterative Dichotomiser3), Random forest, Ensemble methods- Bagging, Boosting, Stacking--Case Study

UNSUPERVISED LEARNING: Measures of Distance, Clustering: K-means, Hierarchical Clustering: Agglomerative and Divisive--Case Study

UNIT III

Artificial Neural Networks– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm, Remarks on the Back-Propagation algorithm--Case Study

UNIT IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example

Reinforcement Learning – Introduction, the learning task, *Q*–learning, non-deterministic, rewards andactions, temporal difference learning, an illustrative example

UNIT V

Introduction to Image Processing – Digital Image Representation, Image types

Introduction to CV – Image formation: Geometric primitives and transformations, photometric image formation

Computer Vision Applications - Self driving cars, Pedestrian detection, X-Ray Analysis

TEXT BOOKS:

1. Artificial Intelligence A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.
2. Machine Learning –Tom M. Mitchell,- Tata McGraw-Hill
3. Computer Vision Algorithms & Applications, Richard Szeliski, Springer.

REFERENCE BOOKS:

1. S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt.Ltd., 2017.

2. "Reinforcement Learning Algorithms: Analysis and Applications," Boris Belousov, Hany Abdul samad, Pascal Klink, Simone Parisi, and Jan Peters First Edition, Springer 2021.

3. 3. Digital Image Processing Using MATLAB, Rafael C. Gonzalez, Richard E. Woods and Steven L. Eddins, 2004.

22EC3173: ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Professional Elective–I)

B.Tech III Year I Semester	L	T	P	C
	3	-	-	3

Course Objectives:

1. To understand the various measuring systems functions and metrics for performance analysis.
2. To understand the principle of operation and working of different electronic instruments.
3. To understand the construction and principle of operation of different electronic instruments via oscilloscope and special purpose oscilloscopes.
4. To understand the working principles of various transducers
5. To aware students how to use bridges to measure resistance, capacitance, and inductance using various measuring techniques.

Course Outcomes: On completion of this course student can be able to

1. Understand and identify the various electronic instruments based on their specifications for carrying out a particular task of measurement..
2. Analyze various types of signal generators and signal analyzers for generating and analyzing various real time signals.
3. Analyze different types of oscilloscopes and acquire the knowledge of measuring parameters of different real time signals.
4. Measure various physical parameters by appropriately selecting the transducers.
5. Understand about bridges for the measurement of resistance, capacitance and inductance and also can learn how all the physical parameters can be measured.

UNIT - I

Block Schematics of Measuring Systems: Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multi meters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

UNIT - II

Signal Analyzers: AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, Video Signal Generators, and Specifications

UNIT - III

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period and Frequency Specifications.

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

UNIT - IV

Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers.

UNIT - V

Bridges: Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge.

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure – High Pressure, Vacuum level, Temperature -Measurements, Data Acquisition Systems.

TEXT BOOKS:

1. Electronic Measurements and Instrumentation – K. Lal Kishore, Pearson Education 2010.
2. Electronic Instrumentation: H. S. Kalsi – McGraw Hill Education, 2nd Edition2004.
3. Electronic Instrumentation and Measurements – David A. Bell, 3rd Edition Oxford Univ.Press,2013.

REFERENCES:

1. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ. Press, 1997.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D.Helbincs, W.D. Cooper: PHI 5thEdition, 2003.
3. Electronic Measurements and Instrumentation: B.M. Oliver, J.M. Cage MC GRAW HILLEDUCATION Reprint, 2009.
4. Industrial Instrumentation: T.R. Padmanabham Springer, 2009.

