B. Tech - Electronics and Communication Engineering

III YEAR I SEMESTER

S.N	Course Code	Course Title	Category	L	T	P	Credits
1	19EC3111	Data Communications and Networks	PC	3	0	0	3
2	19EC3112	Microprocessors & Microcontrollers	PC	3	0	0	3
3	19MB3113	Business Economics and Financial Analysis	HS	3	0	0	3
4	**Open Elective - I**		OE -I	3	0	0	3
	Professional Elective - I						
5	19EC3171	Coding Theory and Techniques	PE-I	3	0	0	3
	19EC3172	Spread Spectrum Communication					
	19EC3173	Numerical Techniques and Complex Variables					
	19EC3174	Scripting Languages					
6	19MC0005	Professional Ethics	MC	2	0	0	0
7	19EC3151	Data Communications and Networks Lab	PC	0	0	3	1.5
8	19EC3152	Microprocessors & Microcontrollers Lab	PC	0	0	3	1.5
9	19HS3151	Advanced English Communication Skills Lab	HS	0	0	2	1
10	19EC 3181	Summer Internship*	PW	0	0	2	1
		Total		**17**		**10**	**20**

***Note:** Summer Internship to be carried out during summer break after II-year II semester.

III YEAR II SEMESTER

S.N	Course Code	Course Title	Category	L	T	P	Credits
1	19EC3211	Antennas and Wave Propagation	PC	3	1	0	4
2	19EC3212	Linear Integrated Circuits and Applications	PC	3	0	0	3
3	19EC3213	Digital Signal Processing	PC	3	0	0	3
4	**Open Elective –II**		OE	3	0	0	3
5	**Professional Elective - II**						
	19EC3271	Embedded System Design	PE	3	0	0	3
	19EC3272	Deep Learning					
	19EC3273	Electronics Measurements and Instrumentation					
	19EC3274	Data Science and Data Analytics					
6	19EC3251	LinearIC Applications Lab	PC	0	0	3	1.5
7	19EC3252	Digital Signal Processing Lab.	PC	0	0	3	1.5
8	19EC3253	Python Programming Lab	ES	0	0	2	1
9	19EC3291	Technical Paper Presentation	PW			2	1
		Total		**15**	**1**	**10**	**21**

DATA COMMUNICATIONS AND NETWORKS

B.Tech. III Year I Semester **L T P C**
Course Code: 19EC3111 **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, Addressing Introduction, Wireless Links and Network Characteristics, Wi Fi: 802.11 Wireless LANs -The 802.11Architecture,

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. 802.11 MAC Protocol, IEEE 802.11 Frame

UNIT - III:

The Network Layer: Introduction, Forwarding and Routing, Network Service Models, Virtual Circuit and Datagram Networks-Virtual-Circuit Networks, Datagram Networks, Origins of VC and Datagram Networks, Inside a Router-Input Processing, Switching, Output Processing, Queuing, The Routing Control Plane, 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 4th 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

MICROPROCESSORS AND MICROCONTROLLERS

B.Tech. III Year I Sem. **L T P C**
Course Code: 19EC3112 **3 0 0 3**

Course Objectives:

1. To familiarize the architecture of microprocessors and microcontrollers
2. To provide the knowledge about interfacing techniques of bus &memory.
3. To develop programming skills using 8051 based systems
4. To understand the concepts of ARM architecture
5. To study the basic concepts of Advanced ARM processors

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

1. Understands the internal architecture, organization and assembly language programming of 8086processors.
2. Understands the internal architecture, organization and assembly language programming of 8051/controllers
3. Understands the interfacing techniques to 8051 based systems.
4. Understands the internal architecture of ARM processors and
5. To outline basic concepts of advanced ARM processors.

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.

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

UNIT -II:

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 –III:

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 –IV:

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.

