RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Choice Based Credit System

Electronics & Communication Engineering, III-Semester (Mathematics-III)

(Applicable to CS/IT/EC)

COURSE OBJECTIVE- The objective of this course is to fulfill the needs of Engineers to understand the Applications of Fourier Series, Fourier & Laplace Transforms and Statistical Techniques in order to acquire Mathematical knowledge and to Solving a wide range of Practical Problems Appearing in the CS/IT/EC discipline of Engineering.

Course Contents

Fourier Series: Fourier Series for Continuous & Discontinuous Functions, Expansion of odd and even periodic functions, Half-range Fourier series, Complex form of Fourier Series.

Integral Transforms:

Fourier Transform**:** Complex Fourier Transform, Fourier Sine and Cosine Transforms, Applications of Fourier Transform in Solving the Ordinary Differential Equation.

Laplace Transform**:** Introduction of Laplace Transform, Laplace Transform of elementary Functions, Properties of Laplace Transform, Change of Scale Property, First and Second Shifting Properties, Laplace Transform of Derivatives and Integrals. Inverse Laplace Transform & its Properties, Convolution theorem, Applications of Laplace Transform in solving the Ordinary Differential Equations.

Random Variables: Discrete and Continuous Random Variables, Probability Function, Distribution Function, Density Function, Probability Distributions, Mean and Variance of Random Variables.

Distribution: Discrete Distributions- Binomial & Poisson Distributions with their Constants, Moment Generating Functions, Continuous Distribution- Normal Distribution, Properties, Constants, Moments.
Curve Fitting using Least Square Method.

COURSE OUTCOMES- The curriculum of the Department is designed to satisfy the diverse needs of students. Coursework is designed to provide students the opportunity to learn key concept of Applications of Fourier Series, Fourier & Laplace Transforms and Statistical Techniques.

EVALUATION- Evaluation will be continuous, an integral part of the class as well as through external assessment.

Reference:

1. Probability & Statistics by G Shanker Rao, University Press.
2. Mathematical Statistics by George R., Springer
3. Erwin Kreyszig: Advanced Engineering Mathematics, Wiley India.
4. H C Taneja: Advanced Engineering Mathematics, I.K. International Publishing House Pvt. Ltd.
5. S S Sastri: Engineering Mathematics, PHI
6. Ramana, B.V.: Advance Engg. Mathematics, TMH New Delhi
7. Engineering Mathematics By Samnta Pal and Bhutia, Oxford Publication
8. Probability and Statistics in Engineering, W.W. Hines et. al., Wiley India PVT Ltd.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Choice Based Credit System

Electronics & Communication Engineering, III-Semester

Digital Circuits & System

Course Objective

To learn the basic methods for the design of digital circuits and provide the fundamental Concepts used in the design of digital systems.

- To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- To introduce the methods for simplifying Boolean expressions
- To outline the formal procedures for the analysis and design of combinational circuits andsequential circuits
- To introduce the concept of memories and programmable logic devices.
- To illustrate the concept of synchronous and asynchronous sequential circuits

Course contents:

Review of 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.Introduction to number systems and binary operations.

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.

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.

Sequential logic circuits: Latches, Flip-flops - SR, JK, D, T, and Master-Slave, Characteristic table and equation– Application table – Edge triggering – Level Triggering – Realization of one flip flopusing other flip flops – serial adder/subtractor.

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.

Logic Families: Introduction to different logic families and their characteristics ,RTL,DTL,TTL, ECL, IIL,TTL inverter – circuit description and operation, CMOS inverter – circuit description and operation, other TTL and CMOS gates,

Memories – ROM - ROM organization - PROM – EPROM – EEPROM –EAPROM, RAM – RAM organization Static RAM, Dynamic RAM, Programmable Logic Array (PLA) - Programmable Array Logic (PAL)

Course outcome

Students who are successful in this class will demonstrate at least the abilities:

1. To introduce the concepts and techniques associated with the number systems and codes. To minimize the logical expressions using Boolean postulates.
2. To design various combinational and sequential circuits.

TEXT BOOKS

1. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 6th Edition, TMH, 2003.
3. http://www.nptelvideos.in/2012/12/digital-circuits-and-systems.html

REFERENCES

1. Anil K. Maini, Digital electronics Principles and Integrated circuits Wiley India Pvt. Ltd.
2. Anandkumar- fundamental of digital circuit. 3rd edition. PHI
3. John. F. Wakerly, Digital Design, Principles and Practices, Pearson Prentice Hall
4. John.M Yarbrough, Digital Logic Applications and Design, Thomson Learning, 2002.
5. Comer: Digital Logic & State Machine Design, Oxford Publication.
6. Donald D.Givone, Digital Principles and Design, TMH, 2003.
7. Ghosal- Digital electyronis, cengage learning.

