# Bachelor of Technology (Electronics & Communication Engineering)
## Scheme of Studies/Examination
### Semester V

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course No.</th>
<th>Subject</th>
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<th>Hours/Week</th>
<th>Examination Schedule (Marks)</th>
<th>Duration of Exam (Hrs)</th>
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* The student will be evaluated on the basis of technical training seminar and technical writing/reading skills out of 50 marks for each.
Bachelor of Technology (Electronics & Communication Engineering)
Scheme of Studies/Examination
Semester VI

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* The student will be evaluated on the basis of technical seminar and technical group discussions out of 50 marks for each. All students have to undergo for industrial training after 6th semester which will be evaluated in 7th semester.
Unit-I

8085 CPU Architecture: Evolution of Microprocessor, Introduction to 8085 - 8085 architecture Pin Details, Addressing Modes, Instruction Set and Assembler Directives, Instruction Timing Diagram.

Unit-II

8086 CPU Architecture: 8086 Block diagram; description of data registers, address registers; pointer and index registers, PSW, Queue, BIU and EU. 8086 Pin diagram description, Generating 8086 CLK and reset signals using 8284, WAIT state generation. Microprocessor BUS types and buffering techniques, 8086 minimum mode and maximum mode CPU module. MAIN MEMORY SYSTEM DESIGN: Memory devices, 8086 CPU Read/Write timing diagrams in minimum mode and maximum mode. Address decoding techniques. Interfacing SRAMS; ROMS/PROMS, Interfacing and refreshing DRAMS.

Unit-III

8086 Instruction Set: Instruction formats, addressing modes, Data transfer instructions, string instructions, logical instructions, arithmetic instructions, transfer of control instructions; process control instructions; Assembler directives.

8086 PROGRAMMING TECHNIQUES: Writing assembly Language programs for logical processing, arithmetic processing, timing delays; loops, data conversions.

Unit-IV

Basic I/O Interface: Parallel and Serial I/O Port design and address decoding. Memory mapped I/O Vs Isolated I/O Intel’s 8255 and 8251- description and interfacing with 8086. ADCs and DACs, - types, operation and interfacing with 8086. Interfacing Keyboards, alphanumeric displays, multiplexed displays, and stepper motor, optical encoder with 8086.

Interrupts and DMA: 8086 Interrupt mechanism; interrupt types and interrupt vector table. Applications of interrupts, Intel’s 8259. DMA operation. Intel’s 8237.

Text Books:
Reference Books:

Note: Question paper template will be provided to the paper setter.
<table>
<thead>
<tr>
<th>Course Outcomes</th>
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<tbody>
<tr>
<td>CO 1 Students will be able understand who the entrepreneurs are and what competences needed to become an Entrepreneur</td>
</tr>
<tr>
<td>CO 2 Students will be able understand insights into the management, opportunity search, identification of a Product; market feasibility studies; project finalization etc. required for small business enterprises.</td>
</tr>
<tr>
<td>CO 3 Students can be able to write a report and do oral presentation on the topics such as product identification, business idea, export marketing etc.</td>
</tr>
<tr>
<td>CO 4 Students be able to know the different financial and other assistance available for the establishing small industrial units.</td>
</tr>
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</table>

**Unit -I**

**Entrepreneurship:** Concept and Definitions; Entrepreneurship and Economic Development; Classification and Types of Entrepreneurs; Entrepreneurial Competencies; Factor Affecting Entrepreneurial Growth – Economic, Non-Economic Factors; EDP Programmes; Entrepreneurial Training; Traits/Qualities of an Entrepreneurs; Entrepreneur; Manager Vs. Entrepreneur.

**Unit -II**

**Opportunity / Identification and Product Selection:** Entrepreneurial Opportunity Search & Identification; Criteria to Select a Product; Conducting Feasibility Studies; Project Finalization; Sources of Information.