UNIT – V:

Advanced ARM Processors: Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

TEXT BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Rayand K. M. Bhurchandani, TMH, 2nd Edition2006.
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

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech. III Year I Sem. **L T P C**
3 0 0 3

Course Code: 19MB3113

Course Objective:

1. Understand the concept of Business Economics, Inflation, National income
2. Gain an understanding of demand its normal and exceptional behavior
3. Comprehend the theory of production and its relevance in decision making and familiarize the various market structures
4. Understand the concept and significance of accounting, preparation of final accounts
5. Understand and analyze the financial statements through ratios

Course Outcome:

1. The students will understand the various Forms of Business units
2. Impact of economic variables on the Business.
3. The students will understand impact of demand and Supply,
4. Examining the optimal Production and Cost function and Market Structure, Pricing aspects.
5. The Students can study the firm's financial position by analyzing the Financial Statements of a Company through Ratios

UNIT – I

Introduction to Business and Economics:

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, 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, Oligopoly, 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, and Preparation of Final Accounts.

UNIT - V

Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems). Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:

[1] D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. 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.

Coding Theory and Techniques

(Professional Elective - I)

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

Course Code: **19EC3171** **3 0 0 3**

Course Objectives:

1. To acquire the knowledge in measurement of information and errors
2. Understand the importance of various codes for communication systems.
3. Able design encoder and decoder of various codes.
4. To Analyze the applicability of source codes.
5. To Analyze the applicability of channel codes.

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

1. Learn measurement of information and errors.
2. Obtain knowledge in designing various source codes
3. Design encoders and decoders for block and cyclic codes
4. Obtain knowledge in designing various channel codes.
5. Understand the significance of codes in various applications.

Unit-1 :

Coding for Reliable Digital Transmission and storage: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.

Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

Unit-2

Cyclic Codes: Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

Unit-3

BCH codes: Linear algebra, Galois field, Definition and Construction of Binary BCH Codes, Error Syndromes in finite fields, Decoding SEC and DE

Reed-Solomon (RS) Codes: Dimension, Definition of distance, Generator polynomial, Minimum distance and binary expansion of RS codes. Reed-Solomon (RS) Codes: Decoding overview, PGZ decoder for RS codes

Unit-4

Convolutional Codes: Encoding of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system

Unit -5

Turbo Codes: LDPC Codes- Codes based on sparse graphs, Decoding for binary erasure channel, Log-likelihood algebra, Brief propagation, Product codes, Iterative decoding of product codes, Concatenated convolution codes- Parallel concatenation, The UMTS Turbo code, Serial concatenation, Parallel concatenation, Turbo decoding

TEXT BOOKS:

1. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J. Costello, Jr, Prentice Hall, Inc.

2. Error Correcting Coding Theory-Man Young Rhee- 1989, McGraw-Hill

REFERENCE BOOKS:

1. Error Correcting Coding Theory-Man Young Rhee-1989, McGraw – Hill Publishing, 19

2. Digital Communications-Fundamental and Application - Bernard Sklar, PE.

3. Digital Communications- John G. Proakis, 5th ed., 2008, TMH.

4. Introduction to Error Control Codes-Salvatore Gravano-oxford

5. Error Correction Coding – Mathematical Methods and Algorithms – Todd K. Moon, 2006, Wiley India.

6. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Edition, 2009, TMH.

Spread Spectrum Communications

(Professional Elective - I)

B.Tech. III Year I Sem. **L T P C**
Course Code: 19EC3172 3 0 0 3

Course Objectives: The objectives of this course are to make the student

1. Understand the concept of Spread Spectrum and study various types of Spread spectrum sequences and their generation.
2. Understand the principles of Code Division Multiple Access (CDMA) and use of Spread spectrum concept in CDMA
3. Understand various Code tracing loops for optimum tracking of wideband signals.
4. Understand the procedure for synchronization of receiver for receiving the Spread spectrum signal.
5. Study the performance of spread spectrum systems in Jamming environment.

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

1. Generate various types of Spread spectrum sequences
2. Apply principles of Code Division Multiple Access (CDMA) and use of Spread spectrum concept in CDMA
3. Can provide various Code tracing loops for optimum tracking of wideband signals.
4. Analyze the performance of Spread spectrum systems in Jamming environment.
5. Analyze the performance of Spread spectrum systems with Forward Error Correction.

UNIT – I

Introduction to Spread Spectrum Systems: Fundamental Concepts of Spread Spectrum Systems, Pseudo Noise Sequences, Direct Sequence Spread Spectrum, Frequency Hop Spread Spectrum, Hybrid Direct Sequence Frequency Hop Spread Spectrum, Code Division Multiple Access.

