Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

Branch- Common to All Discipline

New Scheme Based On AICTE Flexible Curricula

BT301	**Mathematics-III**	**3L-1T-0P**	**4 Credits**

OBJECTIVES: The objective of this course is to fulfill the needs of engineers to understand applications of Numerical Analysis, Transform Calculus and Statistical techniques in order to acquire mathematical knowledge and to solving wide range of practical problems appearing in different sections of science and engineering. More precisely, the objectives are:

- To introduce effective mathematical tools for the Numerical Solutions algebraic and transcendental equations.
- To enable young technocrats to acquire mathematical knowledge to understand Laplace transformation, Inverse Laplace transformation and Fourier Transform which are used in various branches of engineering.
- To acquaint the student with mathematical tools available in Statistics needed in various field of science and engineering.

Module 1: Numerical Methods – 1: (8 hours): Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

Module 2: Numerical Methods – 2: (6 hours): Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, Gauss-Seidal, and Relaxation method.,

Module 3: Numerical Methods – 3: (10 hours): Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. RungeKutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

Module 4: Transform Calculus: (8 hours): Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method, Fourier transforms.

Module 5: Concept of Probability: (8 hours): Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

Textbooks/References:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
7. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
8. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
9. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968. Statistics

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Electronics & Communication Engineering III-Semester

EC302 ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Unit-1 Theory of Measurement: Introduction, Characteristics of Instruments and measurement systems (Static &Dynamic) Error analysis: Sources, types and statistical analysis. Instrument Calibration: Comparison Method. DC and AC Ammeter, DC Voltmeter- Chopper type and solid-state, AC voltmeter using Rectifier. Average, RMS, Peak responding voltmeters, Multi-meter, Power meter, Bolometer and Calorimeter.

Unit-2 CRO: Different parts of CRO, Block diagram, Electrostatic focusing, Electrostatic deflection, Post deflection acceleration. Screen for CRTs, Graticules, Vertical and Horizontal deflection system, Time base circuit, Oscilloscope Probes, Applications of CRO, Special purpose CROs- Multi input, Dual trace, Dual beam, Sampling, Storage (Analog and Digital) Oscilloscope

Bridges : Maxwell's bridge (Inductance and Inductance-Capacitance), Hay's bridge, Schering bridge (High voltage and Relative permittivity), Wein bridge. Impedance measurement by Q-meter

Unit-3 (Transducer): Classification of Transducers, Strain gauge, Displacement Transducer Linear Variable Differential Transformer (LVDT) and Rotary Variable Differential Transformer (RVDT), Temperature Transducer- Resistance Temperature Detector (RTD), Thermistor, Thermocouple, Piezo-electric transducer, Optical Transducer- Photo emissive, Photo conductive, Photo voltaic, Photo-diode, Photo Transistor

Unit-4 Signal and Function Generators, Sweep Frequency Generator, Pulse and Square Wave Generator, Beat Frequency Oscillator, Digital display system and indicators, Classification of Displays, Display devices: Light Emitting diodes (LED) and Liquid Crystal Display(LCD).

Unit-5 Advantages of Digital Instrument over Analog Instrument, Digital-to-analog conversion (DAC) - Variable resistive type, R-2R ladder Type, Binary ladder, Weighted converter using Op-amp and transistor, Practical DAC. Analog-todigital Conversion (ADC) - Ramp Technique, Dual Slope Integrating Type, Integrating Type (voltage to frequency), Successive Approximations. Digital voltmeters and multi-meters, Resolution and sensitivity of digital multi-meter.

Text/Reference Books:

1. Albert D. Helfrick, William David Cooper, “Modern electronic instrumentation and measurement techniques”, TMH 2008.
2. Oliver Cage, “Electronic Measurements and Instrumentation”, TMH, 2009.
3. Alan S. Morris, “Measurement and Instrumentation Principles”, Elsevier (Buterworth Heinmann), 2008.
4. David A. Bell, “Electronic Instrumentation and Measurements”, 2nd Ed., PHI, New Delhi 2008.
5. H.S. Kalsi, “Electronics Instrumentation”, TMH Ed. 2004
6. A.K.Sawhney, “A Course in Electrical and Electronic Measurements and Instrumentation”, Dhanpat Rai.
7. MMS Anand, “Electronic Instruments & Instrumentation Technology”, PHI Pvt. Ltd., New Delhi Ed. 2005

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New Scheme Based On AICTE Flexible Curricula

Electronics & Communication Engineering III-Semester

EC303 DIGITAL SYSTEM DESIGN

Unit-1 Number Systems: Decimal, Binary, Octal and Hexadecimal systems, conversion from one base to another, Codes-BCD, Excess- 3, Gray Reflected ASCII, EBCDIC.