22EC3151: MICROCONTROLLERS LAB

B.Tech. III Year I Sem. **L T P C**

0 0 2 1

COURSE OBJECTIVES:

1. To Introduce Assembly Language Program concepts
2. To understand an ALP for arithmetic and logical operations in 8086
3. To understand an ALP for arithmetic and logical operations in 8051
4. To Interface I/O devices with 8051 microcontroller
5. To Interface I/O devices with ARM

COURSE OUTCOMES: At the end of the course, student will be able to

1. Implement the basic programming for Arithmetic and Logical operations in 8086 micro- processor.
2. Implement the basic programming for Arithmetic and Logical operations in 8051 Microcontroller
3. Implement time delay generation & serial communication of 8051.
4. Implement interfacing of I/O devices with 8051 Microcontroller.
5. Implement interfacing of I/O devices with ARM

Cycle 1: Using 8086 Processor Kits and/or Assembler (5 Weeks)

- Assembly Language Programs to 8086 to Perform
  1. Arithmetic, Logical, String Operations on 16 Bit and 32-BitData.
  2. Logical Operations, Rotate, Shift, Swap and Branch Operations.

Cycle 2: Using 8051 Microcontroller Kit (5 weeks)

- Introduction to IDE
  1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift,Swap and Branch Instructions
  2. Time delay Generation Using Timers of8051.
  3. Serial Communication from/ to 8051 to / from I/O devices.

Cycle 3: Interfacing I/O Devices to 8051(4 Weeks)

1. Matrix Keypad to 8051.
2. LCD Interfacing using 8051.
3. 8 bit ADC Interface to 8051.
4. Triangular Wave Generator through DAC interfaces to8051.

Cycle 4: Interfacing I/O devices to ARM (2weeks)

1. LCD/LED interfacing to ARM
2. Buzzer interfacing to ARM

22EC3152: DIGITAL SYSTEM DESIGN THROUGH VERILOG LAB

B.Tech. III Year I Sem.

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Course Objectives:

The main objectives of the course is to

1. Familiarize with the CAD tool to write HDL programs.
2. Understand simulation and synthesis of digital design.
3. Know the difference between synthesizable and non-synthesizable code.
4. Understand the differences between three modeling styles.
5. Understand logic verification using Verilog simulation.

Course Outcomes: At the end of this course, students should be able to:

6. Write the Verilog programs to simulate and synthesize Digital Circuits.
7. Design Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.
8. Describe sequential circuits in Behavioral description and obtain simulation waveforms.
9. Synthesize Register Transfer Level (RTL) models of digital circuits.
10. Gain the knowledge to verify Digital Circuits functionality using FPGA/ Zed Boards.

Note:

1. Programming can be done using XILINX or any complier.
2. Synthesize Register Transfer Level (RTL) models of digital circuits.
3. Download the programs on Xilinx FPGA/Zed boards.
4. Minimum 12 experiments should be conducted:

List of Experiments:

1. Verify all the logic gates using HDL code and implement using FPGA/Zed boards.
2. Write the HDL code for decoder and encoder and implement using FPGA/ Zed boards.
   - 3 to 8 Decoder.
   - 8 to 3 Encoder (With priority and without priority).
3. Write the HDL code for multiplexer and demultiplexer and implement using FPGA/Zed boards.
   - 8-to-1 multiplexer.
   - 1-to-8 demultiplexer.
4. Design and simulate the HDL code for the following code converters.
   - 4- Bit binary to gray code converter.
   - 4- Bit grayto binary code converter.
5. Design and simulate the HDL code for 16-bit comparator.
6. Design and simulate the HDL code for Full adder and Full subtractor using three modeling styles.
7. Design and simulate the HDL code for carry look a head adder.
8. Design and simulate the HDL code for 4-bit Array multiplier.
9. Design and simulate the HDL code to implement 8-bit ALU functionality.
10. Design and simulate the HDL code for flip flops: SR, D, JK, T.
11. Design and simulate the HDL code for Shift registers: SISO, PIPO using D Flip-Flops.
12. Design and simulate the HDL code for 12 x 8 MAC (Multiplier Accumulator).
13. Design and simulate the HDL code for 4-bit binary, BCD counters (synchronous/ asynchronous reset).
14. Design and simulate the HDL code to detect the sequence 1010101.
15. Design and simulate the HDL code for FSM: traffic light controller.