Binary Shift Register Sequences for Spread Spectrum Systems: Introduction, Definitions, Mathematical Background and Sequence Generator Fundamentals, Maximal Length Sequences, Gold Codes.

UNIT – II

Introduction to random processes, Wide-Sense Stationary (WSS), Autocorrelation, Power Spectral Density (PSD).

Code Tracking Loops: Introduction, Optimum Tracking of Wideband Signals, Base Band Delay-Lock Tracking Loop, Tau-Dither Non- Coherent Tracking Loop.

UNIT – III

Initial Synchronization of the Receiver Spreading Code: Introduction, Problem Definition and the Optimum Synchronizer, Serial Search Synchronization Techniques, Synchronization by Estimated the Received Spreading Code.

UNIT – IV

Cellular Code Division Multiple Access (CDMA) Principles: Introduction, Wide Band Mobile Channel, the Cellular CDMA System, Single User Receiver in a Multi User Channel, CDMA System Capacity, Multi-User Detection in CDMA Cellular Radio: Optimal Multi-User Detection, Linear Suboptimal Detectors, Interference Combat Detection Schemes, Interference Cancellation Techniques.

UNIT - V

Performance of Spread Spectrum Systems in Jamming Environments: Spread Spectrum Communication System Model, Performance of Spread Spectrum Systems without Coding. Performance of Spread Spectrum Systems with Forward Error Correction: Elementary Block Coding Concepts, Optimum Decoding Rule, Calculation of Error Probability, Elementary Convolution Coding Concepts, Viterbi Algorithm, Decoding and Bit-Error Rate.

TEXT BOOKS:

1. Rodger E Ziemer, Roger L. Peterson and David E Borth - "Introduction to Spread Spectrum Communication- Pearson, 1st Edition, 1995.
2.Mosa Ali Abu-Rgheff – "Introduction to CDMA Wireless Communications." Elsevier Publications, 2008.

REFERENCE BOOKS:

1. George R. Cooper, Clare D. McGillem - "Modern Communication and Spread Spectrum," McGraw Hill, 1986.
2. Andrew j. Viterbi - "CDMA: Principles of spread spectrum communication," Pearson Education, 1st Edition, 1995.
3. KamiloFeher - "Wireless Digital Communications," PHI, 2009.
4. Andrew Richardson - "WCDMA Design Handbook," Cambridge University Press, 2005.
5. Steve Lee - Spread Spectrum CDMA, McGraw Hill, 2002.

NUMERICAL TECHNIQUES and COMPLEX VARIABLES
(PE-I)

	L	T	P	C
B.Tech. III Year I Sem				
Subject Code: 19EC3173	**3**	**0**	**0**	**3**

Pre-requisites: Mathematics courses of first year of study.

Course Objectives: To learn

1. Various methods to the find roots of an equation.
2. Solve the problems under curve fitting.
3. Evaluation of integrals using numerical techniques
4. Solving ordinary differential equations using numerical techniques
5. Differentiation and Integration of Complex valued functions.
6. Evaluation of Integrals using Cauchy's integral formula and cauchy's residue theorem
7. Expansions of complex functions using Taylor's and Laurent's series

Course Outcomes: After learning the contents of this paper the student must be able to

1. Understand numerical techniques to find the roots of nonlinear equations and solution of system of linear equations.
2. Approximate a linear and non-linear equation to the given data by the method of least squares.
3. Understand curve fitting and evaluate numerical integration.
4. Find the numerical solutions for a given ODE's.
5. Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems
6. Taylor's and Laurent's series expansion of complex function

UNIT -I: Solution of Non-Linear Systems & Curve Fitting

Solution of polynomial and transcendental equations: Introduction; Bisection method; Regula-Falsi method; Newton-Raphson method.

Curve Fitting: Fitting a straight line; Second degree curve; exponential curve; power curve by method of least squares.

UNIT-II: Numerical integration

Numerical Integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules, Weddle's Rule, Evaluation of principal value integrals, Generalized Quadrature.

UNIT-III: Numerical Solution of Ordinary differential equations: Solution by Taylor's series; Picard's method of successive Approximation; Euler and modified Euler's methods; Runge-Kutta methods

UNIT-IV: Complex Variables (Differentiation): Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate.