Logic gates and binary operations- AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive– NOR Implementations of Logic Functions using gates, NAND–NOR implementations – Multi level gate implementations- Multi output gate implementations.

Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality, Boolean function, Canonical and standard forms,Minimization of Boolean functions, Minterm,Maxterm, Sum of Products (SOP), Product of Sums (POS),Karnaugh map Minimization, Don't care conditions, Quine-McCluskey method of minimization.

Unit-2 Combinational logic circuits :Half adder – Full Adder – Half subtractor - Full subtractor– Parallelbinary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder– Serial. Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/De-multiplexer – decoder - encoder – parity checker – parity generators – codeconverters - Magnitude Comparator.

Unit-3. **Sequential Logic Design**: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation

Unit-4 Registers and Counters: Asynchronous Ripple or serial counter. Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Downcounters – Programmable counters – Design of Synchronous counters: state diagram-State table –State minimization –State assignment - Excitation table and maps-Circuit. Implementation - Modulo–n counter, Registers – shift registers - Universal shift registers. Shift register counters – Ring counter – Shift counters - Sequence generators.

Unit-5 Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Conceptof Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

Text/Reference Books:

1. Malvino & Leach, “Digital Principles and Applications”, TMH.
2. M. Morris Mano, “Digital Logic Design”, PHI
3. R.P. Jain, “Modern Digital Design”, TMH.
4. S. Salivahanan & S. Arivazhagan, “Digital Circuits and Design”, Vikas Publishing.
5. D. Roy Chaudhuri, Digital Circuits, “An Introduction Part -1 & 2”, Eureka Publisher.
6. Ronald J Tocci , “Digital Systems, Principles and Applications”, PHI.
7. Taub & Schilling, “Digital Integrated Electronics”, TMH.

DIGITAL SYSTEM DESIGN LAB

1. Study of different basic digital logic gates and verification of their Truth Table.
2. Study and verification of the law of Boolean Algebra and De-Morgan’s Theorem.
3. Construction and verification of various combinational circuits such as Half Adder, Full Adder, Half & Full Subtractor.
4. Study of Multiplexer, De-multiplexer.
5. Study of Different Code Converters, Encoder, Decoder.
6. Construction and verification of various types of Flip-Flops using gates and IC’s.
7. Construction and Verification of different Shift Registers.
8. Construction and verification of different types of Counters.
9. Study of important TTL technologies, Verifications of important TTL Circuit Parameters.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Electronics & Communication Engineering III-Semester

EC304 Electronic Devices

Unit-1 Semiconductor Material Properties: Elemental & compound semiconductor materials , Bonding forces and Energy bands in intrinsic and extrinsic silicon, Charge carrier in semiconductors , carrier concentration, Junction properties, Equilibrium condition, biased junction, Steady state condition, breakdown mechanism (Rectifying Diodes, Zener Diodes), Metal Semiconductor Junction.

Special diodes: Tunnel diodes, Varactor diodes, Schottky diode, Photo diodes, Photodetector, LED, solar cell.

Unit-2 Diode circuits: Ideal and Practical diode, Clipper, Clamper.

Power Supply: Rectifiers-Half wave, Full wave, Bridge rectifier, filter circuits, Voltage regulation using shunt & series regulator circuits, Voltage regulation using IC.

Unit-3 Fundamentals of BJT: Construction, basic operation, current components and equations,CB, CE and CC configuration, input and output characteristics, Early effect, Region of operations: active, cut-off and saturation region. BJT as an amplifier. Ebers-Moll model, Power dissipation in transistor (Pd, max rating), Photo transistor. Transistor biasing circuits and analysis: Introduction, various biasing methods: Fixed bias,Self bias, Voltage Divider bias, Collector to base bias, Load-line analysis: DC and AC analysis, Operating Point and Bias Stabilization and Thermal Runaway. Transistor as a switch.

Unit-4 Small Signal analysis: Small signal Amplifier,Amplifier Bandwidth, Hybrid model, analysis of transistor amplifier using h-parameter, Multistage Amplifier: Cascading amplifier, Boot-strapping Technique, Darlington amplifier and cas-code amplifier, Coupling methods in multistage amplifier, Low and high frequency response, Hybrid πmodel, Current Mirror circuits. Large Signal analysis and Power Amplifiers: Class A,Class B,Class AB, Class C, Class D, Transformer coupled and Push-Pull amplifier.

