IV SEMESTER

(A30405) SIGNALS & SYSTEMS
(Common for ECE and EEE)

B. Tech. (ECE) IV-Semester

L	T	P	C
3	0	0	3

UNIT-I

Signal Analysis and Fourier Series: Signal Analysis: Introduction, classification of signals, elementary signals and basic operations on signals. Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions,

Fourier Series: Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum

UNIT-II

Fourier Transforms and Sampling: Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function.

Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Types of sampling- impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing.

UNIT-III

Signal Transmission through Linear Systems: Linear system, impulse response, Response of a linear system, linear time invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization.

UNIT-IV

Convolution and Correlation of Signals: Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval‘s theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT-V

Laplace Transforms and Z-Transforms:

Laplace Transforms: Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T‘s relation between L.T‘s, and F.T. of a signal.

Z–Transforms: Fundamental difference between continuous and discrete time signals, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

Text Books

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

References

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.
3. Signals and Systems – Anand Kumar, PHI, 3rd Edition.
4. Signals and signals- Iyer and K.Satya Prasad, Cengage Learning.
5. Signals and Systems – A. Rama Krishna Rao-2008,TMH
6. Introduction to Signal and System Analysis-K .Gopalan 2009, Cengage Learning.

Course Outcomes

Upon completing this course the student will be able to

1. Describe the analogy between vectors and signals.
2. Analyze the signals in frequency domain using Fourier series and Fourier transform.
3. Classify the characteristics of different types of systems.
4. Apply and analyze the concepts of sampling, convolution and correlation.
5. Evaluate the response of the systems using Laplace and Z-transforms.

(A30406) ELECTRONIC & PULSE CIRCUITS

B. Tech. (ECE) IV-Semester

L	T	P	C
3	0	0	3

UNIT-I

Multi Stage Amplifiers: Analysis of Cascaded RC Coupled BJT amplifiers, Cascade Amplifier, Different Coupling, Darlington Pair, Schemes used in Amplifiers - RC Coupled Amplifier, Transformer Coupled Amplifier, Direct Coupled Amplifier.

Feedback Amplifiers: Concepts of Feedback, Classification of Feedback Amplifiers, General characteristics of Negative Feedback Amplifiers, Effect of Feedback on Amplifier Characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative Problems

UNIT-II

BJT amplifiers – Frequency response: Logarithms, Decibels, General frequency considerations, Frequency response of BJT amplifier, Analysis at Low and High frequencies, Effect of coupling and bypass Capacitors, The Hybrid- pi (π) - Common Emitter Transistor Model, CE Short Circuit Current Gain, Current Gain with Resistive Load, Emitter follower at higher frequencies

UNIT-III

Large Signal Amplifiers: Classification, Class A Large Signal Amplifiers, Transformer Coupled Class A Power Amplifier, Efficiency of Class A Amplifier, Class B Amplifier, Efficiency of Class B Amplifier, Class-B Push- Pull Amplifier, Complementary Symmetry Class B Push-Pull Amplifier, Distortion in Power Amplifiers, Thermal Stability and Heat Sinks.

UNIT-IV

Linear Wave Shaping: High pass and low pass RC circuits and their response for sinusoidal, step, pulse, square & ramp inputs, high pass RC network as Differentiator, and low pass RC circuit as an integrator

Non- Linear Wave Shaping Diode clippers, clipping at two independent levels, comparator, applications of voltage comparator, clamping operation, clamping circuit taking source and diode resistances into account, clamping circuit theorem.

UNIT-V

Multivibrators: Analysis of fixed biased Bistable multivibrator, self-biased Bistable multivibrator, commutating capacitors, methods of triggering of Bistable multivibrator, analysis of Monostable, triggering of Monostable multivibrator, calculation of pulse width of Monostable multivibrator, Analysis of Astable multivibrator, calculation of frequency of Astable multivibrator and Schmitt trigger using Transistors.

Text books

1. Millman‘s Pulse, Digital and Switching Waveforms- J.Millman, H.Taub and Mothaiki S. Prakash Rao, 2 Ed, 2008,TMH
2. Pulse and Digital Circuits- A. Anand Kumar, 2005, PHI

Reference books

1. Fundamentals of Pulse and Digital Circuits- Ronald J. Tocci, 3 Ed,2008
2. Pulse and Digital Circuits- MothekiS.Prakash Rao,2006,TMH
3. Wave Generation and Shaping- L. Strauss
4. Electronic Devices and Circuit Theory - Robert L.Boylestad, Louis Nashelsky, 9 Ed., 2008 PE.
5. Micro electric Circuits-Sedra and Smith-5Ed., 2009, Oxford University Press.
6. Electronic Devices and Circuits - S. Salivahanan, N.Suresh Kumar, A. Vallavaraj, 2 Ed., 2009, TMH.

