Program Structure and Syllabus of B. Tech III Year (I & II Semesters)

ELECTRONICS & COMMUNICATION ENGINEERING (ECE)

R20 Regulations

ANURAG UNIVERSITY
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B.TECH III YEAR I SEMESTER 5T+ 3L

S.No	Course Code	Category	Course Title	L	T	P	Credits
1	A55020	PC	Analog Communication Systems	3	0	0	3
2	A55021	PC	Microprocessors & Microcontrollers and Interfacing	2	1	0	3
3	A55022	PC	Linear Control Systems	2	1	0	3
4	A55023	PC	VLSI Design	3	0	0	3
5	A55080 A55093 A55041	OE	**Open Elective – I** 1. Entrepreneurship Development 2. Fundamentals of Engineering Materials 3. Mobile Application Development	3	0	0	3
6	A55206	PC	Analog Communication Systems Lab	0	0	2	1
7	A55207	PC	Microprocessors & Microcontrollers and Interfacing Lab	0	0	3	1.5
8	A55208	PC	VLSI Design Lab	0	0	2	1
9	A55091	MC	NSS/NSO	2	0	0	0
10	A55288	HS	LRQA	0	0	3	1.5
Total				**15**	**02**	**10**	**20**

III YEAR II SEMESTER 5T+3L

S.No	Course Code	Category	Course Title	L	T	P	Credits
1	A56026	HS	Project Management	3	0	0	3
2	A56027	PC	Digital Communication	2	1	0	3
3	A56028	PC	Digital Signal Processing	3	1	0	4
4	A56029	PC	Embedded Systems & IOT	3	0	0	3
5	A56030 A56031 A56032	PE	**Professional Elective-I** 1. CPLD &FPGA Architectures 2. Computer Organization and Operating System 3. Computer Networks	3	0	0	3
6	A56206	PC	Digital Signal Processing Lab	0	0	3	1.5
7	A56207	PC	Embedded Systems & IOT Lab	0	0	3	1.5
8	A56230	HS	Skills Integrated English Lab	0	0	2	1
Total				**14**	**02**	**08**	**20**

ANALOG COMMUNICATION SYSTEMS

B. Tech III Year I Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A55020	PC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Prerequisite: Signals and Systems, Electronic Devices & Circuits

Course Objectives:

- To learn the basic concepts of amplitude modulation.
- To study DSB-SC and SSB-SC modulation generation and detection methods.
- To know about AM transmitters, receivers and know their performance.
- To study the concepts of angle modulation techniques and know their applications.
- To analyze the noise performance of Analog Modulation systems.

Unit-I: Amplitude Modulation:

Introduction to communication system, need for modulation, amplitude modulation-definition, time domain and frequency domain description, power relations in AM waves, Generation of AM waves:- square-law modulator, switching modulator. Detection of AM waves:-square law detector, envelope detector.

Unit-II: DSB-SC and SSB-SC Modulation:

DSB-SC Modulation: Definition, time domain and frequency domain description. Generation of DSBSC Waves- balanced modulator, ring modulator. Demodulation of DSB-SC waves- coherent detection, COSTAS Loop. SSB-SC modulation- Definition, time domain and frequency domain description. Generation of SSB-SC waves, frequency discrimination method and phase discrimination method. demodulation of SSB waves using synchronous detector.

Unit III: AM Transmitters and Receivers:

Introduction to vestigial side band modulation. AM transmitter block diagram and explanation of each block. AM receiver types- tuned radio frequency receiver, super heterodyne receiver. RF section and characteristics- Frequency changing and tracking, comparison of AM, DSB-SC, SSB-SC and VSB-SC Techniques. Applications of different AM systems.

Unit IV: Angle Modulation:

Basic concepts, frequency modulation: single tone frequency modulation, spectrum analysis of sinusoidal FM wave, narrow band FM, wide band FM, power and transmission bandwidth of FM wave. comparison of FM and AM.
Generation of FM waves: Direct method- parametric variation method (varactor diode, reactance modulator). Indirect method:- Armstrong method. Detection of FM waves-balanced frequency discriminator, phase locked loop.

Unit V: Noise and Pulse Modulation:

Noise in analog communication system, noise in DSB and SSB system, noise in AM System, pre-emphasis and de-emphasis. Types of Pulse modulation, PAM (Single polarity, double polarity) PWM- Generation and demodulation of PWM. PPM- Generation and demodulation of PPM.

Text Books:

1. H Taub & D. Schilling, Gautam Saha, “Principles of Communication Systems”, TMH, 3rd edition, 2007.
2. R.P. Singh, SP Sapre, “Communication Systems”, TMH, 2nd edition, 2007

Reference Books:

1. George Kennedy and Bernard Davis, “Electronics & Communication System”, TMH, 4th edition, 2009.
2. Simon Haykin, John Wiley, “Communication Systems”, Wiley, 4th edition, 2008.
3. KN Hari Bhat & Ganesh Rao, “Analog Communications”, Pearson Education India, 2nd edition, 2008.
4. B.P Lathi, “Communication Systems”, BS Publication, 2006.

Course Outcomes:

After completing this course, the student will be able to

- Understand the need for modulation and basic concepts of Amplitude modulation.
- Explain the advantages of DSB-SC and SSB-SC modulation techniques compared to AM.
- Apply and relate analog modulation techniques to real time applications like telecommunications, TV’s etc.
- Discuss the angle modulation technique FM its performance.
- Describe the noise performance of AM, DSB-SC, SSB-SC and FM Systems.

MICROPROCESSORS & MICROCONTROLLERS AND INTERFACING

B. Tech III Year I Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A55021	PC	L	T	P	C	CIE	SEE	Total
		2	1	0	3	40	60	100

Prerequisite: Digital Circuits

Course Objectives:

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

Unit-I: 8085 Microprocessor:

Evolution of microprocessors, the 8085 microprocessor, microprocessor communication and bus timings, generating control signals, 8085 MPU and its architecture and pin diagram, decoding and executing an instruction, instruction set and assembly language programming.