22EC3153:DATA COMMUNICATIONS AND NETWORKS LAB

B.Tech. III Year I Semester **L T P C**

0 0 2 1

Course Objectives:

1. To introduce the Fundamentals of data communication networks
2. To demonstrate the Functions of various protocols of Data link layer.
3. To demonstrate Functioning of various Routing protocols.
4. To introduce the Functions of various Transport layer protocols.
5. To understand the significance ofapplication layer protocols

Course Outcomes:

1. Demonstrate the physical connections in Data Communication networks.
2. Demonstrate the queuing techniques in various links of Data Communication networks.
3. Verification of various routing protocol functionalities.
4. Verifying the functionalities of Application protocols.
5. Knowledge of different packets involved in various transmission data.

A. Minimum of 12 Experiments have to be conducted
B. All the Experiments may be Conducted using Network Simulation software like NS-2, NSG-2.1 and Wire SHARK/equivalent software.

Note: For Experiments 2 to 10 Performance may be evaluated through simulation by using the parameters Throughput, Packet Delivery Ratio, Delay etc.

1. Generate a TCL Script to create two nodes and links between nodes
2. Generate a TCL Script to transmit data between nodes
3. Evaluate the performance of various LAN Topologies
4. Evaluatethe performance of Drop Tail and RED queue management schemes
5. Evaluatethe performance of CBQ and FQ Scheduling Mechanisms
6. Evaluatethe performance ofTCP and UDP Protocols
7. Evaluatethe performance ofTCP, New Reno and Vegas
8. Evaluate the performance of AODV and DSR routing protocols
9. Evaluate the performance of AODV and DSDV routing protocols
10. Evaluate the performance of IEEE 802.11 and IEEE802.15.4
11. Capturing and Analysis of TCP and IP Packets
12. Simulation and Analysis of ICMP and IGMP Packets
13. Analyze the Protocols SCTP, ARP, NetBIOS, IPXVINES
14. Analysis ofHTTP, DNS and DHCP Protocols

Major Equipment Required:

Required software (Open Source) like NS-2, NSG-2.1 and Wire SHARK

22MC0005: INTELLECTUAL PROPERTY RIGHTS

B.Tech. III Year I Sem. **L T P C**

3 0 0 0

Course Objectives:

- To know the concept of intellectual property
- To study about trade marks
- To study about law of copyrights and law of patents.
- To impart the knowledge on trade secrets
- To know new developments in IPR laws at national and international level.

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Distinguish and Explain various forms of IPRs
- Identify criteria to fit one's own intellectual work in particular form of IPRs
- Apply statutory provisions to protect particular form of IPRs.
- Explain about trade secrets
- Appraise new developments in IPR laws at national and international level

UNIT – I:

INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction, types of intellectual proper international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II:

TRADE MARKS: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes**.**

UNIT – III:

LAW OF COPYRIGHTS: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law.

LAW OF PATENTS: Foundation of patent law, patent searching process, ownership rights and tran

UNIT – IV:

TRADE SECRETS: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V:

NEW DEVELOPMENT OF INTELLECTUAL PROPERTY: new developments in trade mark law; copyright law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copyright law, international patent law, and international development in trade secrets law.

TEXT BOOK:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

REFERENCE BOOK:

1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd

22MB3211: BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech. III Year II Sem. **L T P C**

3 0 0 3

Course Objectives:

- To understand the concepts of business economics, objectives, scope, role & responsibilities of a manager of a business undertaking
- To analyze the market dynamics namely demand, elasticity of demand, demand forecasting and supply
- To gain the knowledge on the production theories and cost analysis while dealing with the production
- To explain the process & principles of accounting and to maintain Journal, Ledger, Trial Balance.
- To acquire the basics of how to analyze and interpret the financial statements through ratio analysis.