**Unit -III**

**Small Enterprises and Enterprise Launching Formalities:** Definition of Small Scale; Rationale; Objective; Scope; Role of SSI in Economic Development of India; SSI; Registration; NOC from Pollution Board; Machinery and Equipment Selection; Project Report Preparation; Specimen of Project Report; Project Planning and Scheduling using Networking Techniques of PERT / CPM; Methods of Project Appraisal.

**Unit -IV**

**Role of Support Institutions and Management of Small Business:** Director of Industries; DIC; SIDO; SIDBI; Small Industries Development Corporation (SIDC); SISI; NSIC; NISBUD; State Financial Corporation SIC; Marketing Management; Production Management; Finance Management; Human Resource Management; Export Marketing; Case Studies– At least one in whole course.

**Text Books:**

**Note:** Question paper template will be provided to the paper setter.
Purpose
To familiarize the students with the performance parameters of antenna, methods of analysis of antenna, antenna used for various applications and different ways of propagating the signal.

Course Outcomes

CO1 To understand the performance parameters of antenna.

CO2 Understanding the mechanism of calculating the radiated fields of antenna and to calculate the radiated fields of some common Antennas.

CO3 To understand the requirements, principals, and structures for an antenna to be broadband.

CO4 To understand the different ways of signal propagation.

Unit – I
Basic Principles and Definitions: Retarded vector and scalar potentials. Radiation and induction fields. Radiation from elementary dipole (Hertzian dipole, short dipole, Linear current distribution), half wave dipole, Antenna parameters : Radiation resistance, Radiation pattern, Beam width, Gain, Directivity, Effective height, Effective aperture, Bandwidth and Antenna Temperature.

Radiating Wire Structures and Antenna Arrays: Folded dipole, Monopole, Biconical Antenna, Loop Antenna, Helical Antenna. Principle of pattern multiplication, Broadside arrays, Endfire arrays, Array pattern synthesis, Uniform Array, Binomial Array, Chebyshev Array, Antennas for receiving and transmitting TV Signals e.g. Yagi-Uda and Turnstile Antennas.

Unit – II
Broadband and Frequency Independent Antennas: Broadband Antennas. The frequency independent concept: Rumsey’s principle, Frequency independent planar log spiral antenna, Frequency independent conical spiral antenna and Log periodic antenna.


Unit – IV

Text Books:
2. G.S.N.Raju, Antenna and Wave Propagation, Pearson.

Reference Books:
2. John D. Kraus, Ronald JMarhefka, Ahmad S Khan, Antennas for all applications, McGraw Hill.

Note: Question paper template will be provided to the paper setter.


<table>
<thead>
<tr>
<th>ECE-305N</th>
<th>VLSI Technology</th>
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<tbody>
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<td>Lecture</td>
<td>Tutorial</td>
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</table>

Course Outcomes

CO1  Students will be able estimate oxide thickness, growth rate, etch rate, deposition rate, and perform pattern etching etc. using knowledge of mathematics, science, engineering and practices.

CO2  Students can design and conduct experiments such as oxidation, metallization and analyze growth / deposition rate, thickness etc.

CO3  Shall be able to understand system, design such as CVD reactor, PVD chamber etc.

CO4  Understanding of professional and ethical responsibility while working in clean rooms.

CO5  Communicate effectively: Students can write an engineering report on the topic assigned and give an effective oral presentation.

Unit -I

Clean Room Technology - Clean room concept – Growth of single crystal Si, surface contamination, cleaning & etching, cleaning of p-type & n-type Si-wafer by solvent method & RCA cleaning, Fabrication process of p-n diode.

Unit -II

Oxidation – Growth mechanism and kinetic oxidation, oxidation techniques and systems, oxide properties, oxide induced defects, charactrisation of oxide films, Use of thermal oxide and CVD oxide; growth and properties of dry and wet oxide, dopant distribution, oxide quality, Isolation Techniques with reference to VLSI circuits.

Unit -III


Unit -IV

Mask making, E-beam writing, Lithography – Optical lithography, Lift-off technique, Some Advanced lithographic techniques, Physical Vapour Deposition – APCVD, Plasma CVD, MOCVD. Metallisation - Different types of metallisation, uses & desired properties, Fabrication process of Schottky diodes, VLSI Process integration and NMOS fabrication process.