Unit–II: 8086 Microprocessor:

8086 architecture, register organization, memory segmentation, programming model, memory Addresses, physical memory organization, signal descriptions of 8086, timing diagrams. Addressing modes, assembler directives, macros, instruction set and assembly language programming of 8086: addressing modes, assembler directives, macros, simple programs involving logical, arithmetic expressions and string manipulations.

Unit–III: Interfacing to Microprocessors:

I/O interface with 8255-PPI, 8255-various modes of operation and interfacing to 8086, interrupt structure of 8086, serial communication standards, 8251 USART architectures and its interfacing to 8086, RS-232C. 8257 DMA controller and its interfacing to 8086, memory interfacing to 8086.

Unit-IV: 8051 Microcontroller:

Architecture, I/O ports, register set, memory organization, addressing modes and instruction set of 8051, interrupts in 8051, interrupt priority in the 8051.

Unit–V: Interfacing to Microcontroller:

Timers/Counters and serial communication registers in 8051, interface with keyboard & displays, serial data communication and timer/counter interfacing program.

Text Books:

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

Reference Books:

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

Course Outcomes:

After completing the course, students should be able to

- Write the assembly language programs of 8085 for simple applications.
- Write assembly language programs for different addressing modes of 8086.

Apply the knowledge of interrupt structure of 8086, communication standards and serial communication in 8086 interfacing.

- Write the assembly language programs of 8051 for simple applications.
- Design 8051 interfacing with different peripherals.

LINEAR CONTROL SYSTEMS

B. Tech III Year I Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A55022	PC	L	T	P	C	CIE	SEE	Total
		2	1	0	3	40	60	100

Prerequisite: Signals and systems, Mathematics

Course Objectives:

- To introduce basic concepts of control systems and transfer function representation
- To employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions and identify the needs of different
  types of controllers to ascertain the required dynamic response from the system
- To formulate different types of analysis in frequency domain to explain the nature of stability of the system.
- To design compensators and determine the stability of the system using state space analysis

Unit - I: Introduction to Control System:

Introduction: Concepts of control systems, open-loop and closed-loop systems. different examples of control systems. feedback characteristics, effects of feedback. Transfer function representation: block diagram algebra, determining the transfer functionfrom block diagrams, signal flow graphs(SFG) - reduction using mason's gain formula.

Unit - II: Time Response Analysis & PID Controllers:

Time response analysis- standard test signals. Time response of first and second order systems. Time domain specifications, steady state errors and error constants. PID controllers- effects of proportional derivative, proportional integral systems on steady state error.

Unit - III: Stability Analysis:

Concept of stability - Routh-Hurwitz Criteria. limitations of Routh's stability.
Root-Locus technique- construction of Root-loci, effects of adding poles and zeros to G(s)H(s) on the root loci.

Unit - IV: Frequency Response Analysis:

Introduction, frequency domain specifications, determination of frequency domain specifications from the bode diagrams, polar plots, concept of nyquist stability criterion.

Unit - V: Compensation Techniques & State Variable Analysis:

Compensation techniques – lag, lead, lead-lag compensators design in frequency domain. State Variable analysis - concepts of state variables, state space model, solution of state equations, state transition matrix (STM) and its properties, concept of controllability and observability.

Text Books:

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

References:

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

Course Outcomes:

After completing the course, students will be able to

- Characterize any system in Laplace domain to illustrate different specification of the system using transfer function concept.
- Employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions & effect of controllers on steady state response.
- Apply Routh-Hurwitz criterion and Root Locus to determine the stability of linear time-invariant systems in time domain.
- Formulate different types of analysis in frequency domain to explain the nature of stability of the system.
- Identify the needs of different types of compensator to ascertain the required dynamic response from the system and analyse linear control system using the state space technique.

VLSI DESIGN

B. Tech III Year I Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A55023	PC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Prerequisite: Electronic Devices & circuits, Digital Circuits

Course objectives:

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

Unit-I: Introduction to IC Technology and Electrical Properties:

Metal-oxide-semiconductor (MOS), P-channel MOS, N-channel MOS, complementary MOS(CMOS) and Bi-CMOS technologies- oxidation, lithography, diffusion, ion implantation, metallization, encapsulation, probe testing, integrated resistors and capacitors, CMOS nanotechnology. Basic electrical properties : Basic electrical properties of MOS and Bi-CMOS circuits- Ids-Vds relationships, MOS transistor threshold voltage, 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, 2μm CMOS design rules for wires, contacts and transistors layout diagrams for NMOS and CMOS inverters and logic gates, scaling of MOS circuits.

Unit- III: Gate Level Design Data Path Subsystems:

Complex gates, switch logic, alternate gate circuits, time delays, driving large capacitive loads, wiring capacitances, fan-in and fan-out, choice of layers. Data path subsystems: Subsystem design, shifters, adders, ALUs, multipliers, parity generators, comparators, zero/one detectors, counters.

Unit- IV: Array Subsystems and Semiconductor Integrated Circuit Design:

SRAM, DRAM, ROM, serial access memory, content addressable memory

Semiconductor integrated circuit design: PLAs, FPGAs, CPLDs, standard cells, programmable array logic, design approach, parameters influencing low power design.

Unit- V: CMOS Testing:

CMOS testing, need for testing, test principles, design strategies for test, chip level test techniques, system-level test techniques, and layout design for improved testability.

Text Books:

1. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, “Essentials of VLSI circuits and systems”, PHI, 2005 Edition.
2. Wayne Wolf, “Modern VLSI Design” Pearson Education, 3rd Edition, 2002.

References:

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

Course Outcomes:

After completing the course, students should be able to

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

Entrepreneurship Development

B. Tech III Year I Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A55080	OE	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Course Objectives:

- To familiarize the student with entrepreneurship, the issues involved in it,
- The potential of entrepreneurship and intrapreneurship,
- The legal environment and statutory issues and explore various funding opportunities.