UNIT-V: Complex Variables (Integration): Line integrals, Cauchy's theorem, Cauchy's Integral formula, Liouville's theorem, Maximum-Modulus theorem (All theorems without proof); zeros of analytic functions, singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem (without proof).

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition,2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. J.W.Brown and R.V. Churchill, Complex variables and Applications, 7th Ed.,Mc-Graw Hill,2004.

REFERENCE BOOKS:

1. M. K. Jain, SRK Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations , New Age International publishers.
2. Curtis F. Gerald and Patrick O. Wheatley, "Applied Numerical Analysis", Pearson Education.

Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

Scripting Languages
(Professional Elective - I)

B.Tech. III Year I Sem. **L T P C**
Course Code: 19EC3174 **3 0 0 3**

Prerequisites: Computer Programming and Data Structures

Course Objectives:
1. Able to differentiate scripting and non-scripting languages.
2. To learn Scripting languages like PERL
3. To learn Scripting languages such as TCL/TK python and BASH.
4. Expertise to program in the Linux environment.
5. Usage of scripting languages in IC design flow.

Course Outcomes: Upon completing this course, the student will be able to
1. Known about basics of Linux and Linux Networking
2. Use Linux environment and write programs for automation
3. Understand the concepts of Scripting languages
4. Create and run scripts using PERL.
5. Create and run scripts using TCl/Python.

UNIT–I:Linux Basics

Introduction to Linux, File System of the Linux, General usage of Linux kernel & basic commands, Linux users and group, Permissions for file, directory and users, searching a file & directory, zipping and unzipping concepts.

UNIT–II: Linux Networking

Introduction to Networking in Linux, Network basics & Tools, File Transfer Protocol in Linux, Network file system, Domain Naming Services, Dynamic hosting configuration Protocol & Network information Services.

UNIT–III: Perl Scripting.

Introduction to Perl Scripting, working with simple values, Lists and Hashes, Loops and Decisions, Regular Expressions, Files and Data in Perl Scripting, References &Subroutines, Running and Debugging Perl, Modules, Object–Oriented Perl.

UNIT–IV: TCL /TK Scripting

TCL Fundamentals, String and Pattern Matching, TCL Data Structures, Control Flow Commands, Procedures and Scope, Evel, Working with Unix, Reflection and Debugging, Script Libraries, TK Fundamentals, TK by examples, The Pack Geometry Manager, Binding Commands to X Events, Buttons and Menus, Simple TK Widgets, Entry and List box Widgets Focus, Grabs and Dialogs.

UNIT–V: Python Scripting.

Introduction to Python, using the Python Interpreter, More Control Flow Tools, Data Structures, Modules, Input and Output, Errors and Exceptions, Classes, Brief Tour of the Standard Library.

TEXT BOOKS:

1. Practical Programming in TCL and TK by Brent Welch, Updated fort TCL 7.4 and TK4.0.
2. Red Hat EnterpriseLinux4: System Administration Guide Copyright, Red Hat Inc, 2005.

REFERENCEBOOKS:

1. Learning Python–Mark LutzandDavidAscher,2nd Ed.,O'Reilly,2003.
2. Learning Perl–4thEd.Randal Schwartz,Tom Phoenix andBraindfoy.2005.
3. Python Essentials– Samuele Pedroni and Noel Pappin.O'Reilly, 2002.
4. Programming Perl–Larry Wall,Tom Christiansen and JohnOrwant,3rdEdition,O'Reilly,2000.(ISBN0596000278)

DATA COMMUNICATIONS AND NETWORKS LAB

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

Course code: 19EC3151 **0 0 3 1.5**

Note:

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. Writing a TCL Script to create two nodes and links between nodes
2. Writing a TCL Script to transmit data between nodes
3. Evaluate the performance of various LAN Topologies
4. Evaluate the performance of Drop Tail and RED queue management schemes
5. Evaluate the performance of CBQ and FQ Scheduling Mechanisms
6. Evaluate the performance of TCP and UDP Protocols
7. Evaluate the performance of TCP, 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. Evaluate the performance of IEEE 802.11 and SMAC
12. Capturing and Analysis of TCP and IP Packets
13. Simulation and Analysis of ICMP and IGMP Packets
14. Analyze the Protocols SCTP, ARP, NetBIOS, IPXVINES
15. Analysis of HTTP, DNS and DHCP Protocols