Course Outcomes

At the end of the course, the student will be able to:

1. Design and analyze simple multistage amplifiers and feedback amplifier.
2. Analyze BJT amplifiers at high frequencies.
3. Design different large signal amplifiers.
4. Design different Linear and Nonlinear wave shaping circuits.
5. Design and analyze various multivibrator circuits.

(A30407) ANALOG & DIGITAL COMMUNICATIONS

B. Tech. (ECE) IV-Semester

L	T	P	C
3	1	0	4

UNIT-I

Amplitude Modulation: Modulation, Need for modulation, FDM, Amplitude Modulation-Time and Frequency domain, single tone modulation, power relations, Generation of AM wave with switching modulator, Detection of AM Waves using Envelope detector, DSB-SC: Time and Frequency domain, Generation of DSB-SC-Ring Modulator, Coherent detection, Hilbert transform and properties, SSB-SC: Time and Frequency domain, Generation of SSB-Frequency and Phase discrimination method, Demodulation of SSB.

UNIT-II

Angle Modulation: Frequency Modulation: Single tone Frequency Modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Transmission bandwidth of FM Wave, Generation of FM Waves-Direct and Indirect FM, Detection of FM Waves: Foster Seeley Discriminator, Phase locked loop, Comparison of FM and AM. Noise: Types of Noise, Modelling of noise and AWGN, Comparison of Noise performance in AM, DSBSC, SSB & FM (without derivations), Pre-emphasis and De-emphasis, Super heterodyne Receiver.

UNIT-III

Pulse Analog Modulation: Sampling theorem, Types of sampling process, Types of Pulse Modulation, PAM- Generation and Demodulation, PWM- Generation and Demodulation, PPM- Generation and Demodulation, TDM.

Pulse Digital Modulation: PCM, Generation and Reconstruction, Quantization Noise, DPCM, DM and Adaptive DM, Noise in PCM and DM.

UNIT-IV

Digital Carrier Modulation Schemes:

Optimum Receiver for Binary Digital Modulation Schemes, Description of Binary ASK, FSK, PSK and QPSK Schemes, Transfer Function of the matched filter, Bandwidth and Probability of Error calculations of binary ASK, FSK, PSK and QPSK (Coherent schemes), Comparison of Digital Modulation Schemes. Introduction to QAM,

Signal space representation of binary- ASK, PSK, FSK, QPSK and QAM.

UNIT-V

Concepts of Information theory:

Information, Entropy, Shannons Hartley law, Source coding Techniques-Huffman coding, Shannon-Fano coding, and channel coding techniques.

Textbooks

1. Communication Systems - Simon Haykin, 2nd Ed., Wiley publications
2. Digital and Analog Communication Systems – Sam Shanmugam, John Wiley, 2005.

Reference Books

1. B.P. Lathi, Communication Systems, BS Publication, 2004.
2. R.P.Singh and S.D Sapre, Communication Systems Analog and Digital, TMH, 2006.
3. Wayne Tomasi, Electronics communications systems: Fundamentals through advanced, 5th Edition, Pearson, 2004.
4. Principles of communication systems – Herbert Taub, Donald L Schiling, Goutam Saha,3rd Edition, McGraw-Hill, 2008.
5. Digital Communications- John G. Proakis, Masoud Salehi- 5 th Edition, Mcgarw- Hill,2008

Course Outcomes

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

1. Analyze different modulation and demodulation schemes for Analog & digital communications.
2. Evaluate fundamental communication system parameters.
3. Calculate basic system parameter of baseband data transmission systems.
4. Explain the concept of source coding and channel coding techniques.
5. Explain the concept of channel coding technique.

(A30408) ELECTROMAGNETIC WAVES & TRANSMISSION LINES

B. Tech. (ECE) IV-Semester

L	T	P	C
3	1	0	4

UNIT-I

Electrostatics: Coulomb's Law, Electric Field Intensity- Fields due to Different charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace Equations; Illustrative Problems.

UNIT-II

Magnetostatics: Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.

Maxwell"s Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in differential Forms. Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems

UNIT-III

EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane waves- Definition, All Relations Between E & H, Sinusoidal variations, Wave Propagation in lossless and lossy Media, Conductors & Dielectrics- Characterization, Wave Propagation in Good Conductors and good Dielectrics, Polarization, Illustrative Problems. Reflection and Refraction of plane waves- Normal and Oblique incidences for both perfect Conductor and perfect Dielectrics, Brewster Angle, Critical Angle and Total internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem-Applications, Illustrative problems.