Unit – I: Introduction to Entrepreneurship:

Entrepreneurship and intrapreneurship, business incubators, rural entrepreneurship, social entrepreneurship, women entrepreneurs, role of entrepreneurs in economic development, types of entrepreneurs. entrepreneurial mind set and stress, causes of failure.

Unit – II: Opportunity Identification:

Myths and realities of entrepreneurship, opportunity identification, problem worth solving, idea generation techniques, design thinking.

Unit – III: Customer Analysis:

Market segmentation, consumer persona, product market fit, unique value proposition.

Unit – IV: Business Model and MVP:

Business model canvas, MVP, risks and assumptions, importance of financial planning.

Unit – V: Organizational Forms Funding Opportunities:

Organizational forms - Partnership, sole proprietorship, corporation. intellectual property rights- copyrights, trademarks, patents. law vs. ethics, informal capital-friends and family, angels, venture capitalists, idea/ patent, growth strategies.

Textbooks:

1. Vasant Desai, YayatiNayak, “Entrerpreneurship”, Himalaya Publishing House,2018
2. Rajeev Roy, “Entrepreneurship”, Oxford University Press, 2/e, 2012

References:

1. 1.D.F.Kuratko and T.V.Rao, “Entrepreneurship”, Cengage Learning,2012
2. 2.Dhruv Nath, Sushanto Mitra, “Funding Your Startup: And Other Nightmares”, 2020
3. V Srinivasa Rao, “Lean Digital Thinking: Digitalizing Businesses in a New World Order”, Bloomsbury India, 2021
4. S.K.Mohanty, “Fundamentals of Entrepreneurship”, PHI, 1/e,2005
5. MOOCS by Wadhwani Foundation

Course Outcomes:

After completing the course, students should be able to

- Interpret the concepts of Entrepreneurship and Intrapreneurship.
- Apply the opportunity identification techniques
- Differentiate needs of different segments and their
- Develop business model and MVP
- Recognize organizational forms, IPR concerns and funding opportunities for startups.

Fundamentals of Engineering Materials

B. Tech III Year I Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A55093	OE	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Course Objectives:

- Identify the relation between processing, structure and physical properties
- Understand the phase diagrams of binary systems
- Study the heat treatment principles
- Classify the different types of ferrous and non-ferrous metals
- Learn the recent developments in materials science and engineering

Unit-I: Crystal Structure:

Unit cells – metallic crystal structures – imperfections in solids: point, line, surface and volume defects – dislocation strengthening mechanisms – effect of grain size on the properties of metals and alloys

Unit-II: Alloys and Phase diagrams:

Necessity of alloying – effect of various alloying elements – substitutional and interstitial solid solutions – Hume Rothery's rules for solid solution – phase rule – lever rule. Phase diagrams: Interpretation of binary phase diagrams – isomorphous, eutectic, peritectic diagrams – iron iron-carbide phase diagram

Unit-III: Heat Treatment:

Annealing, normalizing, hardening, tempering, austempering, martempering – isothermal transformation curves – continuous cooling curves – surface hardening methods: case hardening, carburizing, nitriding, cyaniding, carbo-nitriding – age hardening

Unit-IV: Ferrous Metals, Non-Ferrous Metals and Alloys:

Ferrous metals: Classification, properties and applications of cast irons, plain carbon steels, stainless steel, tool steels, maraging steels, hadfield manganese steels, high speed steels. Non-ferrous metals and alloys: Properties and applications of copper and copper alloys: brass, bronze and cupro-nickel – aluminum and Al-Cu-Mg alloys – nickel based super alloys – titanium alloys

UNIT-V: Non-metals:

Classification, properties and applications of polymers, ceramics, composites and nano materials

Text Books:

1. Sidney H. Avener,"Introduction to Physical Metallurgy",Tata Mc-Graw Hill Publications.
2. Donald R. Askeland,"Essential of Materials for Science and Engineering", CL Engineering Publications.
3. Kodgire,"Material Science and Metallurgy", Everest Publishing Home.

References Books:

1. Agarwal,"Science of Engineering Materials",McGraw Hill Education.
2. William and collister,"Materials Science and Engineering", John Wiley and Sons.
3. V. Raghavan,"Elements of Material Science",Prentice Hall India Learning Pvt Ltd.
4. W. G. Vinas and H. L. Mancini,"An Introduction to Material Science", Princeton University Press.
5. R. A. Flinn and P. K. Trojan,"Engineering Materials and their Applications",Jaico books.

Course Outcomes:

At the end of this course, students will be able to:

- Discuss the crystal structure and defects
- Demonstrate the concept of alloying
- Construct the equilibrium diagrams of different alloys
- Select suitable heat treatment process to achieve desired properties of materials classify metals and non- metals

Mobile Application Development

B. Tech III Year I Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A55041	OE	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Course Objectives:

- Outline the usage of Android development framework.
- Understand the main components of an Android application and its entire life Cycle.
- Develop database programming using SQLite.
- Identify the use of location-based service in android applications.
- Build SMS and MMS applications using Intents.

Unit-I:Introduction to Android

Introduction to android, features of android, the development framework: understanding the android software stack, android application architecture; the dalvik virtual machine, creating first android application, types of android applications, android development tools: the android virtual device manager, android emulator, the dalvik debug monitor service.

Unit-II: Creating applications and Activities:

Introduction to the application manifest file, using the manifest editor, externalizing resources: creating resources - simple values, drawables, layouts, menus, animations. the android activity life cycle. building user interfaces: fundamental android ui design, introducing layouts: defining layouts, using layouts to create device independent user interfaces, optimizing layouts.

Unit-III: Databases and Content Providers:

Introduction to android databases, introducing sqlite, content values and cursors, working with sqlite databases - introducing the sqliteopenhelper, querying a database, extracting values from a cursor, adding, updating, and removing rows, creating content providers, using content providers - introducing the content resolver, querying content providers, adding, deleting, and updating content

Unit-IV: Maps and Location based services:

Using the location-based services, selecting a location provider, selecting a location provider, finding current location; Creating map-based activities: Introducing map view and map activity, creating a map-based activity, maps and fragments

Unit-V: Telephony and SMS:

Using telephony - initiating phone calls, accessing telephony properties and phone state, monitoring changes in phone state using the phone state listener, introducing SMS and MMS -using SMS and MMS in your application, sending SMS and MMS from your application using intents, sending SMS messages using the SMS manager.