Graphical Programming using Lab

1. To verify the truth table of all basic logic gates and to implement all gate using universal gate.
2. Design of 4 bit Adders (CLA, CSA, CMA, Parallel adders)
3. Design of Binary Subtractors
4. Design of Encoder (8X3), Encoder(3X8)
5. Design of Multiplexer (8X1), and De-multiplexer (1X8)
6. Design of code converters & Comparator
7. Design of FF (SR, D, T, JK, and Master Slave with delays)
8. Design of registers using latches and flip-flops

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Choice Based Credit System

Electronics & Communication Engineering, III-Semester

Network Analysis

COURSE OBJECTIVE:-

- To make the students capable of analyzing any given electrical network.
- To make the students learn how to synthesize an electrical network from a given impedance/admittance function.
- Understand the fundamental concepts and theories about networks. - Apply this knowledge to solve real-world, network-centric problems. - Use advanced network analysis methods and tools to visualize and analyze networks. Interpret the results with respect to exploratory, quantitative and substantive questions. - Design and execute a small-scale network analysis project in a systematic fashion.

COURSE CONTENTS:-

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, Concept of phasor & vector, impedance & admittance, Nodal & mesh analysis, analysis of magnetically coupled circuits. Dot convention, coupling coefficient, tuned circuits, Series & parallel resonance.

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

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.

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.

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.

. **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.

COURSE OUTPUT:-

After successful completion of the course, student will be able to

- Apply the fundamental concepts in solving and analyzing different Electrical networks
- Select appropriate and relevant technique for solving the Electrical network in different conditions
- Apply mathematics in analyzing and synthesizing the networks in time and frequency domain
- Estimate the performance of a particular network from its analysis

TEXT 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).

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Choice Based Credit System

Electronics & Communication Engineering, III-Semester

Electronic Devices & Circuits

COURSE OBJECTIVE: Any electronic trade has its basis on a certain number of components and somebasic standard circuits. These common circuits are applied in all sections of theElectronics technology. A good understanding of the basic functioning of allthese components and circuits will be a solid platform to enter into the morecomplex portion and specialized field of Electronics Engineering.Emphasis has been given on the characteristics and application ofsemiconductor devices/ components. In the case of basic standard circuits, thefocus has been made on the interaction of active and passive components andoverall performance according to the stated requirements.

COURSE CONTENTS:

Introduction to semiconductor physics: insulator, conductor, semiconductor and semiconductor types. Drift and diffusion carries, Hall Effects.

Review of PN junction diode: PN junction diode in forward and reverse bias, temperature dependence of V-I characteristics, diode resistances, diode junction capacitance. Types of diodes: Zener Diode, Varactor Diode, Tunnel Diode, PIN Diode, Schottky Diode, LED and Photo Diodes, Switching characteristics of diode.

Bipolar junction transistor - Construction, basic operation, current components and equations,CB, CE and CC-configuration, input and output characteristics, Early effect, Region ofoperations: active, cut-off and saturation region. BJT as an amplifier. Ebers-Moll model, Power dissipation intransistor ($P_{d,\,max}$ 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.

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.

LargeSignal analysis and Power Amplifiers: Class A,Class B,Class AB,Class C,Class D, Transformer coupled and Push-Pull amplifier.

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 drainand transfer Characteristics.

Uni-junction Transistor (UJT) and Thyristors:UJT: Principle of operation, characteristics, UJT relaxation oscillator, PNPN Diode and its characteristics, Silicon controlled rectifier: V-I characteristics, DIAC and TRIAC,Thyristors parameters and applications.

LIST OF EXPERIMENTS:

1. To determine and analyzethe V-I characteristics of PN Junction diode and Zener diode.
2. To determine input and output characteristics of transistor amplifiers in CE, CB &CC configurations.
3. To determine the frequency response of transistor CE amplifier, direct coupled and RC coupled amplifier.
4. To determinecharacteristics ofUJT as relaxation Oscillator.
5. To determineDrain and Transfer Characteristicsof JFET Amplifier.
6. To determineDrain and Transfer Characteristicsof MOSFET Amplifier.
7. To determinecharacteristics of class A and Bpower amplifiers.
8. To determine characteristics of classC and AB power amplifiers.

