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

S. No.	Course No.	Subject	L:T:P	Hours/Week	Examination Schedule (Marks)				Duration of Exam (Hrs)
					Theory	Sessional	Practical	Total	
1	ECE - 301N	Microprocessors & Interfacing	3:1:0	4	75	25	0	100	3
2	HS-303N	Business Intelligence & Enterpreneurship	3:0:0	3	75	25	0	100	3
3	ECE-303N	Antenna & Wave Propgation	3:1:0	4	75	25	0	100	3
4	ECE-305N	VLSI Technology	3:1:0	4	75	25	0	100	3
5	CSE-304N	Essentials of Information Technology	3:0:0	3	75	25	0	100	3
6	ECE-307N	Control Systems Engineering	3:1:0	4	75	25	0	100	3
7	ECE-309N	Microprocessors & Interfacing Lab	0:0:3	3	0	40	60	100	3
8	ECE-311N	Design Automation Lab	0:0:3	3	0	40	60	100	3
9	ECE-313N	Antenna & Wave Propagation Lab	0:0:3	3	0	40	60	100	3
10	ECE-315N*	Personality & Soft Skills Development	2:0:0	2	0	100	0	100	3
		Total		**33**	**450**	**370**	**180**	**1000**	

* The student will be evaluated on the basis of technical **training** seminar and technical writing/reading skills out of 50 marks for each.

ECE -301N	Microprocessor & Interfacing					
Lecture	Tutorial	Practical	Theory	Sessional	Total	Time
3	1	0	75	25	100	3
Purpose	To learn the architecture and programming of Intel family microprocessors and its interfacing.					
Course Outcomes						
CO 1	To study the Architecture of 8085 microprocessors					
CO 2	To learn the architecture 8086 Microprocessor and its interfacing to memories					
CO 3	To learn the instruction set of 8086 Microprocessor and assembly language programming of 8086 Microprocessor.					
CO 4	To learn interfacing of interrupts, basic I/O and DMA with 8086 Microprocessor					

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.

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

Text Books:

1. Barry B. Brey, "The Intel Microprocessor8086/8088, 80186", Pearson Education, Eighth Edition, 2009
2. D.V. Hall, Microprocessors and Interfacing, McGraw Hill 2nd ed.

Reference Books:

1. Liu, Gibson, "Microcomputer Systems: The 8086/88 Family", 2nd Edition, PHI,2005
2. Kenneth Ayala, "The 8086 Microprocessor: Programming & Interfacing the PC", Cengage Learning, Indian Edition, 2008
3. Kip Irvine, "Assembly language for IBM PC", PHI, 2nd Edition, 1993
4. Peter Abel, "Assembly language programming", Pearson Edu,5th Edition,2002
5. Uffenback, "The 8086 Family Design" PHI, 2nd Edition.
6. Walter A Triebel and Avtar Singh; The 8088 and 8086 Microprocessors, Programming, Interfacing, Software, Hardware and Applications, Fourth Edition, Pearson Education.

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

HS-303N	Business Intelligence & Entrepreneurship					
Lecture	Tutorial	Practical	Theory	Sessional	Total	Time
3	0	0	75	25	100	3
Course Outcomes						
CO 1	Students will be able understand who the entrepreneurs are and what competences needed to become an Entrepreneur					
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.					
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.					
CO 4	Students be able to know the different financial and other assistance available for the establishing small industrial units.					

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:

1. Small-Scale Industries and Entrepreneurship. Himalaya Publishing House, Delhi -Desai, Vasant, 2003.
2. Entrepreneurship Management -Cynthia, Kaulgud, Aruna, Vikas Publishing House, Delhi, 2003.
3. Entrepreneurship Ideas in Action- L. Greene, Thomson Asia Pvt. Ltd., Singapore, 2004.

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

ECE-303N	Antenna & Wave Propagation					
Lecture	Tutorial	Practical	Theory	Sessional	Total	Time
3	1	0	75	25	100	3 Hr.
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.

Unit – II

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 – III

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.

Patch Antenna: Advantages and basic Configurations of Patch antenna. Different feeding techniques of Patch antenna. Method to analyze Patch antenna

Unit – IV

Propagation of Radio Waves : Different modes of propagation, Ground waves, Space waves, Surface waves and Tropospheric waves, Ionosphere, Wave propagation in the ionosphere, critical frequency, Maximum Usable Frequency (MUF), Skip distance, Virtual height, Radio noise of terrestrial and extra terrestrial origin. Multipath fading of radio waves.

Text Books:

1. A.R.Harish, M.Sachidananda, Antenna and Wave Propagation, Oxford University Press.
2. G.S.N.Raju, Antenna and Wave Propagation, Pearson.

Reference Books:

1. ConstantineA.Balanis, Antenna Theory Analysis and Design, John wiley & Sons.
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.

ECE-305N	VLSI Technology					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hrs**
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

Solid State Diffusion – Fick's equation, atomic diffusion mechanisms, measurement techniques, diffusion in polysilicon and silicon di-oxide diffusion systems. Ion implantation – Range theory, Equipments, annealing, shallow junction, high energy implementation.