Text Book:

1. Reto Meier, “Professional Android 4 Application Development”, 1stEdition, Wrox Press, Wiley Publishing, 2014.

Reference Books:

2. Pradeep Kothari, “Android Application Development (with Kitkat Support)”, Black Book, 2014.
3. Erik Hellman, “Android Programming: Pushing the Limits”, 1st Edition, Wiley Publications, 2014.
4. Mike Wolfson, “Android Developer Tools Essentials”, O’Reilly Edition, 1st Edition, 2013.

Course Outcomes:

At the end of this course, students will be able to:

- Analyze the architecture of android and current trends in mobile operating systems.
- Apply suitable software tools and APIs for the design of user Interfaces to a particular mobile application.
- Design applications for mobile devices using SQLite database.
- Apply the location-based services in android applications.
- Summarize the monitoring changes to the phone, network, data connectivity and SIM states.

ANALOG COMMNICATION SYSTEMS LAB

B. Tech III Year I Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A55206	PC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100

List of Experiments:

PART-A

All the experiments to be simulated using MATLAB or equivalent:

1. Amplitude Modulation & Demodulation
2. SSB-SC Modulation & Demodulation
3. Frequency Modulation & Demodulation
4. Frequency Synthesizer
5. Spectrum analysis of AM and FM Signals
6. Pulse Position Modulation & Demodulation

. PART-B

All the experiments to be verified in Hardware:

1. Amplitude Modulation & Demodulation
2. DSB-SC Modulation & Demodulation
3. Frequency Modulation & Demodulation
4. Frequency Synthesizer
5. Pulse Amplitude Modulation and Demodulation
6. Pulse Width Modulation & Demodulation

Equipments required for Laboratory:

i) CRO's - 0-20 M Hz
ii) Function Generators - 0- 1 M Hz
iii) Trainer kits
iv) TV Receiver Demo kit
v) Software: MATLAB or Equivalent
vi) Computers with latest Specifications.

Outcomes:

After completing the course, students should be able to

- Generate and detect analog modulated signals such as AM, DSB-SC, SSB-SC and FM and to analyze their performance.
- Study the functionality of Frequency Synthesizer and its applications.
- Generate and detect analog modulated signals such as PAM, PPM and PWM and to analyze their performance.
- Observe the spectral Characteristics of AM and FM signals.

MICROPROCESSORS & MICROCONTROLLERS AND

INTERFACING LAB

B. Tech III Year I Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A55207	PC	L	T	P	C	CIE	SEE	Total
		0	0	3	1.5	40	60	100

Course objectives:

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

Note: Minimum of 12 experiments to be conducted.

List of Experiments:

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

1. Programs for 16 bits arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array and to generate Fibonacci series for 8086.
3. Programs for string manipulations for 8086.
4. Program for digital clock design using 8086.
5. Interfacing ADC and DAC to 8086.
6. Parallel communication between two microprocessors using 8255.
7. Interfacing to 8086 and programming to control stepper motor using.
8. To interface Seven Segment Display using 8086
9. Programming using arithmetic, logic and bit manipulation instructions of 8051.
10. Program and verify Timer / Counter in 8051.
11. Program and verify Interrupt handling in 8051.
12. UART Operation in 8051.
13. LCD interface with 8051.
14. Keypad Interface with 8051.

Course outcomes:

After completing the course, students should be able to

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

VLSI DESIGN LAB

B. Tech III Year I Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A55208	PC	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100

Course Objectives

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

List of Experiments:

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

E-CAD programs:

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

Cycle -1

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

Cycle -2

VLSI Experiments:

Experiments can be done using CADENCE or Equivalent CAD tools

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

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

Requirements:

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

Course Outcomes:

After completing the course, students should be able to

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

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

2 / 0 / 0 0

A55091 NSS / NSO

LRQA

B. Tech III Year I Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A55288	HS	L	T	P	C	CIE	SEE	Total
		0	0	3	1.5	40	60	100

Course Objectives

Unit- I:

Number System : Speed Math's , Numbers , Factors ,Prime and co primes , LCM & HCF , Divisibility rules , Finding the unit digit and applications , remainder theory. Ratio and Proportion with Ages: Definition of ratio and Proportion, Finding the resultant ratio. Problems based on Ratios and ages. Percentages: Introduction to percentages, percentage increase /decrease, results on population, results on depreciation, variations, applications of percentage Profit and Loss: Classification of profit and loss, profit/ loss percentages, successive discount.

Unit-II:

Time and Distance: Difference between the average, relative and effective speed , reaching the destination late and early , stoppage time per hour, problems based on trains and problems based on boats. Time and Work: Calculating efficiency, alternate days concept, work and wages ,chain rule , problems based on pipes and cisterns. Simple and Compound Interest : Simple interest ,principle , rate, amount , applications of simple interest , compound interest , compounded annually , compounded half yearly , compounded quarterly , difference between simple and compound interest .

Unit-III:

Permutations and Combinations: Fundamental rules, problems on permutations and combinations. Probability: Definition, notations and problems based on probability. Mean, Median and Mode : Introduction and problems on mean, median and mode. Partnership: Relation between partners, period of investments and shares. Averages: Average of different groups, change in average by adding, deleting and replacement of objects. Flow Chart : Introduction of symbols and problems on flow charts.

Unit-IV:

Seating Arrangement: Circular, Row, Column, Square and Double row arrangement. Puzzles : Paragraph, incomplete puzzles and problems on them. Number Series: Number, Alphabet and Letter Series. Analogy: Simple, Double, Word and Number Analogy. Coding and Decoding: Classifications and Problems on Coding and Decoding.