Major Equipment Required:

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

MICROPROCESSORS & MICROCONTROLLERS LAB

B.Tech. III Year I Sem. **L T P C**
0 0 3 1.5

Course Code: 19EC3152

COURSE OBJECTIVES:
1. To Introduce Assembly Language Program concepts
2. Write ALP for arithmetic and logical operations in 8086 and 8051
3. To Interface I/O devices with 8051 microcontroller and 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 microprocessorand 8051 Microcontroller.
2. Identity the assembly level programming in given problem.
3. Implement interfacing of I/O devices with 8051 Microcontroller and 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 to8051.
2. Sequence Generator Using Serial Interface in8051.
3. 8 bit ADC Interface to8051.
4. Triangular Wave Generator through DAC interfaces to8051.

Cycle 4: Interfacing I/O devices to ARM (2weeks)
1. LCD interfacing to ARM
2. Buzzer interfacing to ARM

TEXT BOOKS:
1. Advanced Microprocessors and Peripherals by A K Ray, Tata McGraw-Hill Education,2006
2. The 8051 *Microcontrollers*: Architecture, Programming & Applications by Dr. K. Uma Rao, Andhe Pallavi, Pearson, 2009.

Advanced English Communication Skills Lab

B.Tech. III Year I Sem. **L T P C**
CourseCode:19HS3151 0 **0 2 1**

Introduction
A course on Advanced English Communication Skills (AECS) Lab is considered essential at the third year level of B.Tech and Pharmacy courses. At this stage, the students need to prepare themselves for their career which requires themto listen to, read, speak and write in English both for their professional and interpersonal communication. The main purpose of this course is to prepare the students of Engineering for their placements.

Course Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:
- To improve students' fluency in spoken English
- To enable them to listen to English spoken at normal conversational speed
- To help students develop their vocabulary
- To read and comprehend texts in different contexts
- To communicate their ideas relevantly and coherently in writing
- To make students industry-ready
- To help students acquire behavioural skills for their personal and professional life
- To respond appropriately in different socio-cultural and professional contexts

Course Outcomes: Students will be able to:
- Acquire vocabulary and use it contextually
- Listen and speak effectively
- Develop proficiency in academic reading and writing
- Increase possibilities of job prospects
- Communicate confidently in formal and informal contexts

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

Unit-I: Inter-personal Communication and Building Vocabulary –Starting a Conversation–Responding Appropriately and Relevantly –Using Appropriate Body Language –Role Play in Different Situations – Synonyms and Antonyms, One-word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.

Unit-II: Reading Comprehension –General Vs Local Comprehension, Reading for Facts, Guessing Meanings from Context, , Skimming, Scanning, Inferring Meaning.

Unit-III: Writing Skills –Structure and Presentation of Different Types of Writing –Letter Writing/Resume Writing/ e-correspondence/ Technical Report Writing.

Unit-IV: Presentation Skills –Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/ emails/Assignments…etc.,

Unit-V: Group Discussion and Interview Skills –Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation-Concept and Process, Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews.

REFERENCES:

• Kumar, Sanjay and PushpaLatha. English for Effective Communication, Oxford University Press, 2015.

• Konar, Nira. English Language Laboratories –A Comprehensive Manual, PHI Learning Pvt. Ltd.,

ANTENNAS AND WAVE PROPAGATION

B.Tech. III Year II Sem. **L T P C**
CourseCode:19EC3211 3 1 **0 4**

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 carry out 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, Field Zones, 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, New Delhi, 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, New Delhi, 2001

LINEAR INEGRATED CIRCUITS AND APPLICATIONS

B.Tech. III Year II Sem. **L T P C**
Course Code:19EC3212 **3 0 0 3**

Pre-requisite: Electronic Devices & Circuits

Course Objectives: The main objectives of the course are:

1. To introduce the basic building blocks of linear integrated circuits.
2. To teach the linear and non-linear applications of operational amplifiers.
3. To introduce the theory and applications of analog multipliers and PLL
4. To teach the theory of ADC and DAC.
5. To introduce the concepts of waveform generation and introduce some special function ICs.