Unit-5 FET construction- JFET: Construction, n-channel and p-channel, transfer and drain characteristics, parameters, Equivalent model and voltage gain, analysis of FET in CG, CS and CD configuration. Enhancement and Depletion MOSFET drain and transfer Characteristics. Uni-junction Transistor (UJT) and Thyristors: UJT: Principle of operation, characteristics, UJT relaxation oscillator.

Text/Reference Books:

1. Millman & Halkias, "Electronic Devices And Circuits", TMH.
2. Salivahanan, Kumar & Vallavaraj, "Electronic Devices And Circuits", TMH.
3. Boylestad & Neshelsky, "Electronic Devices & Circuits", PHI.
4. Schilling & Belove, "Electronic Circuits , Discrete & Integrated", TMH.
5. Chattopadhyay & Rakhshit, "Electronic Fundamentals & Applications", New Age
6. Adel S. Sedra & Kenneth C. Smith, "Microelectronic Circuits", OUP.
7. R. A. Gayakwad, "Op-Amps And Linear Integrated Circuits", PHI
8. Theodore F. Bogart, Jeffrey S. Beasley, "Guillermo Rico Electronic Devices & Circuits".
9. Allen Mottershead, "Electronic Devices & Circuits".

ELECTRONIC DEVICES LAB

1. Diode Characteristic
   a) pn junction diode Characteristics and Static & Dynamic resistance measurement from graph.
   b) To plot Zener diode Characteristics curve.
2. Clipper Clamper
   a) To plot the Characteristics curve of various clamper circuits.
   b) To plot the Characteristics curve of various clamper circuits.
3. Half wave, full wave & bridge rectifier
   a) To measure Vrms, Vdc for half wave, full wave & bridge rectifier.
   b) To measure ripple factor, ratio of rectification for full wave & half wave rectifier.
4. Voltage regulation using zener diode shunt regulator and transistor series voltage regulator in the following cases
   a) Varying input
   b) Varying load
5. Characteristic of BJT
   a) To plot the input & output Characteristics curve in CB & CE configuration
   b) To find α & β and Q point from the above curve.

c) To plot the Characteristics curve of various clipper circuits.

6. h- Parameter

   To measure h- parameter (Av, Ai, Ro & Ri) in CE Amplifier

7. Multi Stage Amplifier
   a) To plot the Characteristics curve for Direct Coupled Amplifier.
   b) To plot the Characteristics curve for RC Coupled Amplifier.
   c) To plot the Characteristics curve for transformer Coupled Amplifier.
8. FET Characteristic
   a) To plot the Characteristics curve for n channel – JFET in CS configuration.
   b) To find out pinch off voltage from the above characteristics curve

9 UJT Characteristic

   a) To plot the Characteristics curve for UJT.
   b) To determine intrinsic stand off ratio.

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Electronics & Communication Engineering III-Semester

EC305 Network Analysis

Unit-1 Introduction to circuit theory: basic circuit element R,L,C and their characteristics in terms of linearity & time dependant nature, voltage & current sources, controlled & uncontrolled sources KCL and KVL analysis, Steady state sinusoidal analysis using phasors; Concept of phasor & vector, impedance & admittance, Nodal & mesh analysis, analysis of magnetically coupled circuits. Dot convention, coupling coefficient, tuned circuits, Series & parallel resonance

Unit-2 Network Graph theory: Concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks

Unit-3 Network Theorems: Thevenins & Norton's, Super positions, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.

Unit-4 Transient analysis: Transients in RL, RC&RLC Circuits, initial& final conditions, time constants. Steady state analysis

Laplace transform: solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain.

Unit-5 Two port parameters: Z, Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, Reciprocity and Symmetry in all parameter.

Text/Reference Books: 1. M.E. Van Valkenburg, Network Analysis, (Pearson)
2. S P Ghosh A K Chakraborty Network Analysis & Synth. (MGH).
3. http://www.nptelvideos.in/2012/11/networks-and-systems.html

REFERENCE:- 1. Sudhakar-Circuit Network Analysis & Synth(TMH).
2. J. David Irwin Engineering Circuit analysis tenth edition, Wiley india.
3. Kuo- Network Analysis & Synthesis, Wiley India.
4. Robert L Boylestad introductory Circuit analysis, Pearson
5. Smarajit Ghosh, NETWORK THEORY: ANALYSIS AND SYNTHESIS (PHI).