Text Book:

2. VLSI Technology, Author: Sze, S.M.; Notes: Wiley, 1985;
3. An Introduction to Semiconductor Microtechnology, Author: Morgan, D.V., and Board;
4. The National Technology Roadmap for Semiconductors industry.

Note: Question paper template will be provided to the paper setter.
CSE-304N Essentials of Information Technology

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Purpose
To introduce the well informed design concepts of Object Oriented Programming using Java and RDBMS

Course Outcomes (COs)

CO1  Solve Problems using various efficient and reliable Algorithms.
CO2  Design and Study the basic concepts in Java.
CO3  Document and implement Object oriented paradigms and design models in Java.
CO4  Design and study RDBMS Modeling and its program implementation.

Unit I:

Unit II:
Programming Basics: Identifiers, Variables, Data Types, Operators, Control Structures: Loop, If else, Nested If, Switch Statement, Arrays, Strings.. Object Oriented Concepts: Class & Object, Operator, Instance Variables & Methods, Access Specifiers, Reference Variables: This, Super, Parameter Passing Techniques, Constructors, Static, and Command Line Arguments

Unit III:

Unit IV:
RDBMS- Data Processing, Database Technology, Data Models, Data Independence, ER Modeling Concept, ER-notations, Converting ER Diagram into Relational Schema, Definition of Keys: Primary key, Foreign key, Unique Key.

SQL: DDL Statements, DML Statements, DCL Statements, Joins, Sub queries, Views.

Books on Java

Books on RDBMS, Oracle, MYSQL
2. MySQL by Paul DuBois Published by New Riders.
Unit-I


Unit-II


Unit-III

Frequency Response & Stability Analysis: Correlation between time and frequency response, Polar Plots, Nyquist plots, Bode Plots, Nyquist stability criterion, Gain margin & Phase margin, relative stability using Nyquist Criterion, frequency response specifications.

UNIT-IV


Text Book:
Control System Engg.: I. J. Nagrath & M.Gopal; New Age India.
Reference Books:
1. Automatic Control Systems: B.C. Kuo; PHI.
2. Modern Control Engg: K. Ogata; PHI.

Note: Question paper template will be provided to the paper setter.
Before starting with the experiments, teacher should make the students conversant with the following essential theoretical concepts.

A.  
   i) Programming Model of Intel’s 8086.
   ii) Addressing Modes of Intel’s 8086.
   iii) Instruction formats of Intel’s 8086

B. Instruction set of Intel’s 8086.

C. Assembler (TASM), and Debugger.

List of Experiments: (Verification of atleast 3 experiments may also be done using TASM)

1. a) Familiarization with 8086 Trainer Kit.
   b) Familiarization with Digital I/O, ADC and DAC Cards.
   c) Familiarization with Turbo Assembler and Debugger S/Ws

2. Write a program to arrange block of data in
   i) ascending and (ii) descending order.

3. Write a program to find out any power of a number such that \( Z = X^N \). Where \( N \) is programmable and \( X \) is unsigned number.

4. Write a program to generate.
   i) Sine Waveform (ii) Ramp Waveform (iii) Triangular Waveform Using DAC Card.

5. Write a program to measure frequency/Time period of the following functions.
   i) Sine Waveform (ii) Square Waveform (iii) Triangular Waveform using ADC Card.

6. Write a program to increase, decrease the speed of a stepper motor and reverse its direction of rotation using stepper motor controller card.

7. Write a programmable delay routine to cause a minimum delay = 2MS and a maximum delay = 20 minutes in the increments of 2 MS

8. Write a program that takes any two numbers as Input from the user through the input device (Keyboard) & Prints their sum on the standard output device (Screen).
9. Write a program that takes any two numbers as input from the user through the input device (Keyboard) & prints their sum on the standard output device (Screen) by giving appropriate messages to the user.

