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

S. No.	Course No.	Subject	L:T:P	Hours/ Week	Examination Schedule (Marks)				Duration of Exam (Hrs)
					Theory	Sessional	Practical	Total	
1	ECE-302N	Digital Signal Processing	3:1:0	4	75	25	0	100	3
2	ECE- 304N	Digital Design Using Verilog	3:1:0	4	75	25	0	100	3
3	ECE-306N	Digital Communication	3:1:0	4	75	25	0	100	3
3	HS-302N	Fundamentals of Management	4:0:0	4	75	25	0	100	3
5	ECE-308N	Computer Communication Network	3:1:0	4	75	25	0	100	3
6	ECE-310N	Digital Signal Processing lab	0:0:3	3	0	40	60	100	3
7	ECE- 312N	Digital Design Using Verilog Lab	0:0:3	3	0	40	60	100	3
8	ECE-314N	Digital Communication lab	0:0:3	3	0	40	60	100	3
9	ECE- 316N*	Personality & Soft Skills Development 2	2:0:0	2	0	100	0	100	3
		Total		**31**	**375**	**345**	**180**	**900**	

* 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.

ECE-302N	Digital Signal Processing					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hr.**
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.**					

Unit-I

Discrete Transforms: Z- transform and its properties, Inversion of Z-transform, One sided Z-transform and solution of differential equations. Analysis of LTI systems in Z-domain, causality, stability, schur-cohn stability test, relationship between Z-transform and Fourier transform.

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

Design of IIR Filters: Design of IIR filters from analog filters, Design by approximation of derivatives, Impulse Invariance Method, Bilinear Transformation Method, Least Square Methods.

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. Oppenhelm;PHI

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

ECE-304N	Digital Design Using Verilog					
Lecture	Tutorial	Practical	Theory	Sessional	Total	Time
3	1	0	75	25	100	3 Hr.
Purpose	To familiarize the students with the conventions of the Verilog HDL programming, algorithmic levels of abstraction for modeling digital hardware systems, Finite State Machines, the concept of test-benches to create testing behavioral environments for simulation based verification.					
Course Outcomes						
CO1	To understand the constructs and conventions of the Verilog HDL programming.					
CO2	To understand the structural, register-transfer level (RTL), and algorithmic levels of abstraction for modeling digital hardware systems.					
CO3	To design and modeling of combinational and sequential digital systems (Finite State Machines).					
CO4	To apply the concept of test-benches to create testing behavioral environments for simulation based verification.					

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:

1. T. R. Padmanabhan, B. Bala Tripura Sundari (2004), Design through Verilog HDL, Wiley & Sons Education, IEEE Press, USA.

2. J. Bhaskar (2003), A Verilog Primier, 2nd edition, BS Publications, India.

Reference Books:

1. Samir Palnitkar (2013), Verilog HDL, Pearson India.
2. Stephen. Brown, ZvonkoVranesic (2005), Fundamentals of Logic Design with Verilog, Tata McGraw Hill, India.
3. Charles H. Roth (2004), Digital Systems Design using VHDL, Jr. Thomson Publications, India.

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

ECE-306N	Digital Communication					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	1	0	75	25	100	3 Hr.
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:

1. Proakis John G., Digital Communication System, McGraw, (2000) 4th ed.
2. Simon Haylein, Digital Communication Systems, Wiley India edition, (2009) 2nd ed.
3. Information Theory,Coding and Cryptography, Ranjan Bose, TMH, II edition, 2007

Reference Books :

1. Lathi B. P., Modern Analog and Digital Communication, , Oxford University Press, (1998) 3rd ed.
2. Taub & Schilling, Principles of Communication Systems, McGraw Hill Publications, (1998) 2nd ed.
3. Simon Haykin, Communication Systems, John Wiley Publication, 3rd ed.

4. Sklar, Digital Communications, Prentice Hall-PTR, (2001) 2nd ed.
5. R N Mutagi, Digital Communication: Theory, Techniques and Applications, Oxford University Press, 2nd ed.