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

1. Have a thorough understanding of operational amplifiers with linear integrated circuits.
2. Design the solution for linear & non-linear applications using IC741
3. Elucidate and design the active filters and oscillators.
4. Attain the knowledge of functional diagrams and applications of IC 555 and IC 565
5. Acquire the knowledge about the Data converters

UNIT – I: Differential Amplifiers: Differential Amplifiers: Differential amplifier configurations, Balanced and unbalanced output differential amplifiers, current mirror, level Translator
Op-Amp: Basic information of Op-amp, ideal and practical Op-amp, Op-amp characteristics: DC and AC Characteristics, 741 op-amp and its features, modes of operation: Inverting, non-inverting Amplifiers

UNIT - II: Applications of Op-amp: Instrumentation amplifier, ac amplifier, V to I and I to V converters, Sample & hold circuits, multipliers and dividers, differentiators and integrators, comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723

UNIT – III: Active Filters & Oscillators: Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation- RC, Wien bridge and quadrature type, waveform generators - triangular, sawtooth, square wave.

UNIT – IV: Timers & Phase Locked Loops: 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.

UNIT – V: D-A and A-D Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC dual slope integration type ADC, DAC and ADC specifications.

TEXT BOOKS: 1. Linear Integrated Circuits, D. Roy Chowdhury, New Age International(p) Ltd.
2. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, PHI

REFERENCES BOOKS:

1. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.
2. Operational Amplifiers & Linear Integrated Circuits: Theory & Applications, Denton J. Daibey, TMH.
3. Design with Operational Amplifiers & Analog Integrated Circuits, Sergio Franco, McGraw Hill.

DIGITAL SIGNAL PROCESSING

B.Tech. III Year II Semester **L T P C**
Course code:19EC3213 **3 0 0 3**

Prerequisite: Signals and Systems

Course Objectives:

1. To provide background and fundamental material for the analysis and processing of digital signals.
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.

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

1. Understand the LTI system characteristics and Multirate signal processing.
2. Understand the inter-relationship between DFT and various transforms.
3. Design a IIR filter for a given specification.
4. Design a IIR filter for a given specification
5. Understand the significance of various filter structures and effects of round off errors.

UNIT - I:

Introduction: Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Normalized Frequency, Linear Shift Invariant Systems, Stability, and Causality, linear differential equation to difference equation, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems Multirate Digital Signal Processing: Introduction, Down Sampling, Decimation, Up sampling, Interpolation, Sampling Rate Conversion.

UNIT - II:

Discrete Fourier series: Fourier Series, Fourier Transform, Laplace Transform and Z-Transform relation, 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: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z-Transform. Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse 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.

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

Realization of Digital Filters: Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms.

Finite Word Length Effects: Limit cycles, Overflow Oscillations, Round-off Noise in IIR Digital Filters, Computational Output Round Off Noise, Methods to Prevent Overflow, Trade Off Between Round Off and Overflow Noise, Measurement of Coefficient Quantization Effects through Pole-Zero Movement, Dead Band Effects.

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 – Li Tan, 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

EMBEDDED SYSTEM DESIGN

(Professional Elective - II)

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

Course Code: 19EC3271 **3 0 0 3**

Course objectives

1. Understand the basics and applications of an embedded system
2. learn the method of designing an embedded system for any type of application
3. Firmware design approch of an embedded system
4. understand operating system concepts , RTOS Architecture
5. understand the Task Communication and Device Drivers. How to Choose RTOS

Course outcomes

By the end of this course, Students should be able to

1. understand the design flow of an embedded system and they can implement this on real time embedded systems
2. able to differentiate different types of processors and interfacing memory types to design an embedded systems
3. design control circuits for embedded system and devlop the programs using programming languages
4. to learn about RTOS for Embedded system Design , multiprocessing , multitasking techniques.
5. analyze Task Communications and Synchronization techniques in RTOS and task synchronization and latency issues

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

Integration and Testing of Embedded Hardware and Firmware: Integration of Hardware and Firmware, Boards Bring up

The Embedded System Development Environment: The Integrated Development Environment (IDE), Types of files generated on Cross-Compilation, Disassembler / Decompiler, Simulators, Emulators and Debugging, Target Hardware Debugging, Boundary Scan.