10. Write a program that initializes 100 positions in an array and loads them with zero.

11. Write a program that prints a Blinking character in the middle of the screen.

12. Write a program that accepts a number from the user through the input device (Keyboard), calculates its factorial and prints the result on the screen.
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<th>Lecture</th>
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**Course Outcomes**

- **CO1**: To familiarize the students with circuit simulation tool (Multisim).
- **CO2**: Describe the Digital and analog aspects of the simulation tool.
- **CO3**: To familiarize with the programming aspects of the virtual microcontrollers using inbuilt compiler and debugger.
- **CO4**: To familiarize with the hardware associated with the simulating tool (NI-ELVIS).

**List of Experiments:**

1. Introduction to Multisim and associated GUI (Graphical User Interface) modules.
2. To design and study the volt-ampere characteristics of PN-Diode.
3. To design a virtual bridge rectifier.
4. To design a virtual Schmitt Trigger using Operational Amplifier.
5. To design a virtual low pass filter and study its phase and frequency response.
6. To design a virtual monostable multivibrator using 555 timer.
7. To design a virtual Weighted Average DAC.
8. To program and simulate the virtual MCU (Micro-Controller Unit) for LCD display.
9. Introduction to NI-ELVIS board.
10. To design on board circuit for Differentiator and Integrator and taking the output on screen.
11. To design on board circuit for Shift Register using associated peripherals and considering the output on screen.
12. To design the virtual single toned amplitude modulation circuit and analyze the spectrum of the output.
List of Experiments:

1. To study and analyze the characteristic of monopole antenna.
2. To study and analyze the characteristic of Dipole antenna.
3. To study and analyze the characteristic of quarter wave Dipole.
4. To study and analyze the characteristic of Turnstile antenna.
5. To study and analyze the characteristic of different Patch antenna.
6. To study and analyze the characteristic of square loop antenna.
7. To study and analyze the characteristic of array of square loop antenna.
8. To study and analyze the characteristic of rectangular Waveguide.
9. To study and analyze the characteristic of circular Waveguide.
10. To study and analyze the characteristic of circulator.
ECE-302N  
Digital Signal Processing

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Purpose: To familiarize the students with the basic concepts of Digital Signal Processing, Z-Transform, Fourier transform Designing of FIR and IIR Filters.

Course Outcomes

**CO1**  
Introduce to Z-Transform, Fourier Transform and their properties.

**CO2**  
To understand the basic concepts of Frequency Domain sampling and implementation of Discrete Time Systems.

**CO3**  
Familiarization with the Design of FIR Filters.

**CO4**  
Familiarization with the Design of IIR Filters.

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**Unit-I**


**Frequency Selective Filters:** All pass filters, minimum-phase, maximum-phase and mixed-phase systems, Goertzel algorithm, Chirp Z-transform, applications of Z-Transform.

**Unit-II**

**Frequency Domain Sampling and DFT:** Properties of DFT, Linear filtering using DFT, Frequency analysis of signals using DFT, radix 2, radix-4, computation of DFT of real sequences.

**Implementation of Discrete Time Systems:** Direct form, cascade form, frequency sampling and lattice structures for FIR systems. Direct forms, transposed form, cascade form parallel form. Lattice and lattice ladder structures for IIR systems.

**Unit-III**

**Design of FIR Filters:** Characteristics of practical frequency selective filters. Filters design specifications peak pass band ripple, minimum stop band attenuation. Four types of FIR filters, alternation theorem.

Design of FIR filters using windows, Kaiser window method comparison of design methods for FIR filters, Gibbs phenomenon, design of FIR filters by frequency sampling method, design of optimum equiripple FIR filters.

**Unit-IV**


Characteristics of Butterworth, Chebyshev and Elliptical analog filters, Design of IIR filters, Frequency transformation, design of IIR filters in frequency domain.
Text Books:
John G. Proakis, Digital Signal Processing, PHI.