6. Roy Choudhary D; Network and systems; New Age Pub.
7. Bhattacharya and Singh- Network Analysis & Synth (Pearson)

EXPERIMENTS LIST:-

1. To Verify Thevenin Theorem and Superposition Theorem.

2. To Verify Reciprocity Theorem and Millman's Theorem.

3. To Verify Maximum Power Transfer Theorem.

4. To Determine Open Circuit and Short Circuit parameters of a Two Port Network.

5. To Determine A,B, C, D parameters of a Two Port Network.

6. To determine h parameters of a Two Port Network.

7. To Find Frequency Response of RLC Series Circuit RLC parallel Circuit and determine resonance and 3dB frequencies.

8. To determine charging and discharging times of Capacitors.

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New Scheme Based On AICTE Flexible Curricula

Electronics & Communication Engineering III-Semester

EC306 EMI Lab

List of Experiments:

1. **Study of Cathode Ray Oscilloscope.**
2. **Study of displacement measurement by LVDT.**
3. **Force measurement by strain gauge.**
4. **Measurement of Capacitor using Q-meter.**
5. **Measurement of Self-induction using Q-meter.**
6. **Temperature measurement by thermistor.**
7. **Study of optical Transducers: Photo-diode, Photo-Transistor.**
8. **Design of digital to analog converter, R-2R ladder Type and analysis of its characteristics.**
9. **To measurement of the unknown Inductance by using Maxwell's bridge method.**
10. **To measurement of the unknown capacitance by using Schering bridge method.**
11. **To measurement of the unknown Frequency by using Wein's bridge method.**
12. **To measurement of the unknown Inductance by using Hay's bridge method.**
13. **To calculate Frequency and amplitude using CRO & Function Generator.**
14. **To calculate Frequency using Lissajious Pattern.**
15. **To study RVDT.**
16. **Study of Function Generator.**
17. **Temperature measurement by thermocouple.**
18. **Temperature measurement by RTD.**
19. **Study of optical Transducers: Photo conductive, Photo voltaic.**
20. **To study digital Multimeter.**

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Branch- Common to All Discipline

ES401	**Energy & Environmental Engineering**	**3L-1T-0P**	**4 Credits**

The objective of this Course is to provide *an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternative energy sources and their technology and application.*

Module 1: Introduction to Energy Science:

Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment; Overview of energy systems, sources, transformations, efficiency, and storage; Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)

***Module2*: Ecosystems**

- Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem (a.)Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

***Module 3*: Biodiversity and its conservation**

- Introduction – Definition: genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, National and local levels; India as a mega-diversity nation; Hot-sports of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

***Module 4:* Environmental Pollution**

- Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards; Solid waste Management: Causes, effects and control measures of urban and industrial wastes; Role of an individual in prevention of pollution; Pollution case studies; Disaster

management: floods, earthquake, cyclone and landslides.

Module 5: **Social Issues and the Environment**

- From Unsustainable to Sustainable development; Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of people; its problems and concerns. Case Studies
  Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies Wasteland reclamation; Consumerism and waste products; Environment Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation; Public awareness.

Module 6: Field work

- Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

REFERENCE

1. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.
2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB).
3. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai,
4. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
5. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards', Vol I and II, Enviro Media (R)
6. Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press.
7. Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living, Gaiam

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Electronics & Communication Engineering IV-Semester

EC402 Signals & Systems

Unit-1 Introduction of Signals and Systems: Definition of signal, Classification of Signal and representation: Continuous time and discrete time, even/odd, periodic/aperiodic, random/deterministic, energy/power, one/multidimensional, some standard signals, , Basic Operations on Signals for CT/DT signal, transformation of independent & dependent variables,

Definition of system and their classification: CT/DT, linear/non-linear, variant/non-variant, causal and non-causal system state/dynamic system, interconnection of systems. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability.

Unit-2 Linear Time- Invariant Systems: Introduction, Impulse Response Representation for LTI Systems, Convolution, Properties of the Impulse Response Representation for LTI Systems, Difference Equation for LTI Systems, Block Diagram Representations(direct form-I, direct form-II, Transpose, cascade and parallel). Impulse response of DT-LTI system and its properties.