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

HS-302N	Fundamentals of Management					
Lecture	Tutorial	Practical	Theory	Sessional	Total	Time
4	0	0	75	25	100	3 Hrs.
Purpose	To make the students conversant with the basics concepts in management thereby leading to nurturing their managerial skills					
Course Outcomes						
CO1	An overview about management as a discipline and its evolution					
CO2	Understand the concept and importance of planning and organizing in an organization					
CO3	Enabling the students to know about the importance of hiring and guiding the workforce by understanding the concept of leadership and communication in detail					
CO4	To understand the concept and techniques of controlling and new trends in management					

Unit-I

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

Evolution of Management Thought: Development of Management Thought- Scientific management, Administrative Theory of Management, Bureaucratic Organization, Behavioral approach (Neo Classical Theory): Human Relations Movement; Behavioral Science approach; Modern approach to management – Systems approach and contingency approach.

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
2. Principles of Management - Koontz &O'Donnel; (McGraw Hill)

Reference Books

1. Business Organization and Management – Basu ; Tata McGraw Hill
2. Management and OB-- Mullins; Pearson Education
3. Essentials of Management – Koontz, Tata McGraw-Hill
4. Management Theory and Practice – Gupta, C.B; Sultan Chand and Sons, new Delhi
5. Prasad, Lallan and S.S. Gulshan. Management Principles and Practices. S. Chand & Co. Ltd., New Delhi.
6. Chhabra, T.N. Principles and Practice of Management. DhanpatRai& Co., Delhi.
7. Organizational behavior – Robins Stephen P; PHI.

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

ECE-308N	Computer Communication Networks					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	1	0	75	25	100	3 Hr.
Purpose	To familiarize the students with the concepts of basic computer networks used in communication. Also familiarize the students with the various layers of OSI and TCP/IP model.					
Course Outcomes						
CO1	To understand the concept of basics of computer networks and physical layer& media.					
CO2	To understand the concept and processes of data link layer and medium access sublayer.					
CO3	To familiarize with the concept and design issues of network, transport & session layer.					
CO4	To familiarize with the concept and protocols of presentation and application layer.					

Unit – I

Introduction:

Introduction to Computer Networks, Protocols and standards, Network Models: The OSI Model, Layers in the OSI Model, TCP/IP protocol suite, Introduction to addressing.

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:

Aloha Protocols, LAN Protocols: wired LAN,s ,Wireless LAN, Networks, Satellite Networks.

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.
2. Leon –Garcia, Computer Networks, Mc Graw Hill

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

ECE-310N	Digital Signal Processing Lab					
Lecture	**Tutorial**	**Practical**	**Sessional**	**Practical**	**Total**	**Time**
0	**0**	**3**	**40**	**60**	**100**	**3 Hr.**
Course Outcomes						
CO1	**Introduction to MATLAB.**					
CO2	**Study of different function and signals of DSP.**					
CO3	**Study of DFT and DTFT with their properties.**					
CO4	**Study of z-transform and its properties.**					

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 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.

ECE-312N	Digital Design Using Verilog Lab					
Lecture	**Tutorial**	**Practical**	**Sessional**	**Practical**	**Total**	**Time**
0	**0**	**3**	**40**	**60**	**100**	**3 Hr.**
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						
CO1	**To describe, design, simulate, and synthesize circuits using the Verilog hardware description language.**					
CO2	**To design and modeling of combinational and sequential digital systems.**					
CO3	**To develop program codes for synthesis-friendly combinational and sequential logic circuits.**					
CO4	**To understand the advanced features of Verilog HDL and be able to write optimized codes for complex systems.**					

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 implementa8 bit ALU containing 4 arithmetic & 4 logic operations.

ECE-314N	Digital Communication Lab					
Lecture	**Tutorial**	**Practical**	**Sessional**	**Practical**	**Total**	**Time**
0	**0**	**3**	**40**	**60**	**100**	**3 Hr.**
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
9. Measurement of Numerical Aperture
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.