Reference Books:

1. S. K. Mitra, Digital Signal Processing, TMH
2. Rabiner and Gold, Digital Signal Processing, PHI
3. Salivahan, Digital Signal Processing, TMH
4. Digital Signal Processing: Alon V. Oppenheim; PHI

Note: Question paper template will be provided to the paper setter.
Unit-I

Introduction: Introduction, conventional approach to digital design, VLSI design, ASIC design flow, Role of HDL. Conventional Data flow, ASIC data flow, Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools, Test Benches.

Language constructs and conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks.

Unit-II

Gate level modeling: Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Additional Examples, Design of Flip-flops with Gate Primitives, Delays, Strengths and Contention Resolution, Net Types, Design of Basic Circuits.

Behavioral modeling: Introduction, Operations and Assignments, Functional Bifurcation, Initial Construct, Always Construct, Examples, Assignments with Delays, Wait construct, Multiple Always Blocks, Designs at Behavioral Level, Blocking and Non-blocking Assignments, The case statement, Simulation Flow, if and if-else constructs, assign-deassign construct, repeat construct, for loop, the disable construct, while loop, forever loop, parallel blocks, force-release construct, Event.

Unit-III

Modeling at data flow level: Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators, Additional Examples.

Switch level modeling: Introduction, Basic Transistor Switches, CMOS Switch, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Trireg Nets.

Unit-IV

Functions, tasks, and user defined primitives: Introduction, Function, Tasks, User- Defined Primitives (UDP), FSM Design (Moore and Mealy Machines).

System tasks, functions, and compiler directives: Introduction, Parameters, Path Delays, Module Parameters, System Tasks and Functions, File-Based Tasks and Functions, Compiler Directives, Hierarchical Access, General Observations.

Text Books:


**Reference Books:**


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<th>ECE-306N</th>
<th>Digital Communication</th>
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<td><strong>Tutorial</strong></td>
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**Course Outcomes**

| CO1 | Student will be able to perform coding of various sources. |
| CO2 | Student will be able to analyze various basic digital pulse modulation schemes. |
| CO3 | Student will be able to understand base band pulse transmission. |
| CO4 | Student will be able to analyze various basic digital modulation techniques. |

**Unit – I**

**Information Theory:** Introduction, Entropy, Huffman Coding, Channel Capacity, Channel Coding, Linear Block Codes, Matrix Description, Syndrome Decoding, Hamming Code, Cyclic Code, Convolution Code generation and Viterbi decoding.

**Unit – II**

**Pulse Modulation System:** Model of digital communication systems, Sampling theorem for baseband and bandpass signals: natural sampling, Flat top sampling, Signal recovery & holding, Quantization of signal, Quantization error, Source coding & companding, Pulse code modulation (PCM), Noise in PCM systems, Differential pulse code modulation (DPCM), Adaptive pulse code modulation (ADPCM), Delta modulation (DM), Comparison of PCM, DPCM and DM, Adaptive delta modulation, Quantization noise, Time division multiplexed systems (T & E type systems), Calculation of O/P signal power, The effect of thermal noise, O/P signal to noise ratio in PCM, Quantization noise in delta modulation, The O/P signal to quantization noise ratio in delta modulation, O/P signal to noise ratio in delta modulation

**Unit – III**

**Base Band Pulse Transmission:** Matched filter and its properties average probability of symbol error in binary enclosed PCM receiver, Intersymbol interference, Nyquist criterion for distortionless base band binary transmission, ideal Nyquist channel raised cosine spectrum, correlative level coding Duo binary signalling, tapped delay line equalization, adaptive equalization, LMS algorithm, Eye pattern.

**Unit – IV**

**Digital Pass Band Transmission:** Pass band transmission model; gram Schmidt orthogonalization procedure, geometric Interpretation of signals, Response of bank of correlaters to noise input, detection of known signal in noise, Hierarchy of digital modulation techniques, BPSK, DPSK, DEPSK, QPSK, systems; ASK, FSK, QASK, Many FSK, MSK, Many QAM, Signal space diagram and spectra of the above systems, effect of intersymbol interference, bit symbol error probabilities, synchronization.