Unit-3 z-Transform: Introduction, ROC of finite duration sequence, ROC of infinite duration sequence, Relation between Discrete time Fourier Transform and z-transform, properties of the ROC, Properties of z-transform, Inverse z-Transform, Analysis of discrete time LTI system using zTransform, Unilateral z-Transform.

Unit-4 Fourier analysis of discrete time signals: Introduction, Properties and application of discrete time Fourier series, Representation of Aperiodic signals, Fourier transform and its properties, Convergence of discrete time Fourier transform, Fourier Transform for periodic signals, Applications of DTFT.

Unit-5 State-space analysis and multi-input, multi-output representation. The state-transition matrix and its role. The Sampling Theorem and its implications- Spectra of sampled signals. Reconstruction:

Reference Books:

1. Simon Haykin, “Signals and Systems”, John Wiley.
2. Simon Haykin, “Analog and Digital Communications”, John Willey.
3. Bruce Carlson, “Signals and Systems”, TMH.

4. Oppenheim & Wilsky, “Signals & Systems”, PHI.
5. Taub and Schilling "Principles of communication signals", 2nd ed. New York: Mcgraw-Hill, 1986.

LIST OF EXPERIMENTS

1. Introduction to MATLAB Tool.
2. To implement delta function, unit step function, ramp function and parabolic function for continuous-time.
3. To implement delta function, unit step function, ramp function and parabolic function for discrete-time.
4. To implement rectangular function, triangular function, sinc function and signum function for continuous-time.
5. To implement rectangular function, triangular function, sinc function and signum function for discrete-time.
6. To explore the communication of even and odd symmetries in a signal with algebraic operations.
7. To explore the effect of transformation of signal parameters (amplitude-scaling, time-scaling & shifting).
8. To explore the time variance and time invariance property of a given system.
9. To explore causality and non-causality property of a system.
10. To demonstrate the convolution of two continuous-time signals.
11. To demonstrate the correlation of two continuous-time signals.
12. To demonstrate the convolution of two discrete-time signals.
13. To demonstrate the correlation of two discrete-time signals.
14. To determine Magnitude and Phase response of Fourier Transform of given signals.

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Electronics & Communication Engineering IV-Semester

EC403 Analog Communication

Unit-1

Frequency domain representation of signal: Fourier transform and its properties, condition of existence, Fourier transform of impulse, step,signum , cosine, sine, gate pulse, constant, properties of impulse function. Convolution theorem (time & frequency), correlation(auto & cross), energy & power spectral density

Unit-2

Introduction: Overview of Communication system, Communication channels Need for modulation, Baseband and Pass band signals, Amplitude Modulation: Double side band with Carrier (DSB-C), Double side band without Carrier, Single Side Band Modulation, DSB-SC, DSB-C, SSB-SC,Generation of AM, DSB-SC, SSB-SC, VSB-SC & its detection,Vestigial Side Band (VSB).

Unit-3

Types of angle modulation, narrowband FM,wideband FM, its frequency spectrum, transmission BW, methods of generation (Direct & Indirect), detection of FM (discriminators: balanced, phase shift and PLL detector),pre emphasis and de-emphasis. FM transmitter & receiver: Block diagram ofFM transmitter& receiver, AGC, AVC, AFC,

Unit-4

AM transmitter& receiver: Tuned radio receiver &super heterodyne, limitation of TRF, IF frequency, image signal rejection, selectivity, sensitivity and fidelity ,Noise in AM, FM

Unit-5

Noise: Classification of noise, Sources of noise, Noise figure and Noise temperature, Noise bandwidth, Noise figure measurement, Noise in analog modulation, Figure of merit for various AM andFM, effect of noise on AM &FM receivers.

REFERENCES

1. Simon Haykins, Communication System, John Willy
2. Singh &Sapre, Communication System, TMH
3. B.P. Lathi, Modern Digital and analog communication system; TMH
4. Singhal, analog and Digital communication, TMH
5. Rao, Analog communication, TMH
6. P K Ghose, principal of communication of analog and digital, universities press.
7Taub& shilling, Communication System, TMH
8. Hsu; Analog and digital communication(Schaum); TMH
9. Proakis fundamental of communication system. (Pearson edition).