Course Outcomes: At the end of this course, students will demonstrates the ability to

- Determine the objectives, role & responsibilities of a manager of a business undertaking.
- Understand the demand for a product of a company, to analyze various factors influencing demand elasticity and forecast & compute the future sales level of a product.
- Examine optimum production & cost functions with the help of mathematical equations, Assess the cost behaviour, costs useful for managerial decision making.
- Apply the principle of double entry to the maintenance of books of records and explain the Significance and objectives of trial balance and final accounts.
- Analyze, interpret & comment on the financial statements of a business enterprise by Using ratios analysis

UNIT– I

Introduction to Business and Economics:

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT– II

Demand and Supply Analysis:

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT-III

Production, Cost, Market Structures & Pricing:

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, and Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis.

UNIT-IV

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts (Simple Problems).

UNIT–V

Financial Ratios Analysis : Concept of Ratio Analysis, Importance and Types of Ratios, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios – Analysis and Interpretation (simple problems).

TEXTBOOKS:

1. D.D.Chaturvedi,S.L.Gupta,"BusinessEconomics-TheoryandApplications", InternationalBook HousePvt.Ltd. 2013.
2. Dhanesh K Khatri, "Financial Accounting", Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, "Managerial Economics", 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

REFERENCES:

1. Paresh Shah, "Financial Accounting for Management" 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, "Financial Accounting", 5e, Vikas Publications, 2013.

22EC3211:DIGITAL SIGNAL PROCESSING

B.Tech. III Year II Semester **L T P C**

3 0 0 3

Prerequisite: Signals and Systems

Course Objectives:

1. To provide background of digital signals and computation of DFT.
2. To understand the fast computation of DFT and appreciate the FFT processing.
3. To study the designs and structures of digital IIR filters and analyze and synthesize for a given specifications.
4. To study the designs and structures of digital FIR filters and analyze and synthesize for a given specifications
5. To acquaint in Multi-rate signal processing techniques and finite word length effects and introduction to DSP Processors.

Course Outcomes: Upon completing this course, the student will be able to

1. Understand the basics of DSP and computation of DFT.
2. Understand the inter-relationship between DFT and FFT.
3. Design a IIR filter for a given specification.
4. Design a FIR filter for a given specification
5. Understand the significance of multirate signal processing and basic DSP Processors.

UNIT - I:

Introduction: Introduction to Digital Signal Processing: Basic elements of DSP, Typical Applications of DSP, Linear Constant Coefficient Difference Equations,

Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Circular convolution, Linear Convolution using Circular convolution, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z-Transform. IDFT.

UNIT - II:

Efficient computation of DFT: Disadvantages of DFT, Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Applications of FFT, Inverse FFT. Comparison of DFT & FFT.

UNIT – III

IIR Digital Filters: Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

Realization of Digital Filters: Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms.

UNIT - IV

FIR Digital Filters: Characteristics of FIR Digital Filters, Frequency Response. Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

UNIT – V

Multirate Digital Signal Processing: Introduction, Down Sampling, Decimation, Up sampling, Interpolation, Sampling Rate Conversion. Finite Word Length Effects: Limit cycles, Overflow Oscillations, Methods to Prevent Overflow, Dead Band Effects.

Computer Architecture for Signal Processing: Harvard Architecture, Pipelining, MAC, Introduction to TMS320C67xx Digital Signal Processors, Functional Block Diagram.

TEXT BOOKS:

1. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009

2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.