Unit-V:

Clocks: Relation between minute and hour hand, angle between hands of a clock, exceptional cases in clocks. Gaining and loosing of time. Calendars: Classification of years, finding the day of any random calendar date, repetition of calendar years. Direction Sense Test: Sort of directions in puzzle, distance between two points, Problems on shadows. Blood Relations: Defining the various relations among the members of a family, Solving blood relation puzzles by using symbols and notations. Problems on coded relations.

Text Books :

1. R.S Agarwal,*"Verbal and Non Verbal Reasoning",* New Edition -2020, S. Chand.
2. R.S Agarwal,*"Quantitative Aptitude",* New Edition- 2020, S. Chand.

References:

1. Abhijeet Guha,*"Quantitative Aptitude",* New Edition-2020, Mc Graw Hill.

Course Outcomes:

After completing the course, students should be able to

PROJECT MANAGEMENT

B. Tech III Year II Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A56026	HS	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Course objectives:

- understand the concepts of project management,
- explain how to identify the projects and planning,
- analyze how to execute the projects,
- assess how to lead the team and evaluation of projects
- to explain the Performance Measurement and Evaluation of the projects.

UNIT-I: Introduction

Introduction to project management, need for project management, project management principles. Project lifecycle, project management phases in lifecycle, project management research in brief, project management today, organization structure, stake holder management, creating a culture for project management.

UNIT-II: Project Identification and Planning

Project identification process, defining the project, approaches to project screening and selection, project planning, work breakdown structure, financial module, getting approval and compiling a project charter, setting up a monitoring and controlling process.

UNIT-III: Project Execution

Initiating the project, controlling and reporting project objectives, conducting project evaluation, risk, role of risk management, project management, risk management an integrated approach, cost management, creating a project budget.

UNIT-IV: Leading Project Teams

Building a project team, characteristics of an effective project team. Achieving cross-functional co-operation, virtual project teams, conflict management, negotiations.

UNIT-V: Performance Measurement and Evaluation

Monitoring project performances, Project control cycles, Earned Value management, Human factors in project evaluation and control. Project termination, types of project terminations, project follow-up. Current and future trends in project management.

Text book:

1. Jeffery K. Pinto, “Project Management”, Pearson Education,2015
2.Gray, Larson, “Project Management”, Tata McGraw Hill,2015.

References Books:

1. Enzo Frigenti, “Project Management”, Kogan, 2015.
2. R. Panneerselvam & P. Senthilkumar, “Project Management”, PHI, 2015.
3. Thomas M.Cappels, “Financially Focused Project Management”, SPD,2008.
4. Guide to Project Management Body of Knowledge (PMBOK® Guide) of Project Management Institute, USA.

Course outcomes:

After completing the course, students should be able to

- Explain the phases of project life cycle.
- Identify the projects and planning the projects
- Evaluate to control the project execution.
- Analyze how to lead the project team
- Discuss the recent trends in project management.

DIGITAL COMMUNICATION

B. Tech III Year II Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A56027	PC	L	T	P	C	CIE	SEE	Total
		2	1	0	3	40	60	100

Prerequisite: Signals & Systems, Analog Communication Systems and Digital Circuits

Course Objectives:

- To understand the model of digital communication system and its individual blocks.
- To study various digital modulation techniques and their performance in terms of Probability of error.
- To describe the concept of entropy and need for source coding technique.
- To analyze the necessity of error control coding in digital communication systems.
- To discuss the concept of spread spectrum technique and its applications in CDMA.

UNIT –I: Digital Communication System and Baseband Transmission:

Model of digital communication system, advantages of digital communication system, digital representation of analog signal. baseband transmission-pulse code modulation (PCM), PCM generation and reconstruction, quantization noise, Non uniform quantization and companding, differential pulse code modulation(DPCM), delta modulation (DM) and it's draw backs, adaptive delta modulation (ADM), noise in PCM and DM.

UNIT- II: Digital Modulation Techniques:

Amplitude shift keying (ASK), ASK modulator, ASK detector, binary frequency shift keying (BFSK), bandwidth and frequency spectrum of BFSK, non coherent BFSK detector, binary phase shift keying (BPSK), coherent BPSK detector, quadrature phase shift keying (QPSK), signal space representation, probability of error of ASK, BFSK and BPSK.

UNIT-III: Information Theory:

Information and entropy, conditional entropy and redundancy, mutual information, source coding techniques-Shannon-Fano coding, Huffman coding, Source coding to increase average information per bit. Bandwidth- S/N tradeoff, Hartley-Shannon law.

UNIT-IV: Error Control Coding:

Matrix description of linear block codes, Error detection and correction capabilities of linear block codes. Cyclic codes - Algebraic structure and encoding, Syndrome

calculation and decoding. Convolutional codes - Encoding using state, Tree and trellis diagrams, Decoding using veterbi algorithm.

UNIT-V: Spread Spectrum Modulation:

Use of spread spectrum, direct sequence spread spectrum (DSSS), spread spectrum and code division multiple access, ranging using DSSS, frequency hopping spread spectrum, PN sequence generation and characteristics.

Text Books:

1. Herbert Taub. Donald L Schiling, Goutam Saha, *"Principles of communication systems"*, McGraw-Hill,Third Edition, 2008.
2. Simon Haykin, "*Digital Communication*", John Wiley, 2008.

Reference Books:

1. John G. Proakis,Masoudsalehi, "*Digital Communications*",McGraw-Hill,Fifth Edition, 2008.
2. Ian A. Glover, Peter M. Grant, "*Digital Communications*", Pearson Education, Third Edition 2008.
3. R.P Singh, S D Sapre ,"*Communication Systems*", McGraw-Hill,Second Edition,2007.

Course Outcomes:

After completing this course, the student will be able to

- Understand the advantages of digital communication system.
- Analyze the performance of various digital modulation techniques such as ASK, FSK and PSK in terms of their probability of error.
- Apply source coding technique to increase average information per bit
- Study block codes, cyclic codes and convolutional codes.
- Get familiarized with spread spectrum systems.

DIGITAL SIGNAL PROCESSING

B. Tech III Year II Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A56028	PC	L	T	P	C	CIE	SEE	Total
		3	1	0	4	40	60	100

Prerequisite: Mathematics -I, Signals and Systems.