COURSE OUTCOMES:

Students who are successful in this class will be able to:

1. Understand the basic physics of carrier transport in bulk semiconductors and real device structures.
2. Understand the fundamentals of operation of the main semiconductor electronic devices.
3. Understand the basic parameters of electronic devices, their performance, and limiting factors.
4. Understand the basic principles of electronic device operation with emphasis on bipolar transistors, and unipolar microwave devices.

TEXTBOOKS

1. Millman and Halkias: Integrated electronics, TMH.
2. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education.
3. http://www.nptelvideos.in/2012/12/basic-electronics-drchitralekha-mahanta.html

REFERENCES:

1. Sedra and Smith: Microelectronics, Oxford Press.
2. Anil K. Maini, VarshaAgarwal: Electronic Devices and Circuits, Wiley Publications.
3. Rashid: Electronic Devices and Circuits, Cengage learning.
4. Donald A Neamen: Electronic Circuits Analysis and Design, TMH
5. Salivahanan: Electronic Circuits Analysis and Design, TMH
6. Mottershead: Electronic Devices and Circuits an introduction, PHI
7. Kumar and Jain: Electronic Devices and Circuits, PHI.
8. David A. Bell Electronic Devices and Circuits Oxford University press.

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Electronics & Communication Engineering, III-Semester

Measurements and Instrumentation

COURSE OBJECTIVE:

This course is electronics based course dealing with measurements and instrumentation designed for students. The objectives of this course are to introduce students to the use of various electrical/electronic instruments, their construction, applications, and principles of operation, standards and units of measurements and provide students with opportunities to develop basic skills in the design of electronic equipments.

COURSE CONTENTS:

Accuracy and Precision, Sensitivity, Linearity, Resolution, Hysteresis, Loading Effect. Measurements of Current, Voltage, Power and Impedance: 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.

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

Non-Electrical Quantities (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.

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).
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-to-digital 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.

List of Experiments:

1. Study of Cathode Ray Oscilloscope and Function Generator.
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, RTD and thermocouple.
7. Study of optical Transducers: Photo conductive, Photo voltaic, Photo-diode, Photo-Transistor.
8. Design of digital to analog converter,R-2R ladder Type and analysis of its characteristics.

COURSE OUTPUT:

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

- Identify electronics/ electrical instruments, their use, peculiar errors associated with the instruments and how to minimize such errors.
- Explain the industrial and laboratory applications of such instruments.
- Service and maintain such instruments in case of damage or misuse.
- Understand the basic design techniques of electronic equipment.

TEXTBOOKS

1. H.S. Kalsi: Electronics Instrumentation, TMH
2. A.K. Sawhney: Instrumentation and Measurements, Dhanpat Rai and Co.

REFERENCES:

1. Oliver: electronic Measurements introduction TMH
2. Helfric and Cooper: Modern Electronic Instrumentation and Measurement Techniques, Pearson.
3. Ghosh: introduction to measurements and instrumentation 4th edition PHI
4. Bell: electronic Instrumentation and Measurement oxford press.
5. Banerjee: electrical and electronics Measurement 2nd PHI.
6. Anand: electronics and Instrumentation technology, PHI.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Choice Based Credit System

Electronics & Communication Engineering, III-Semester

Communication Skills

Introduction: Communication, definition and role of communication, Process of communication, Importance of professional communication, Levels of communication, Types of communication, Challenges in communication. Non –verbal communication – Body language, personal appearance, posture, gesture and hand movement, eye contact, facial expressions, paralinguistic features - proxemics, haptics, chronemics. Oral presentations. Case studies.

Books recommended:

1. Business Communication, Mc Graw Hill Education, Matthukutty M. Monippally.
2. Effective Business Communication , Mc Graw Hill Education, Neera Jain, Shoma Mukherji.
3. Technical Communication , Cengage , P. Subba Rao, B. Anita Kumar, C. Hima Bindu.
4. Business Correspondence & Report Writing , Mc graw Hills. , R.C. Sharma & Krishna Mohan .
5. Technical Communication – Principles & Practice , Oxford , Meenakshi Raman.
6. Business Communication- Mc graw Hills , Peter Cordom.
7. Communication Skills , Oxford , Sanjay Kumar & Pushpa TMH.
8. Effective Technical Communication , M. Ashraf Rizvi ,Mc Graw Hill Education.

Language Lab II

Module 1 : Reading comprehension
Module 2 : Role plays
Module 3 : Debate
Module 4 : Group discussion
Module 5 : Resume writing
Module 6 : Interview skills
Module 7 : Body language
Module 8 : Oral presentations