REFERENCES:

1. Digital Signal Processing – Fundamentals and Applications – LiTan, Elsevier, 2008

2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007

3. Digital Signal Processing – S. Salivahanan, A. Vallavaraj and C. Gnanapriya, TMH, 2009

4. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and Barrie W. Jervis, 2 nd Edition, Pearson Education, 2009

22EC3212: CMOS VLSI DESIGN

B.Tech. III Year II semester **L T P C**

3 0 0 3

Prerequisites - Electronic Devices and Circuits, Digital logic Design

Course Objectives: The objectives of the course are to:

1. Give exposure to different steps involved in the fabrication of ICs and electrical properties using MOS Transistor analyze the behavior of inverters designed with various loads.
2. Give exposure to the design rules to be followed to draw the layout of any logic circuit.
3. Provide concept to design different types of logic gates using CMOS inverter and
4. Provide design concepts to design building blocks of data path of any system using gates.
5. Acquire the fundamentals on Analog CMOS ICs

Course Outcomes: Upon completing this course, the student will be able to

1. Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
2. Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit
3. Understand Gate level designs of different gates and driving capacitive Loads.
4. Provide design concepts required to design building blocks of data path using gates and design of simple memories using MOS Transistors.
5. Understand the concepts of CMOS Amplifiers.

UNIT – I

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS
Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids Vds relationships, MOS transistor threshold Voltage, gm, gds, 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 Gates, Scaling of MOS circuits.

UNIT – III

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out Choice of layers.

UNIT – IV

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT – V

CMOS Amplifiers: CS, CD amplifiers, Differential Amplifiers, Cascode Amplifiers, Current Mirrors- Wilson mirror, Wildar mirror, Single stage op-amp

TEXT BOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, PHI, 2005 Edition
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3rd Ed, Pearson, 2009.
3. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

REFERENCE BOOKS:

1. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
2. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
3. Design of Analog CMOS Integrated Circuits, Behzad Razavi, TMH Edition

22EC3271: COMPUTER ORGANIZATION & OPERATING SYSTEMS

(Professional Elective-II)

B.Tech. III Year II semester **L T P C**

3 0 0 3

Course Objectives:

1. Understanding the structure of a computer and its operations
2. Understanding the RTL and micro-level operations and control in a computer
3. Understanding the concepts of I/O devices and memory.
4. Understanding operating systems concepts.
5. Understanding file system interface

Course Outcomes:

1. Visualizing the organization of computer blocks
2. Utilize the micro-level operations to control computer units
3. Understanding the design of digital computer system functional units
4. Utilize operating systems in a computer
5. Identifying, comparing, and assessing issues related to ISA, memory, control, and I/O functions

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.
Register Transfer Language and Micro Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro Operations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit,
Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Instruction Cycle, Memory - Reference Instructions, Input – Output and Interrupt.

UNIT - II

Microprogrammed Control: Control Memory, Address Sequencing, Microprogram Example, Design of Control Unit, Hardwired Control, Microprogrammed Control.
Central Processing Unit: Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

UNIT - III

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor (IOP), Serial Communication.
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory, Introduction to RAID.

UNIT - IV

Operating Systems Overview: Overview of Computer Operating Systems Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating Systems Structures Operating System Services and Systems Calls, System Programs, Operating System Generation.
Memory Management: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Allocation of Frames, Thrashing Case Studies – UNIX, Linux.

UNIT - V

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection.
File System Implementation: File System Structure, File system Implementation, Directory Implementation, Allocation Methods, Free-Space Management.

TEXT BOOKS:

1. Computer Organization - Carl Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition,McGraw Hill.

2. Computer System Architecture - M. Morris Mano, 3rd Edition, Pearson

3. Operating System Concepts - AbrehamSilberchatz, Peter B. Galvin, Greg Gagne, 8thEdition, John Wiley.

REFERENCE BOOKS:

1. Computer Organization and Architecture - William Stallings 6th Edition, Pearson

2. Structured Computer Organization - Andrew S. Tanenbaum, 4th Edition, PHI

22EC3272 : DATA SCIENCE AND DATA ANALYTICS

(Professional elective – II)

B.Tech. III Year II Sem. **L T P C**

3 0 0 3

Course objectives :

1. To introduce the concepts of Date analytics, Big data and data visualization tools
2. To introduce the Applications of modelling in business.
3. To introduce regression concepts, analytical applications to various business domains.
4. To understand object segmentation.
5. To know data visualization techniques.