List of Experiments:

1. To analyze characteristics of AM modulator & Demodulators.
2. To analyze characteristics of FM modulators& Demodulators.
3. To analyze characteristics of super heterodyne receivers.
4. To analyze characteristics of FM receivers.
5. To construct and verify pre emphasis and de-emphasis and plot the wave forms.
6. To analyze characteristics of Automatic volume control and Automatic frequency control.
7. To construct frequency multiplier circuit and to observe the waveform.
8. To design and analyze characteristics of FM modulatorand AM Demodulator using PLL.

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Electronics & Communication Engineering IV-Semester

EC404 Control System

Unit-1 Introduction to Control system: Terminology and classification of control system, examples of control system, mathematical modeling of mechanical and electrical systems, differential equations, transfer function, block diagram representation and reduction, signal flow graph techniques.

Feedback characteristics of control systems Open loop and closed loop systems, effect of feedback on control system and on external disturbances, linearization effect of feedback, regenerative feedback

.**Unit-2 Time response analysis** Standard test signals, time response of 1st order system, time response of 2nd order system, steady-state errors and error constants, effects of additions of poles and zeros to open loop and closed loop system.

Time domain stability analysis Concept of stability of linear systems, effects of location of poles on stability, necessary conditions for stability, Routh-Hurwitz stability criteria, relative stability analysis, Root Locus concept, guidelines for sketching Root-Locus.

Unit-3 Frequency response analysis Correlation between time and frequency response, Polar plots, Bode Plots, all-pass and minimum-phase systems, log-magnitude versus Phase-Plots, closed-loop frequency response.

Frequency domain stability analysis : Nyquist stability criterion, assessment of relative stability using Nyquist plot and Bode plot (phase margin, gain margin and stability).

Unit-4 Approaches to system design Design problem, types of compensation techniques, design of phase-lag, phase lead and phase lead-lag compensators in time and frequency domain, proportional, derivative, integral and Composite Controllers.

Unit-5 State space representation of systems, block diagram for state equation, transfer function decomposition, solution of state equation, transfer matrix, relationship between state equation and transfer function, controllability and observability.

Text/Reference Books:

1. Albert D. Helfrick, William David Cooper, "Modern electronic instrumentation and measurement techniques", TMH 2008.
2. Oliver Cage, "Electronic Measurements and Instrumentation", TMH, 2009.
3. Alan S. Morris, "Measurement and Instrumentation Principles", Elsevier (Buterworth Heinmann), 2008.
4. David A. Bell, "Electronic Instrumentation and Measurements", 2nd Ed., PHI, New Delhi 2008.
5. H.S. Kalsi, "Electronics Instrumentation", TMH Ed. 2004
6. A.K.Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai.
7. MMS Anand, "Electronic Instruments & Instrumentation Technology", PHI Pvt. Ltd., New Delhi Ed. 2005

CONTROL SYSTEM LAB

Control System performance analysis and applications of MATLAB in Control system performance analysis & design.

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New Scheme Based On AICTE Flexible Curricula

Electronics & Communication Engineering IV-Semester

EC405 Analog Circuits

COURSE CONTENTS:

Feedback Amplifier and Oscillators: Concept of feedback and their types, Amplifier with negative feedback and its advantages. Feedback Topologies.

Oscillators: Concept of Positive feedback, Classification of Oscillators, Barkhausen criterion, Types of oscillators: RC oscillator, RC Phase Shift, Wien Bridge Oscillators. LC Oscillator: Hartley, Colpitt's, Clapp and Crystal oscillator.

Introduction to integrated circuits: Advantages and characteristic parameters of IC's, basic building components, data sheets

Operational Amplifier: Differential amplifier and analysis, Configurations- Dual input balanced output differential amplifier, Dual input Unbalanced output differential amplifier, Single input balanced output differential amplifier, Single input Unbalanced output differential amplifier Introduction of op-amp, Block diagram, characteristics and equivalent circuits of an ideal opamp, Power supply configurations for OP-AMP.

Characteristics of op-amp: Ideal and Practical, Input offset voltage, offset current, Input bias current, Output offset voltage, thermal drift, Effect of variation in power supply voltage, common-mode rejection ratio (CMRR), Slew rate and its Effect, PSRR and gain bandwidth product, frequency limitations and compensations, transient response, analysis of TL082 datasheet.