TEXT BOOKS:

1. Shibu K V, "Introduction to Embedded Systems", Second Edition, Mc Graw Hill

REFERENCES:

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill
2. Frank Vahid and Tony Givargis, "Embedded Systems Design" - A Unified Hardware/Software Introduction, John Wiley
3. Lyla, "Embedded Systems" –Pearson
4. David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.

Deep Learning
(Professional Elective - II)

B.Tech III Year II Sem.	**L**	**T**	**P**	**C**
Course Code: 19EC3272	**3**	**0**	**0**	**3**

Course Objectives:

1. Introduced to the basic concepts of neural networks.
2. To Identify and analyze the various types of neural networks and models of neuron and apply accordingly.
3. Introduce the concept of deep learning and its types.
4. Explore the concepts of applications of deep learning.
5. Understand recursive networks, memory, Stochastic Encoders and Decoders

Course Outcomes:

Upon completing this course students will be able to:

1. Analyze and apply the basic the concepts of neural networks
2. Analyze various types of neural networks and use various activation functions to solve complex problems.
3. Relate the concept of deep learning and its architecture.
4. Design and carry out empirical analysis for various types of applications of deep learning systems.
5. Analyze recursive networks, memory, Stochastic Encoders and Decoders

UNIT-I- Introduction to Neural networks: Characteristics of Neural Networks, Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws, Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units. Introduction, Analysis of pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of pattern storage Networks. Analysis of Pattern Mapping Networks.

UNIT – II-Feedback Neural Networks: Introduction, Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks. Competitive Learning Neural Networks & Complex pattern Recognition

Introduction, Analysis of Pattern Clustering Networks, Analysis of Feature Mapping Networks, Associative Memory.

UNIT-III: Fundamentals of Deep Learning: Defining Deep Learning, Common architectural principles of Deep Networks, Building Blocks of Deep Networks, and Major architectures of Deep Networks: Unsupervised Pretrained Networks, Convolution Neural Networks (CNNs), Recurrent Neural Networks.

UNIT-IV: Convolution Neural Networks: The convolution operation, motivation, pooling, Convolution and Pooling as an Infinitely Strong Prior, Applications of deep learning: Large scale deep learning, Computer vision, Speech Recognition, Natural Processing, other applications.

UNIT V: Sequential Modelling Recurrent neural networks: Recursive neural networks, The long short – term Memory, explicit memory, Auto encoders: Under complete, regularized, Stochastic Encoders and Decoders, Denoising Auto encoders

TEXT BOOKS:

1. Artificial Neural Networks B. Yagna Narayana, PHI.(Chapter 1,2 and 3)
2. Deep Learning: A Practitioner's Approach by Josh Patterson, Adam Gibson.
3. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning." An MIT Press book in preparation. (2015)-http://www.deeplearningbook.org/

REFERENCES:

1. Neural Networks by Simon Haykin PHI
2. Deep learning (Adaptive computation &Machine learning) by Ian Good Fellow, Yoshua Bengio, Aran Courville.
3. Fundamentals of Neural Networks: Architectures, Algorithms and Applications, by Fausett.

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(PROFESSIONAL ELECTIVE – II)

B.Tech. III Year IISem. **LT P C**
Course Code: 19EC3273 **3 0 0 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 analysers for generating and analysing 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 5th Edition 2003.
3. Electronic Measurements and Instrumentation: B.M. Oliver, J.M. Cage MC GRAW HILL EDUCATION Reprint2009.
4. Industrial Instrumentation: T.R. Padmanabham Springer2009.

Data Science and Data Analytics

(PROFESSIONAL ELECTIVE – II)

B.Tech. III Year II Sem. **L T P C**
Course Code: 19EC3274 **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 Series 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. Student's Handbook for Associate Analytics – II, III. R18 B.Tech.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.
3. 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.