Course outcomes : By the end of the course students will be able to

1. Understand Date analytics, Big data and data visualization tools
2. Understand the need and Applications of modelling in business.
3. Understand regression concepts, analytical applications to various business domains.
4. Understand object segmentation.
5. Understand data visualization techniques.

UNIT – I

Introduction to Data Analytics: Introduction to Data- Importance of analytics- Data for Business Analytic-Big Data- Business Analytics in Practice. Data Visualization- Data Visualization tools Data Queries statistical methods for summarizing data, exploring data using pivot tables.

UNIT - II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modelling in Business, Databases & Types of Data and variables, Data Modelling Techniques, Missing Imputations etc. Need for Business Modelling.

UNIT - III

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc. Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT - IV

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc. Time Serie Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT - V

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

TEXT BOOKS:

1. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.
2. Business Anylytics, James evans, 2 edition Person 2017.

REFERENCE BOOKS:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D Ullman Stanford Univ

22EC3273 : NETWORK SECURITY AND CRYPTOGRAPHY
(Professional Elective–II)

B.Tech III Year II Semester **L T P C**
3 - - **3**

Course Objectives:

1. To Understand the basic concept of Cryptography and Network Security
2. To understand the necessity of network security, threats/vulnerabilities to networksand counter measures
3. To understand Authentication functions with Message Authentication Codes and Hash Functions.
4. To provide familiarity in Intrusion detection
5. To know the firewall design principles

Course Outcomes: Upon completing this course, the student will be able to

1. Describe network security fundamental concepts and principles
2. Encrypt and decrypt messages using block ciphers and network security technology and protocols
3. Analyze key agreement algorithms to identify their weaknesses
4. Identify and assess different types of threats, malware, spyware, viruses, vulnerabilities
5. Understand the web security

UNIT–I

Security Services, Mechanisms and Attacks, a Model for Internetwork security, Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques**.**
Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Block Cipher Design Principles.

UNIT–II

Encryption: Triple DES, International Data Encryption algorithm, Blowfish, RC5, Characteristics of Advanced Symmetric block Ciphers. Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT–III

Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography.

Message Authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions.

UNIT-IV

Hash and Mac Algorithms: MD-5, Message digest Algorithm, Secure Hash Algorithm. Digital Signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards.

Authentication Applications: Kerberos, Electronic Mail Security: Pretty Good Privacy, SIME/MIME.

UNIT–V

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Key Management. Web Security: Web Security requirements, secure sockets layer and Transport Layer Security, Secure Electronic Transaction.

Intruders, Viruses and Worms: Intruders, Viruses and Related threats.

FireWalls: Firewall Design Principles, Trusted systems.

TEXTBOOKS:

1. Cryptography and Network Security: Principles and Practice-William Stallings, Pearson Education.6th edition-2013
2. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH, 1st edition-2004.

REFERENCEBOOKS:

1. Network Security Essentials (Applications and Standards)by William Stallings Pearson Education. 4th edition-2011
2. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)-2017
3. Principles of Information Security, Whitman, Thomson 4th edition.
4. Introduction to Cryptography, Buchmann, Springer.2nd edition -2004

22EC3251: DIGITAL SIGNAL PROCESSING LAB

B.Tech. III Year II Semester **L T P C**

0 0 2 1

Course Objectives:

1. To generate the elementary signals/ waveforms.
2. To plot frequency response of a given LTIsystem
3. To Calculate and Plot DFT / IDFT and FFT of given DT signal.
4. To develop algorithms for designing and implementation of FIR and IIR filters with standard techniques.
5. To develop the Multirate signal processing.