OP-AMP applications: Inverting and non-inverting amplifier configurations, Summing amplifier, Integrators and differentiators, Instrumentation amplifier, Differential input and differential output amplifier, Voltage-series feedback amplifier, Voltage-shunt feedback amplifier, Log/ Antilog amplifier, Triangular/rectangular wave generator, phase-shift oscillators, Wein bridge oscillator, analog multiplier-MPY634, VCO, Comparator, Zero Crossing Detector. OP-AMP AS FILTERS: Characteristics of filters, Classification of filters, Magnitude and frequency response, Butterworth 1st and 2nd order Low pass, High pass and band pass filters, Chebyshev filter characteristics, Band reject filters, Notch filter; all pass filters, self-tuned filters, AGC,AVC using op-AMP.

TIMER:IC-555 Timer concept, Block pin configuration of timer. Monostable, Bistable and AstableMultivibrator using timer 555-IC, Schmitt Trigger, Voltage limiters, Clipper and

clampers circuits, Absolute value output circuit, Peak detector, Sample and hold Circuit, Precision rectifiers, Voltage-to-current converter, Current-to-voltage converter.

Voltage Regulator: simple OP-AMP Voltage regulator, Fixed and Adjustable Voltage Regulators, Dual Power supply, Basic Switching Regulator and characteristics of standard regulator ICs such as linear regulator, Switching regulator andlow-drop out regulator. Study of LM317, TPS40200 and TPS7250

TEXT BOOKS:

1. RamakantA.Gaikward,"OP- Amp and linear Integrated circuits" Third edition 2006, Pearson.
2. B. Visvesvara Rao Linear Integrated Circuits Pearson.
3. http://www.nptelvideos.in/2012/11/analog-ics.html
4. http://nptel.ac.in/courses/117108107/

REFERENCES:

1. David A. Bell: Operational Amplifiers & Linear ICs, Oxford University Press, 2nd edition,2010.
2. D. Roy Choudhury:Linear Integrated Circuits New Age Publication.
3. B. Somanathan Nair: Linear Integrated Circuits analysis design and application Wiley India Pvt. Ltd.
4. Maheshwary and Anand: Analog Electronics, PHI.
5. S.Salivahanan,V S KanchanaBhaaskaran: Linear Integrated Circuits",second edition, McGraw Hill.
6. Gray Hurst Lewis Meyer Analysis and design of analog Integrated Circuits fifth edition Wiley India.
7. RobertF.Coughlin, Frederick,F.Driscoll: Operational Amplifiers and Linear Integrated Circuits, sixth edition, Pearson.
8. Millman and Halkias: Integrated electronics, TMH.
9. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education.
10. Sedra and Smith: Microelectronics, Oxford Press.

List of Experiments :

Apparatus Required –Dual Channel Cathode Ray Oscilloscope (0-20 MHz), Function Generator (10MHz and above), Dual Power Supply, LM741, TL082, MPY634,TPS7250, Probes, digital multimeter.

1. To measure and compare the op-amp characteristics: offset voltages, bias currents, CMRR, Slew Rate of OPAMP LM741 and TL082.
2. To determine voltage gain and frequency response of inverting and non-inverting amplifiers using TL082.
3. To design an instrumentation amplifier and determine its voltage gain using TL082.
4. To design op-amp integrator (low pass filter) and determine its frequency response.
5. To design op-amp differentiator (high pass filter) and determine its frequency response.

6. Design 2nd order Butterworth filter using universal active filter topology with LM741
7. To design Astable, Monostable and Bistablemultivibrator using 555 and analyse its characteristics.
8. Automatic Gain Control (AGC) Automatic Volume Control (AVC)using multiplier MPY634
9. To design a PLL using opampwith MPY634 anddetermine the free running frequency, the capture range and the lock in range of PLL
10. Design and test a Low Dropout regulator using op-amps for a given voltage regulation characteristic and compare the characteristics with TPS7250 IC.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Electronics & Communication Engineering IV-Semester

EC406 Simulation Lab

COURSE CONTENTS: Introduction to circuit simulation software (TINA-PRO/ PSPICE/ CIRCUIT MAKER). Study of the key features and applications of the software in the field of Electronic Circuits, Electronic Instrumentation and Network Analysis.

Design, Optimization and simulation of;

1. Basic Electronic circuits (examples rectifiers, clippers, clampers, diode, transistor characteristics etc).

2. Transient and steady state analysis of RL/ RC/ RLC circuits, realization of network theorems.

3. Use of virtual instruments built in the software.

Introduction to PCB layout software

Overview and use of the software in optimization, designing and fabrication of PCB pertaining to above circuits simulated using above simulation software. Students should simulate and design the PCB for at least two circuits they are learning in the current semester.