**Text Books:**

**Reference Books:**

Note: Question paper template will be provided to the paper setter.
HS-302N Fundamentals of Management

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<thead>
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<th>Lecture</th>
<th>Tutorial</th>
<th>Practical</th>
<th>Theory</th>
<th>Sessional</th>
<th>Total</th>
<th>Time</th>
</tr>
</thead>
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<td>0</td>
<td>75</td>
<td>25</td>
<td>100</td>
<td>3 Hrs.</td>
</tr>
</tbody>
</table>

Purpose: To make the students conversant with the basics concepts in management thereby leading to nurturing their managerial skills

Course Outcomes

<table>
<thead>
<tr>
<th>CO1</th>
<th>An overview about management as a discipline and its evolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Understand the concept and importance of planning and organizing in an organization</td>
</tr>
<tr>
<td>CO3</td>
<td>Enabling the students to know about the importance of hiring and guiding the workforce by understanding the concept of leadership and communication in detail</td>
</tr>
<tr>
<td>CO4</td>
<td>To understand the concept and techniques of controlling and new trends in management</td>
</tr>
</tbody>
</table>

Unit-I

Introduction to Management: Meaning, Definition, nature, importance & Functions, Management as Art, Science & Profession- Management as social System, Concepts of management-Administration


Unit-II

Planning: nature, purpose and functions, types of plans, planning process, Strategies and Policies: Concept of Corporate Strategy, formulation of strategy, Types of strategies, Management by objectives (MBO), SWOT analysis, Types of policies, principles of formulation of policies

Organizing: nature, importance, process, organization structure: Line and Staff organization, Delegation of Authority and responsibility, Centralization and Decentralization, Decision Making Process, Decision Making Models, Departmentalization: Concept and Types (Project and Matrix), formal & informal organizations.

Unit-III

Staffing: concept, process, features; manpower planning; Job Analysis: concept and process; Recruitment and selection: concept, process, sources of recruitment; performance appraisal, training and development.

Directing: Communication- nature, process, formal and informal, barriers to Effective Communication, Theories of motivation-Maslow, Herzberg, McGregor; Leadership – concept and theories, Managerial Grid, Situational Leadership. Transactional and Transformational Leadership.

Unit-IV

Controlling: concept, process, types, barriers to controlling, controlling Techniques: budgetary control, Return on investment, Management information system-MIS, TQM-Total Quality Management, Network Analysis- PERT and CPM.

Recent Trends in Management: Social Responsibility of Management-Management of Crisis, Total Quality Management, Stress Management, Concept of Corporate Social Responsibility (CSR) and business ethics. Functional aspects of business: Conceptual framework of functional areas of management- Finance; Marketing and Human Resources.
Text Books
1. Management Concepts - Robbins, S.P; Pearson Education India

Reference Books
2. Management and OB-- Mullins; Pearson Education
4. Management Theory and Practice – Gupta, C.B; Sultan Chand and Sons, new Delhi
7. Organizational behavior – Robins Stephen P; PHI.

Note: Question paper template will be provided to the paper setter.
Unit – I

Introduction:

Physical Layer and Media:
Analog and Digital (signals & data), Transmission media: Guided & Unguided, The Telephone System, Narrowband ISDN, Broadband ISDN and ATM.

Unit -II

The Data Link Layer:
Data Link Layer Design issues, Error Detection & correction, Data link control: Framing, Flow & Error control, Noiseless channels, Noisy channels, HDLC, Point to Point protocols.

The Medium Access Sublayer:

Unit – III

Network Layer:
Design issues, IPv4 addresses, IPv6 addresses, internetworking, IPv4, IPv6, congestion control algorithms.

Transport & Session Layer:
Protocol design issues, Process to process delivery, UDP, TCP connection Management, remote procedure calls.

Unit – IV

Presentation Layer:
Design issues, abstract Syntax notation, data compression technique, cryptography.

Application Layer:
Design issues, file transfer, access and and management, electronic mail, virtual terminals, WWW & HTTP.

Text Books:
1. Forouzan B.A, Data Communications and Networking, Tata-Mc-Graw Hill.
2. Tanenbaum A.S, Computer Networks, PHI.
Reference Books:
1. Stallings W, Data and Computer Communications, PHI.