Course Outcomes

1. Able to generate elementary signals/ waveforms and perform arithmetic operations on signals.
2. Able to plot frequency response of a given system and verify the properties of LTI system.
3. Analyze the digital signals using various digital transforms DFT, FFT etc.
4. Able to Implement FIR and IIR filter for a given sequence and calculate the filter coefficients.
5. Able to Implement Decimation and Interpolation Process the sampling rate.

The Programs shall be implemented in Software (Using MATLAB / Lab View / C Programming/ Equivalent) and Hardware (Using TI / Analog Devices / Motorola / Equivalent DSP processors). **Note: -** Minimum of 12 experiments has to be conducted.

List of Experiments:

1. Generation of Sinusoidal Waveform / Signal based on Recursive Difference Equations
2. Histogram of White Gaussian Noise and Uniformly Distributed Noise.
3. To find DFT / IDFT of given DT Signal
4. To find Frequency Response of a given System given in Transfer Function/ Differential equation form.
5. Obtain Fourier series coefficients by formula and using FFT and compare for half sine wave.
6. Implementation of FFT of given Sequence
7. Determination of Power Spectrum of a given Signal(s).
8. Implementation of LP FIR Filter for a given Sequence/Signal.
9. Implementation of HP IIR Filter for a given Sequence/Signal
10. Generation of Narrow Band Signal through Filtering
11. Generation of DTMF Signals
12. Implementation of Decimation Process
13. Implementation of Interpolation Process
14. Implementation of I/D Sampling Rate Converters
15. Impulse Response of First order and Second Order System

22EC3252: CMOS VLSI- DESIGN LAB

B.Tech. III Year II Semester

L	T	P	C
0	0	2	1

Course objectives: Train the students

1. To understand the design of analog and digital circuits using CAD tools.
2. To understand the DRC rules for layout design.
3. To analyze the results of logic and timing simulations and to extract the parasitics.
4. To understand the calculation of performance parameters such as area, power and delay.

Course outcomes: By the end of the course student will be able to

1. Design of analog and digital CMOS circuits.
2. Simulate circuits within a CAD tool and compare to design specifications.
3. Layout design for complex gates to satisfying DRC rules.
4. Analyze DC/Transient characteristics of analog/digital design and to extract the parasitics.
5. Calculating performance parameters such as area, power and delay.

List of Experiments

- Design and implementation of the following CMOS digital/analog circuits using **Cadence /Mentor Graphics / Synopsys /Equivalent** CAD tools.
- The design includes layout and Scaling of CMOS Inverter using design rules
- Design of Layout, Extraction of Parasitics and DC/ Transient analysis, Verification of layouts (DRC, LVS)
- Calculation of s performance parameters such as area, power and delay.

1. CMOS inverter schematic and layout
2. CMOS NOR gates schematic and layout
3. CMOS NAND gates schematic and layout
4. Design of any Boolean expression using AOI/OAI gates
5. Design of basic gates using pass transistor logic.
6. Design a 2:1 Mux using Transmission gate.
7. Design of 1-bit SRAM cell.
8. Perform AC analysis of CS Amplifier.
9. Perform AC analysis of CD Amplifier.
10. Perform AC analysis of Current mirror circuit.
11. Perform AC analysis of Cascode Amplifier.
12. Perform AC analysis of Differential Amplifier circuit.

Note: Any **TEN of** the above 12 experiments are to be conducted

22HS3251:ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B.Tech. III Year II Sem. **L T P C**

0 **0 2 1**

Course Objectives

This lab focuses on using Multi-media instruction as well as stimulating peer group activities for language development to meet the following targets:

1. To improve students fluency in spoken English.
2. To enable them to listen to English spoken at normal conversational speed.
3. To help students develop their vocabulary.
4. To read and comprehend texts in different contexts.
5. To communicate their ideas relevantly and coherently in writing.

Course Outcomes: Students will be able to

1. Acquire vocabulary and Grammar and use them contextually.
2. Listen and speak effectively, and present themselves effectively.
3. Develop proficiency in academic reading and writing.
4. Communicate confidently in formal and informal contexts.
5. Increase their job opportunities.