UNIT-IV

Transmission Lines-I: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for characteristic impedance, Propagation Constant, Phase and Group Velocities, Infinite line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortionlessness and minimum Attenuation, Loading- Types of Loading, Illustrative problems.

UNIT-V

Transmission Lines-II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR, UHF Lines as Circuit Elements: **λ/4, λ/2, λ/8** Lines, Impendence Transformations, Smith Chart – Construction and Applications, Single and Double Stub Matching, Illustrative Problems.

Text Books

1. Elements of Electromagnetics- Mattew N.O. Sadiku, 4th Ed, Oxford Univ.Press.
2. Transmission Lines and Networks- Umesh Sinha, Satya Prakashan, 2001, (Tech India Publications), New Delhi.

Reference Books

1. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, 2nd, 2000, PHI.
2. Electromagnetic Field Theory and Transmission Lines – G. Sashibhushana Rao, Wiley Inia, 2013.

Course Outcomes

Upon successful completion of the course, students will be able to:

1. Explain the concepts of electrostatics using vector calculus and coordinate systems.
2. Explain the magnetic field intensity using Biot-Savart's law and Ampere's law.
3. Outline the characteristics of electromagnetic waves and describe Poynting theorem.
4. Summarize the various characteristics of transmission line.
5. Analyze transmission line parameters and stub matching using Smith chart.

(A30230) CONTROL ENGINEERING

B. Tech. (ECE) IV-Semester

L	T	P	C
3	0	0	3

UNIT-I

Introduction: Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

UNIT-II

Transfer Function Representation: Transfer Function of DC Servo motor - AC Servo motor, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction uses Mason‘s gain formula.

UNIT-III

Time Response Analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

Stability Analysis in S-Domain The concept of stability – Routh‘s stability criterion – qualitative stability and conditional stability – limitations of Routh‘s stability

Root Locus Technique: The root locus concept - 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-Bode diagrams - Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin - Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots-Stability Analysis-Applications of Nyquist criterion to find the stability.

UNIT-V

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it‘s Properties – Concepts of Controllability and Observability

Text Books

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

Reference Books

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998
2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engg. by NISE 3rd Edition – John wiley
4. Modeling & Control of Dynamic Systems‖ by Narciso F. Macia George J. Thaler, Thomson Publishers.

Course Outcomes

On completion of the course students will be able to

1. Explain the need for feedback control systems.
2. Obtain mathematical models of simple Electrical and mechanical systems
3. Evaluate the performance of a linear system in frequency and time domains.
4. Determine the stability of a linear control system. Design classical controllers for given system response.
5. Analyze linear systems in state space domain.

(A30021) SOCIAL INNOVATION IN PRACTICE
(Common for all branches)
B. Tech. (ECE) IV-Semester

L	T	P	C
0	0	2	1

UNIT I
Identify community issues to be addressed, Requirements Analysis: Extensive User requirements analysis, Generating effective System Requirement document.

UNIT II
Social Innovation – Case Studies Presentation of the case studies with a focus on impact and vision on society.

UNIT III
Process of Social Innovation Prompts – identifying needs, Proposals – generating ideas, Prototyping – testing the idea in practice,

UNIT IV
Sustaining-developing a business model, Scaling and diffusion-growing social innovations, Systematic change.

UNIT V
Report writing, Documentation and Panel presentation

Reference Books
1. Requirements Analysis: From Business Views to Architecture; David C. Hay; Prentice Hall Professional
2. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, YeheskelHasenfeld; Palgrave Macmillan
3. Social Enterprise Law: Trust, Public Benefit and Capital Markets By Dana Brakman Reiser & Steven A. Dean

Course Outcomes
On Completion of the course, the students will be able to
1. Identify several social issues to be addressed
2. Analyse the impact of social innovations on the society
3. Analyze the process of scoial innovation for a community problem
4. Develop a scalable business model.
5. Analyse the feasibility and economical factors

(A30015) SOFT SKILLS & PROFESSIONAL ETHICS

B. Tech. (ECE) IV-Semester

L	T	P	C
0	0	2	0

UNIT-I

Business Communication Skills:

English Language Enhancement the Art of Communication.