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:

1. Semiconductor Devices Physics and Technology, Author: Sze, S.M.; Notes: Wiley, 1985
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				
Lecture	**Tutorial**	**Practical**	**Credit**	**Theory**	**Sessional**	**Total**	**Time**
3	**0**	**-**	**3.0**	**75**	**25**	**100**	**3 Hrs.**
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:

Problem Solving Techniques: Introduction to Problem Solving, Introduction to Algorithms and Flowchart, Searching algorithms: Linear search, Binary search and Sorting algorithms: Insertion and Selection sort, Basic Data Structures: Stack, and Linear Queue.

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:

Relationships: Inheritance, Types of Inheritance, Static Polymorphism: Method Overloading, Constructor Overloading, Method Overriding, Abstract, Interface, Introduction to Packages.

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

1. Java: The Complete Reference, Seventh Edition. Herbert Schildt,McGraw –Hill Education.
2. Programming with Java 3e A Primer, E Balagurusamy, McGraw Hill Education.
3. Introduction to Java Programming, K. Somasundaram , Jaico Publishing House, 1st edition.

Books on RDBMS, Oracle, MYSQL

1. Fundamentals of Database Systems, with E-book (3rd Edition) by Shamkant B. Navathe, Ramez Elmasri, Published by Addison Wesley Longman , January 15th , 2002.
2. MySQL by Paul DuBois Published by New Riders.
3. Murach's MySQL Paperback, Joel Murach , Published by Shroff/Murach, 2012.
4. SQL: The Complete Reference , James R. Groff, Paul N. Weinberg, Published by McGraw-Hill Companies, March 1999.
5. Schaum's Outline of Fundamentals of Relational Databases, Ramon Mata-Toledo, Published by McGraw-Hill November 15th 2000.

ECE-307N	Control System Engineering					
Lecture	Tutorial	Practical	Theory	Sessional	Total	Time
3	1	0	75	25	100	3 Hrs
Purpose	The purpose of this course is to create awareness about the various types of control systems with the techniques to analyze them so that the learner is able to mathematically design and evaluate the conditions for which a control system can provide stable output with improved performance.					
Course Outcomes						
CO1	Learner will be able to design and simplify the mathematical and graphical models of a control system through block diagram and signal flow graph method.					
CO2	Learner can evaluate the conditions for which a system can work under stable conditions in time domain.					
CO3	Learner will know about easier graphically methods to evaluate the conditions of stability in frequency domain.					
CO4	Learner will able to apply the compensation technique using state variable approach to covert an unstable system into a stable system under certain conditions.					

Unit-I

Introduction: The control system-open loop & closed loop, servomechanism, stepper motor. Mathematical Models of Physical Systems: Differential equation of physical systems, transfer function, block diagram algebra, signal flow-graphs, Mason's formula & its application. Feedback Characteristics of Control Systems: Feedback and non-feedback systems, Effects of feedback on sensitivity (to parameter variations), stability, overall gain etc.

Unit-II

Time Response Analysis: Standard test signals, time response of first order and second order systems, steady-state errors and error constants, design specification of second-order- systems. Stability:The concept of stability ,necessary conditions for stability, Hurwitz stability criterion, Routh stability criterion, Relative stability analysis. The Root Locus Technique: The Root locus concept, construction /development of root loci for various systems, stability considerations.

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

Compensation of Control Systems: Necessity of compensation, Phase lag compensation, phase lead compensation, phase lag lead compensation, feedback compensation. State Variable Analysis: Concept of state,state variable and state model, state models for linear continuous time systems, diagonalization solution of state equations, concept of controllability and observability.

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.
3. Control Systems: Principles & Designing : Madan Gopal; TMH.

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

ECE-309N	Microprocessors & Interfacing Lab					
Lecture	**Tutorial**	**Practical**	**Sessional**	**Practical**	**Total**	**Time**
0	**0**	**3**	**40**	**60**	**100**	**3 Hour**
Purpose	**Write the efficient Assembly Language Program for different problem statements and implement different system interfacing.**					
Course Outcomes						
CO 1	**Understanding different steps to develop program such as Problem definition, Analysis, Design of logic, Coding, Testing, Maintenance (Modifications, error corrections, making changes etc.)**					
CO 2	**To be able to apply different logics to solve given problem.**					
CO 3	**To be able to write program using different implementations for the same problem**					
CO 4	**Use of programming language constructs in program implementation**					

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) struction 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.

ECE-311N	Design Automation Lab					
Lecture	**Tutorial**	**Practical**	**Sessional**	**Practical**	**Total**	**Time**
0	**0**	**3**	**40**	**60**	**100**	**3 Hr.**
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.

ECE-313N	Antenna & Wave Propagation Lab					
Lecture	**Tutorial**	**Practical**	**Sessional**	**Practical**	**Total**	**Time**
0	**0**	**3**	**40**	**60**	**100**	**3 Hr.**
Course Outcomes						
CO1	**To understand the basic concepts of HFSS or any other simulation software used for 3D simulations**					
CO2	**To design various types of antenna**					
CO3	**To analyze various types of antennas**					
CO4	**To Find performance parameters of antenna**					

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.