Syllabus

The following course activities will be conducted as part of the *Advanced English Communication Skills (AECS) Lab:*

Unit I

Vocabulary and Grammar: Vocabulary Building– Word Formation: Prefixes and Suffixes - Synonyms, and Antonyms, One-word Substitutes, Idioms, Phrases, Collocations, and Compound Words.

Grammar– Articles, Prepositions, Tenses,Subject-Verb Agreement, Voice and Speech-SpottingErrors - Correction of Sentences,

Unit II

Advanced Reading Comprehension: Argumentative Analysis of (with reference to) GRE, TOEFL, IELTS – Jumbled Sentences and Sentence Completion.

Unit III

Writing Skills– Structure and Different Types of Writings– Argumentative Writing – Letter Writing - Resume Writing - Technical Report Writing

Creating and Using LinkedIn Profile- Netiquette- Statement of Purpose (SOP)-Letter of Recommendation

Unit IV

Presentation Skills -_Oral Presentations (Group/Individual) and Written Presentations – PPTs/Posters (Virtual/Offline) – Projects, Reports and Assignments- Introducing Oneself Virtually (Making a Video on Oneself and Analyzing it critically).

Unit V

Group Dynamics &Interviews: Group Discussion - Dos and Don'ts - Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas– Debate: Concept and Process - Difference between Group Discussions and Debates- Rubrics of Evaluation - Interviews and Types of Interviews - Pre-interview Planning, Opening Strategies, Answering Strategies -Introducing Self - Oral Interviews (face-to-face)–Virtual Interviews -Mock Interviews -Handling Technical Glitches.

References

- Kumar,Sanjay and Pushp Lata. *English for Effective Communication*, Oxford University Press, 2015.
- Konal, Nira. *English Language Laboratories- A Comprehensive Manual*, PHI Learning Pvt. Ltd. 2011.
- *The Official Guide to the GRE General Test*. Tamil Nadu: McGra Hills Education (India) 3rd Edition, 2017.

22EC3281: INDUSTRIAL ORIENTED MINI PROJECT

B.Tech. III Year II Sem.

L	T	P	C
0	0	4	2

22MC0002: ENVIRONMENTAL SCIENCE
(Only for Lateral Entry students)

L	T	P	C
3	0	0	0

III B.Tech II Semester

Course Objectives:

- To study and Understand the importance of ecosystems.
- To impart knowledge on various natural resources.
- To know about biodiversity and biotic resources
- To impart knowledge on environmental pollution and control technologies
- To study and understand the environmental policies and regulations.

Course Outcomes: At the end of this course students will demonstrate the ability to

- Explain the importance of ecosystems.
- Discuss about various natural resources.
- Describe the importance biodiversity and biotic resources
- Discuss about environmental pollution and control technologies
- Explain the environmental policies and regulations.

UNIT - I

ECOSYSTEMS: Definition, Scope and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

NATURAL RESOURCES: Classification of Resources: Living and Non-Living resources,
Water Resources: use and over utilization of surface and ground water, floods and droughts,
Dams: benefits and problems.
Mineral Resources: use and exploitation, environmental effects of extracting and using mineral resources,
Land Resources: Forest resources
Energy Resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT - III

BIODIVERSITY AND BIOTIC RESOURCES: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity:habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV

ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES:
Environmental Pollution: Classification of pollution
Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards.
Water Pollution: Sources and types of pollution, drinking water quality standards.
Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil.

Noise Pollution: Sources and Health hazards, standards
Solid Waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management.
Pollution Control Technologies: Wastewater Treatment methods: Primary, secondary and Tertiary.
Overview of air pollution control technologies, Concepts of bioremediation.
Global Environmental Problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

UNIT - V
ENVIRONMENTAL POLICY, LEGISLATION & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. **EIA:** EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socioeconomical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).
Towards Sustainable Future: Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:
1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:
1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.