UNIT-II

Intrapersonal & Interpersonal Relationship Skills:

- Intrapersonal Relationships
- Interpersonal Relationships – To be an Effective Team Player

UNIT-III

Campus to Company:

- Corporate Dressing
- Corporate Grooming
- Business Etiquette
- Communication Media Etiquette

UNIT-IV

Group Discussions, Interviews and Presentations:

- Group Discussions
- Interviews
- Presentations

UNIT-V

Entrepreneurial Skills Development:

- Goal Setting
- Entrepreneurial Skills – Awareness and Development

References

1. UNLEASH the power within Soft Skills – Training Manual (Infosys Campus Connect)

Course Outcomes

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

1. Express themselves with proper pronunciations and sentence construction
2. Demonstrate a strong teamwork and be a team player

3. Develop a strong personal etiquette
4. Demonstrate good leadership qualities
5. Recognize and identify basic English grammar

(A30409) BASIC SIMULATION LAB

B. Tech. (ECE) IV-Semester

L	T	P	C
0	0	3	1.5

Note: Minimum of 12 experiments to be conducted from the following.

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as UNIT impulse, UNIT step, square, saw tooth, triangular, sinusoidal, ramp, sinc.
3. Operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power.
4. Finding the even and odd parts of signal/ sequence and real and imaginary parts of signal.
5. Convolution between signals and sequences.
6. Autocorrelation and cross correlation between signals and sequences.
7. Verification of linearity and time invariance properties of a given continuous/discrete system.
8. Computation of UNIT sample, UNIT step and sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
9. Gibbs phenomenon.
10. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform synthesis using Laplace Transform
12. Locating the zeros and poles and plotting the pole-zero maps in S plane and Z-plane for the given transfer function.
13. Generation of Gaussian noise (real and complex), computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Sampling theorem verification.
15. Removal of noise by autocorrelation / cross correlation.
16. Extraction of periodic signal masked by noise using correlation.
17. Verification of Weiner-Khinchine Relations
18. Checking a random process for stationarity in wide sense

Course Outcomes

Upon completing this course the student will be able to

1. Examine various signals and demonstrate different operations using MATLAB.
2. Evaluate the Fourier transform of a signal and Plot it's magnitude and phase spectrum.
3. Test the sampling theorem using MAT lab
4. Examine a WSS Random process.
5. Describe the waveform synthesis using laplace tranform and plot pole zero maps in s plane and z plane.

(A30410) ELECTRONIC& PULSE CIRCUITS LAB

B. Tech. (ECE) IV-Semester

L	T	P	C
0	0	3	1.5

List of Experiments (Minimum 12 experiments to be done):

PART – 1: Electronic Circuits Minimum Eight experiments to be conducted:

I. Design and simulation in simulation laboratory using any simulation software(Minimum 6 experiments):

1. Common Emitter Amplifier
2. Common Source Amplifier
3. Two Stage RC Coupled Amplifier
4. Current Shunt and Voltage Series Feedback Amplifier
5. Cascode Amplifier
6. Wein Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistors
8. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier.
10. Common Base(BJT) / Common Gate (JFET) Amplifier

II. Testing in Hardware Laboratory (Minimum 2 experiments):

1. Class A power Amplifier (With transformer load)
2. Class C Power Amplifier
3. Hartley & Colpitts Oscillators.
4. Darlington Pair Transistor amplifier.

PART – II: Pulse Circuits (Minimum 4 experiments):

1. Linear Wave Shaping
    a. RC Low Pass Circuit for different time constants
    b. RC High Pass Circuit for Different time constants
2. Transfer characteristics and response of different clipper circuits.
3. The Steady State Output Waveform of Clamper circuits for a Square wave input.
4. Design a Bistable multivibrator and draw its waveforms
5. Design an Astable multivibrator and draw its wave forms
6. Design a Monostable multivibrator and draw its waveforms

Equipment Required for the Laboratory:

1. For Software Simulation of Electronic Circuits

- Computer Systems with Latest Specifications
- Connected in LAN (Optional)
- Operating System (Windows XP)
- Suitable Simulation Software

2. For Hardware Simulation of Electronic Circuits
   - Regulated Power Supply (0 – 30 V)
   - CRO's (0 – 20 MHz)
   - Function Generator (0 – 1M Hz)
   - Components
3. Windows XP/ Linux etc.

Course Outcomes

At the end of the course, the student will be able to:

1. Design and analyze simple single and multi-stage amplifiers using appropriate experimentation setup and simulation software.
2. Analyze different negative feedback amplifiers using appropriate experimentation setup and simulation software.
3. Analyze different power amplifiers using appropriate experimentation setup and simulation software.
4. Design different linear and nonlinear circuits using appropriate experimentation setup.
5. Design and analyze different multivibrator and oscillator circuits using appropriate experimentation setup and simulation software.