Linear IC Applications Lab

Course Code: 19EC3251
B.Tech. III Year II Sem. **L T P C**
0 0 3 1.5

List of Experiments (any twelve Experiments are to be conducted)

Design and Verification of

Applications of op amp using IC 741

1. Voltage Follower
2. Inverting Amplifier and Non Inverting Amplifier
3. Summing Amplifier
4. Zero Crossing Detector
5. Schmitt Trigger using IC 741
6. Differentiator
7. Integrator
8. Multivibrators using op amp
    a. Astable
    b. Monostable
9. RC Phase Shift Oscillator Using Op Amp
10. Wein Bridge Oscillator
11. Multivibrators Using 555 Timer
    a. Astable
    b. Monostable
12. Active filters-LPF, HPF (First Order)
13. VCO Using 565 PLL
14. Voltage Regulator Using IC 723
15. Three terminal voltage regulators-7805, 7809, 7912

Major Equipment required for Laboratories:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply.
2. 20 MHz Oscilloscope with Dual Channel.
3. Bread board and components/ Trainer Kit.
4. Multimeters

ICs required: IC 741, IC 555, IC565, IC 723, 7805, 7809, 7912

DIGITAL SIGNAL PROCESSING LAB

B.Tech. III Year II Semester **L T P C**
Course Code: 19EC3252 **0 0 3 1.5**

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 FET 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

Python Programming Lab

B.Tech. III Year II Sem. **L T P C**
Course Code: 19EC3253 **0 0 2 1**

Prerequisites: Students should install Python on Linux/Windows platform.
Course Objectives:

- To introduce basic concepts of Python programming language.
- To understand the syntax in Python.
- To familiarize different Arithmetic operations using Python
- To learn using various functions and loops using Python.

Course Outcomes: At the end of the lab Student should be able to

- understand the basic concepts and contributions of Python language.
- Perform various arithmetic operations in Python.
- Perform do different operations using loops using Python

Note: - Minimum of 12 experiments has to be conducted.
List of Programs:

1) a)Write a program to demonstrate different number data types in Python.

   b)Write a program to perform different Arithmetic Operations on numbers in Python.

2) a)Write a program to create, concatenate and print a string and accessing sub-stringfrom a given string.

   b)Write a python script to print the current date in the following format "Sun May 2902:26:23 IST 2017"

3) Write a program to create, append, and remove lists in python.

4) Write a program to demonstrate working with tuples in python.

5) Write a program to demonstrate working with dictionaries in python.

6) a)Write a python program to find largest of three numbers.

   b)Write a Python program to convert temperatures to and from Celsius, Fahrenheit.Formula : c/5 = f-32/9]

7) a) Write a Python program to construct the following pattern, using a nested for loop

```
*
* *
* * *
* * * *
* * *
* *
*
*
```

   b) Write a Python script that prints prime numbers less than 20.

8) Write a python program to find factorial of a number using Recursion.
9) Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recallfrom the Pythagorean Theorem that in a right triangle, the square of one side equalsthe sum of the squares of the other two sides).
10) Write a python program to define a module to find Fibonacci Numbers and import themodule to another program.
11) Write a python program to define a module and import a specific function in thatmodule to another program.
12) Write a script named **copyfile.py**. This script should prompt the user for the names oftwo text files. The contents of the first file should be input and written to the second file.
13) Write a program that inputs a text file. The program should print all of the uniquewords in the file in alphabetical order.
14) a) Write a Python class to convert an integer to a roman numeral.
b) Write a Python class to implement pow(x, n)
15) Write a Python class to reverse a string word by word

19EC3291: TECHNICAL PAPER PRESENTATION

B.Tech. III Year II Sem.

L	T	P	C
0	0	2	1

GENERAL INSTRUCTIONS

1. **Pick The Right Topic**: Make sure that you find this topic genuinely interesting, or find some aspect of it that is especially cool.

2. **Skim Your Textbook:** Look over the syllabus, read the newspapers regularly, look through recent issues of relevant journals and magazines, surf the net, watch the Technical news, talk to your classmates and friends to get innovative Ideas.

3. **Narrow down Your Topic**: Many good ideas are wasted because students have a hard time focusing on a narrow enough topics. If your topic is way too broad, try homing in on some part of that topic, and exploring that area in more depth.

4. **My Topic is Too Narrow**: Generalize to similar or related topics (cloning of humans vs. cloning of animals, unexpected social problems that might result from cloning, technical aspects of cloning, moral or religious issues related to cloning, etc.). But keep your focus clear throughout

5. **Organize Your Thoughts In A Good Outline**: Outlining is a genuine pain, especially in the early stages of your paper, by forcing you to come in terms of writing the topic. Try to reveal major deficiencies in your approach. Use it on your first draft to get your bearings, or on your final draft to check the way you've organized your paragraphs.