Course Objectives:

- To understand the fast computation of DFT and appreciate the FFT processing
- To study the designs and structures of digital (IIR and FIR) filters and analyze and synthesize for a given specifications.
- To learn the design procedures used for filter bank and FIR filter
- To learn to program a DSP processor to filter signals

Unit –I: Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT):

Review - Sampling Theorem, Fourier series, Fourier Transform. Discrete Fourier Series (DFS)- representation of periodic sequences, properties. Discrete Fourier transform- properties, linear convolution of sequences using DFT, computation of DFT. Relation between Z-transform and DFT. Fast Fourier Transform-Radix-2 decimation in time and decimation in frequency FFT algorithms.

Unit-II: Realization of Digital Filters:

Application of Z-transforms, solution of difference equations of digital filters, block diagram representation of linear constant coefficient difference equations. Basic structures of IIR systems-direct form-I, direct form-II, cascade, parallel structure. Basic structures of FIR systems-direct form, cascade form, linear phase structure.

Unit-III: Infinite Impulse Response (IIR) Digital Filters:

Analog filter approximations-Butterworth and Chebyshev. Design of IIR digital filters from analog filters, Impulse Invariance and bilinear transformation method.

Unit-IV: Finite Impulse Response (FIR) Digital Filters & Multirate Digital Signal Processing:

Characteristics of FIR digital filters, frequency response, design of FIR digital filters using window techniques, frequency sampling technique, comparison of IIR and FIR filters.
Multirate Signal Processing: Decimation, Interpolation, Sampling rate conversion, Implementation of sampling rate conversion.

Unit–V: Introduction to Digital Signal Processors:

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

Text Books:

1. John G. Proakis, Dimitris G.Manolakis, "Digital Signal Processing- principles, Algorithms, and Applications",fourth edition, Pearson Education, 2007.
2. A. V. Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing" ,PHI,second edition, 2009.
3., B. Venkataramani,M. Bhaskar, "Digital Signal Processing-Architecture, Programming and Applications" ,TATA McGraw Hill, 2002.

References Books:

1. Emmanuel C. Ifeachor and Barrie W. Jervis,"*Digital Signal Processing - A Practical approach*",second Edition, Pearson Education, 2009.
2. Andreas Antoniou," *Digital Signal Processing*",TATA McGraw Hill, Edition 2006.
3. MH Hayes, schaum's Outlines, "*Digital Signal Processing*",TATAMc-Graw Hill,2007.
4. Robert J. Schilling, Sandra L. Harris, "*Fundamentals of Digital Signal Processing using MATLAB*" , Thomson, 2007.
5. Alan V.Oppenheim, RonaldW. Schafer," *Digital Signal Processing*",PHI Edition.,2006

Course Outcomes:

After completing the course, the student will able to

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

EMBEDDED SYSTEMS & IoT

B. Tech III Year II Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A56029	PC	L	T	P	C	CIE	SEE	Total
		3	0	0	4	40	60	100

Prerequisite: Microprocessors & Microcontrollers and Interfacing

Course Objectives:

- To understand the prerequisite of embedded system,
- To differentiate embedded systems with general purpose systems.
- To analyze module requirement of embedded systems
- To evaluate the embedded systems applications to IOT
- To design the IoT applications for industry applications.

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
Typical Embedded System: Core of the embedded System: General purpose and domain specific processors, ASICs, PLDs, commercial off-the-shelf components (COTS).

Unit-II: Memories for embedded systems:

ROM, RAM, memory according to the type of interface, memory shadowing, memory selection for embedded systems, sensors and actuators, communication interface: On board-I2C and SPI, external communication interfaces-RS232, ethernet, USB, bluetooth,Wifi.

Unit-III: RTOS Based Embedded System Design:

Operating system basics, types of embedded operating systems, tasks, task scheduling algorithms : Preemptive, non-preemptive, round robin, weighted round robin. Kernel objects, semaphores, mutex, pipes and message queues.

Unit-IV: Introduction to Internet of Things (IoT):

Definition and characteristics of IoT, physical design of IoT, Logical Design of IoT, IoT enabling technologies, IoT Levels and deployment templates. Introduction to M2M, difference between IoT and M2M.

Unit-V: Domain Specific IoTs :

Home automation, cities, environment, energy, retail, logistics, agriculture , industry ,health and lifestyle.

Text Books:

1. Shibu K.V, *"Introduction to Embedded Systems",* McGraw Hill, edition 2,2016.
2. Raj Kamal, "Embedded Systems", TMH,2nd edition, 2008.
3. Vijay Madisetti, Arshdeep Bahga, —*Internet of Things (A Hands-on Approach*), Universities Press, 2015.

References Books:

1. Frank Vahid, Tony Givargis, "*Embedded System Design*", John Wiley, 3rd Edition, 2006.
2. Dr. K. V. K. K. Prasad; "*Embedded / real –time systems: concepts, design & programming*," Black Book; Dream tech press, Reprint edition 2013.
3. David E. Simon, "*An Embedded Software Primer*", Pearson Education, Reprint 2005.

Course Outcomes:

After completing the course, students should be able to

- Explain the basics of Embedded Systems.
- Apply basic concepts in designing Embedded Systems.
- Describe Different Embedded Systems Development tools in designing Embedded Systems.
- Utilize the techniques used in debugging embedded software.
- Design the applications of embedded systems

CPLD AND FPGA ARCHITECTURES

B. Tech III Year II Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A56030	PE	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Prerequisite: Digital Circuits, VLSI Design

Course Objectives:

- To understand the types of programmable logic devices and the differences between these devices.
- To gain knowledge of various FPGA architectures and their applications.
- To analyse and compare different architectures of FPGAs based on their performance
- To analyse and compare different architectures of CPLDs based on their performance
- To perform Case studies on advanced FPGA/CPLD architectures

Unit-I: Introduction to Programmable Logic Devices:

Introduction, simple programmable logic devices, read only memories, programmable logic arrays, programmable array logic architectures, applications implementation of MSI circuits using PLDs.