Note: Question paper template will be provided to the paper setter.
List of Experiments:

1. Introduction to MATLAB.

2. Write a program to plot the Sine wave, cosine wave and Tangent wave.

3. Write a program to plot the following functions: a) impulse function b) unit step c) unit ramp d) exponential e) sinusoidal

4. Write a program to plot the convolution and multiplication of two signals.

5. Define a function to compute DTFT of a finite length signal. Plot the magnitude and phase plots using subplots.

6. Verify the Symmetry, time shifting and modulating properties of DTFT with a rectangular pulse.

7. Study the aliasing effect by using a Sinusoidal Signal. Show the plots of continuous time Signal. Sampled Signal and reconstructed signals by using subplot.

8. Write a program to plot real, imaginary phase and magnitude of exponential function.

9. Study different window functions available in signal processing.

10. Verify the properties of Discrete Fourier Transform (DFT).

11. Write a program to find the convolution of two sequences using in built convolution function.

12. Write a program to study the frequency shift property of DTFT.

13. Write a program to study circular shift property of DTFT.

14. Write a program to study scaling property of DFT.

15. Write a program to study the sampling theorem of a continuous time signal.

16. Write a program to study the Z-Transform.
17. Write a program to study the various Properties of Z-Transform.

**Note:** At least 10 experiments are to be performed with at least 7 from above list, remaining 3 may either be performed from the above list or designed & set by concerned institution as per the scope of the syllabus.
ECE-312N

Digital Design Using Verilog Lab

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
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<td>0</td>
<td>3</td>
<td>40</td>
<td>60</td>
<td>100</td>
<td>3 Hr.</td>
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Purpose
To familiarize the students with the basics of design of conventional electronic circuits, the features of Verilog HDL, design circuits using gate level modeling.

Course Outcomes

<table>
<thead>
<tr>
<th>CO1</th>
<th>To describe, design, simulate, and synthesize circuits using the Verilog hardware description language.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>To design and modeling of combinational and sequential digital systems.</td>
</tr>
<tr>
<td>CO3</td>
<td>To develop program codes for synthesis-friendly combinational and sequential logic circuits.</td>
</tr>
<tr>
<td>CO4</td>
<td>To understand the advanced features of Verilog HDL and be able to write optimized codes for complex systems.</td>
</tr>
</tbody>
</table>

List of Experiments:

1. Write a Program to implement logic gates.
2. Write a Program to implement half-adder.
3. Write a Program to implement full-adder.
4. Write a Program to implement 4 bit addition/subtraction.
5. Write a Program to implement a 3:8 decoder.
6. Write a Program to implement an 8:1 multiplexer.
7. Write a Program to implement a 1:8 demultiplexer.
8. Write a Program to implement 4 bit comparator.
9. Write a Program to implement Mod-10 up counter.
10. Write a program to perform serial to parallel transfer of 4 bit binary number.
11. Write a program to perform parallel to serial transfer of 4 bit binary number.
12. Write a program to implement an 8 bit ALU containing 4 arithmetic & 4 logic operations.
### Digital Communication Lab

<table>
<thead>
<tr>
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#### Course Outcomes

| CO1      | Student will be able to perform coding techniques.               |
| CO2      | Student will be able to understand Optical fibre communication process |
| CO3      | Student will be able to understand base band pulse transmission.  |
| CO4      | Student will be able to analyze various basic digital modulation techniques. |

#### List of Experiments:

1. To Study ASK
2. To Study PSK
3. To Study FSK
4. To Study Balanced Modulator & Demodulator
5. To Study PCM
6. Setting up a Fiber Optic Analog Link
7. Setting up a Fiber Optic Digital Link
8. Losses in Optical Fiber
10. Time Division multiplexing of signals.

**Note:** At least 10 experiments are to be performed with atleast 7 from above list, remaining 3 may either be performed from the above list or designed & set by concerned institution as per the scope of the syllabus.