Unit –II: Field Programmable Gate Arrays:

Organization of FPGAs, FPGA programming technologies, programmable logic block architectures, programmable interconnects , programmable I/O blocks in FPGAs, dedicated specialized components of FPGAs, applications of FPGA.

Unit-III: FPGA Architectures:

Introduction, SRAM programmable FPGAs, anti-fuse programmable FPGAs, XC4000 architectures, Altera's FLEX 8000/10000 FPGAs and their performances. Case study: XC7Z020; XC7A200.

Unit –IV: CPLD Architectures:

Complex programmable logic devices; Altera MAX 7000, Actel ACT1, ACT2 and ACT3 Architectures and their performances, AMD's-CPLD (Mach 1 to Mach 5).

Unit-V: Design Applications:

Design considerations using CPLDs & FPGAs of parallel adder cell, Parallel adder sequential circuits, counters, multiplexers, parallel counters. Case study: design considerations of zynq7000 series and Artix7 series

Text Books:

1. S. Brown, R.Francis, J.Rose, Z.Vransic, "*Field Programmable Gate Array*", Kluwer Publications, 1992.

2. P.K. Chan & S. Mourad, "*Digital Design Using Field Programmable Gate Array*", prentice Hall(Pte), 1994.

Reference Books:

1. J. Old Field, R.Dorf, "*Field Programmable Gate Arrays*", John Wiley & Sons, New York, 1995.
2. S.Trimberger, Edr. "*Field Programmable Gate Array Technology*", Kluwer Academic Publications, 1994.

Course Outcomes:

After completing the course, student will be able to

- Acquire Knowledge about various architectures and device technologies of PLDs
- Comprehend FPGA Architectures.
- Describe different FPGA architectures and analyse their performances.
- Describe different CPLD architectures and analyse their performances.
- Analyze System level Design on advanced FPGA/CPLD architectures

COMPUTER ORGANIZATION AND OPERATING SYSTEM

B. Tech III Year II Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A56031	PE	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Prerequisite: Microprocessors & Microcontrollers and Interfacing

Course Objectives:

- To get familiarized with the concepts of memory connection to CPU.
- To understand the connectivity and communication between processors.
- To implement scheduling algorithms in operating system.
- To study single set of code that can be used by several processors at different stages of execution.
- To demonstrate the knowledge of task synchronization deadlock issues and allocating memory in OS.

Unit -I: Basic Structure of Computers and Memory Hierarchy:

Basic Structure of Computers-Computer Types, Functional Unit, Memory Hierarchy-Main memory, memory address map, memory connection to CPU, Auxiliary memory-Magnetic disks, magnetic tapes, Cache memory- hit and miss ratio, direct, associative and set associative mapping.

Unit-II: Multiprocessors:

Characteristic of multiprocessor, Interconnection structure- time shared common bus, multiport memory, cross bar switch, multistage switching network, Interprocessor communication and synchronization-mutual exclusion with a semaphore.

UNIT-III: Operating Systems Overview and Process Management:

Introduction-What operating system do, operating system structure (uni-programmed and multi programmed), operating system operations, operating system services, System calls, types of system calls, process scheduling – basic concepts, scheduling criteria, scheduling algorithms, thread scheduling.

Unit-IV: Multithreading and Synchronization:

Multithreaded programming-Overview, multithreading models, process coordination synchronization-background, the critical section problem, Peterson's solution, synchronization hardware, semaphore, classical problems of synchronization, monitors.

Unit-V: Deadlocks & Memory Management:

Principles of deadlock-system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, detection and avoidance, recovery from deadlock. Memory management- swapping, contiguous memory allocation, paging, segmentation.

Text Books:

1. M.Morris Mano, "*Computer Systems and Architecture*" , Third Edition, Pearson /PHI,2011.
2. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "*Operating System Concepts*", 9th edition , John Wiley, 2016.

References Books:

1. **C.** Hamacher, Z. Vranesic and S. Zaky, "*Computer Organization*", McGraw-Hill, 2002.
2. W. Stallings, "*Computer Organization and Architecture - Designing for Performance*", Prentice Hall of India, 2002.
3. J .P. Hayes, "*Computer Architecture and Organization*", McGraw-Hill, 1998.
4. D.M. Dharmdhere, "*Operating Systems – A Concept based Approach*", 2nd Edition. TMH, 2007.
5. Andrew S Tanenbaum, "*Modern Operating Systems*", 3rd Edition, PHI, 2008.

Course Outcomes:

After completing this course, the student will be able to

- Improve usage of memory hierarchy in CPU.
- Select suitable interconnection structure and communication in multiprocessors.
- Evaluate suitable scheduling algorithms in operating system applications.
- Analyze task Synchronization and multithreading in operating systems.
- Examine Memory management techniques and dead lock avoidance

COMPUTER NETWORKS

B. Tech III Year II Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A56032	PE	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Prerequisite: Digital Circuits, Digital communication

Course Objectives:

- To get familiarized with a general overview of the concepts, fundamentals of computer networks, and error-free transmission.
- To become aware of protocols related to data link layer and channel access and utilization methods.
- To get familiarized themselves with the process of routing protocols and strategies.
- To learn to know different techniques for reliable transmission and quality services in computer networks.
- To get familiarized to use different protocols for the exchange of data from the server.

Unit-I: Network Models:

Network Models: Layered tasks, OSI model, layers in the OSI model, TCP/IP protocol Suite, Addressing. Data Link Layer: Error detection and correction-check sum, crc; data link control-framing, flow, and error control.

Unit-II: Data Link Layer:

Data link layer protocols, noiseless channels, noisy channels, HDLC; Multiple Access - random access, controlled access, channelization.

Unit -III: Network Layer:

Network Layer: Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6; Delivery, forwarding, routing- static routing, dynamic routing, unicast routing protocols.

Unit-IV: Transport Layer:

Transport Layer: TCP, UDP, SCTP; congestion control and quality of service - data traffic, congestion control. Quality of service, techniques to improve QoS.

Unit-V: Application Layer:

Application Layer: Domain name system: name space, domain name space, DNS in the Internet, DNS Messages, Electronic Mail, FTP, HTTP.

Text Books:

1. Behrouz A Forouzan, "*Data Communications and Networking*", 4th edition, McGraw-Hill Special Indian Edition 2006.
2. Andrew S Tanenbaum, David. j. Wetherall, "*Computer Networks*" 5th edition. Pearson Education/PHI 2011.

References:

1. S. Keshav, "*An Engineering Approach to Computer Networks*", 2nd edition, Pearson Education, 1997.
2. William Stallings, "*Data Communications*", 8th edition, Pearson Publishers.

Course Outcomes:

After completing the course, students should be able to

- Gain the knowledge of the basic computer network technology, functions of each layer in the OSI and TCP/IP reference model.
- Gain the knowledge of multiple access protocols for different networks
- Obtain the skills of subnetting and routing mechanisms.
- Obtain the skills to improve quality data transmissions.
- Familiarity with the essential protocols which function as an interface between the user and communicating devices.

DIGITAL SIGNAL PROCESSING LAB

B. Tech III Year II Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A56206	PC	L	T	P	C	CIE	SEE	Total
		0	0	3	1.5	40	60	100

Course Objectives:

- To verify properties of a discrete system
- To analyse discrete time signals using various transforms
- To design and implement different types of digital filters
- To verify basic properties of multi rate systems

List of Experiments

Note: - 8 experiments from part A and 4 experiments from part B should be performed. (minimum of 12 experiments must be conducted)

PART-A

1. Generation of Sinusoidal waveform / signal based on recursive difference equations.
2. To find DFT and IDFT of given sequence using FFT function
3. To find frequency response and Impulse response of a given system (Transfer Function / Differential equation form)
4. Determination of Power Spectrum of a given signal(s).
5. Design of Low Pass and High Pass IIR filter for a given specifications.
6. Design of Low Pass and High Pass FIR filter for a given specifications.
7. Generation of Sinusoidal signal through filtering.
8. Generation of Dual Tone Multi Frequency signals.
9. Verify Decimation, Interpolation and I / D sampling rate converters for given discrete time signal
10. Audio specification such as to plot time and frequency display of microphone plus a cosine using DSP. Read a wav file and match with their respective spectrograms.
11. Implementation of noise removal: Add noise above 3 KHz and then remove; Interference suppression using 400 Hz ton
12. To find Circular convolution of two given sequences.

PART-B

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

Course Outcomes:

After completing the course, students should be able to

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

EMBEDDED SYSTEMS & IOT LAB

B. Tech III Year II Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A56207	PC	L	T	P	C	CIE	SEE	Total
		0	0	3	1.5	40	60	100

Course Objectives:

On completion of this lab course the students will be able to:

1. Learn to design and implement various embedded system.
2. Learn to code python.
3. Learn to implement communication protocol.
4. Learn to implement MQ Telemetry Transport protocol.

List of Experiments

1. Familiarization with Arduino/Raspberry PI and perform necessary software installation.
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
6. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when `1T0' is received from smartphone using Bluetooth.
9. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud.
10. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.
11. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
12. Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data

Course Outcomes:

- Understand the Embedded system applications
- Integrate Embedded modules specific application
- Implement an architectural design for IoT for specified requirement
- Solve the given societal challenge using IoT
- Choose between available technologies and devices for stated IoT challenge

SKILLS INTEGRATED ENGLISH LAB

B. Tech III Year II Semester					Dept. of Electronics & communications			
Code	Category	Hours / Week			Credits	Marks		
A56230	HS	L	T	P	C	CIE	SEE	Total
		0	0	2	1	40	60	100

Course Objectives

1. To improve the students' fluency in English, through a well-developed vocabulary
2. To enable them to respond them appropriate socio-cultural and professional contexts.
3. They will be able to communicate their ideas relevantly and coherently in writing.

Exercise I

Presentation Skills: Oral presentations (individual and group) / JAM sessions/Seminar - Power point presentations - Body Language-kinesics - Haptics

Exercise II

Group Discussion: Dynamics of Group Discussion - Dos and Don'ts – Intervention - Summarizing - Modulation of Voice - Relevance - Fluency and Coherence

Exercise III

Vocabulary Building: synonyms and antonyms - Word Roots - One-Word Substitutes, - Prefixes and Suffixes - study of Word Origin- -Analogy -Idioms and Phrases

Exercise IV

Writing Skills: Structure and presentation of different types of writing - Resume Writing /E-Correspondence/Statement of Purpose - Report Writing - Business Report Writing - Research Abilities/Data Collection/Organizing Data/Tools/Analysis

Exercise V

Interview Skills: Concept and Process - Pre-Interview Planning - Opening Strategies - Answering Strategies - Interview through Telephone and Videoconferencing.

A mini project should be given for the students to work in teams and the Assessment is done.

Minimum Requirements:

The English Language Lab shall have two parts:

i) The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

ii) The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a digital stereo –audio & video system.

System Requirement (Hardware component): *Computer network with Lan with minimum 60* multimedia systems with the following specifications:

i) P – IV Processor

a) Speed – 2.8 GHZ

b) RAM – 512 MB Minimum

c) Hard Disk – 80 GB

ii) Headphones of High quality

References Books:

1. Dr. Rao, A. Ramakrishna., Dr. G. Natanam and Prof SA Sankaranarayana. *English Language Communication: A Reader cum Lab Manual. Chennai*: Anuradha Publications, 2008.
2. *English Vocabulary in Use series*. Cambridge University Press, 2008.
3. Nicholls, Anne. *Master Public Speaking.* JAICO Publishing House, 2006.
4. Sen, Leena. *Communication Skills.* New Delhi: PHI Learning Pvt Ltd, 2009.

Course Outcomes

The students will be able to

- make oral presentations effectively
- participate in group discussions
- develop vocabulary
- write project/Business reports
- take part in social and professional communication