II YEAR I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

NUMERICAL METHODS AND COMPLEX VARIABLES
(For 2nd year ECE and EEE)

Course Code: GR25A2102 **L/T/P/C:3/0/0/3**
II Year I Semester

COURSE OUTCOMES

1. Illustration any periodic function in terms of sine and cosine.
2. Solve algebraic and transcendental equations and interpolate.
3. Apply numerical techniques for solving integr and first order ODE's.
4. Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
5. Explain Taylor's and Laurent's series expansions in complex function.

UNIT I
FOURIER SERIES & FOURIER TRANSFORMS
Full Range Fourier series – Half-range Fourier series – Fourier Transforms, Fourier Sine and Cosine transforms

UNIT II
NUMERICAL METHODS-I
Solution of algebraic and transcendental equations: Bisection method – Iteration Method – Newton-Raphson method and Regula-Falsi method. Finite differences: forward differences – backward differences – central differences –Interpolation using Newton's forward and backward difference formulae – Lagrange's method of interpolation.

UNIT III
NUMERICAL METHODS-II
Numerical integration: Trapezoidal rule - Simpson's 1/3rd and 3/8th rules.
Ordinary differential equations: Taylor's series – Euler's method – Modified Euler's method - Runge-Kutta method of fourth order for first order ODE.

UNIT IV
COMPLEX DIFFERENTIATION
Differentiation of Complex functions – Analyticity – Cauchy-Riemann equations (without proof) – Harmonic Functions – Finding harmonic conjugate – Milne-Thomson method – Elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT V
COMPLEX INTEGRATION
Line integral – Cauchy's theorem – Cauchy's Integral formula – Zeros of analytic functions – Taylor's series -Singularities — Laurent's series. Residues – Cauchy Residue theorem (All theorems without Proof).

TEXTBOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

REFERENCES

1. Murray R. Spiegel, Ph.D., Seymour Lipschutz, Ph.D., John J. Schiller, Ph.D., Dennis Spellman, Ph.D., Complex Variables (Schaum's outline).
2. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9thEdition, John Wiley &Sons, 2006.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc-Graw Hill, 2004.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SENSORS MEASUREMENTS AND INSTRUMENTATION

Course Code: GR25A2023 **L/T/P/C:2/1/0/3**
II Year I Semester

COURSE OUTCOMES

1. Illustrate the fundamentals and measurement of different electrical quantities.
2. Outline unknown electrical parameters.
3. Summarize Oscilloscopes and discover the usage of Digital meters.
4. Identify working principles of various Sensors/Transducers.
5. Apply Sensors/Transducers of various types in real time applications.

UNIT I

FUNDAMENTALS OF ELECTRICAL MEASUREMENTS

Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, PMMI type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – extension of range of E.S. Voltmeters. Instrument Transformers-C.T.s and P.Ts Ratio and Phase angle errors.

UNIT II

MEASUREMENT OF ENERGY AND OTHER ELECTRICAL QUANTITIES

Single phase & Three phase energy meters, Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization – applications
Measurement of resistance, Inductance and Capacitance by bridges: Wheatstone bridge, Kelvin Double Bridge, Maxwell's Bridge, Anderson's bridge, Desauty's Bridge, Schering Bridge Derivations (Theoretical Approach).

UNIT III

OSCILLOSCOPE AND DIGITAL VOLTMETERS

Data Acquisition system, Components of Cathode Ray Oscilloscope: Time base Generator, Horizontal & Vertical Amplifier, Electrostatic Deflection. Measurement of phase and frequency **INTRODUCTION TO SMART AND DIGITAL METERING**: Digital Multi-meter, True RMS meters, Clamp- on meters, Digital Energy Meter, Digital Storage Oscilloscope. Digital Voltmeters- Successive Approximation, Ramp, Dual slope Integration.

UNIT IV

SENSOR FUNDAMENTAL PRINCIPLES

Sensors / Transducers, Principle, Types, Basic Requirements, Classification, Selection, Resistive type, Inductive type, and Capacitive type. Linear Variable Differential Transducer (LVDT), Strain Gauge (Elementary).

UNIT V

SENSOR APPLICATIONS

Introduction and Working Principles: Flow - rate sensors: Displacement Flow Sensors, Velocity Flow Sensors, Thermistors and Thermocouples, Ultrasonic sensor, Acceleration Sensors.

TEXTBOOKS

1. "Electrical and Electronic Measurement and Instruments", by A.K.Shawney Dhanpat Rai & Sons Publications.
2. "Sensors and Transducers", by D. Patranabis , PHI Publications

REFERENCES

1. "Sensors and Their Applications XII", by S. J. Prosser, E. Lewis CRC Press
2. "Electrical Measurements and Measuring Instruments", by Er. R K Rajput by S. Chand Publishing.
3. "Measurement Systems", by Ernest O Doebelin by Mc Graw Hill.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRINCIPLES OF ANALOG ELECTRONICS

Course Code: GR25A2024 **L/T/P/C: 3/0/0/3**
II Year I Semester

COURSE OUTCOMES

1. Explain the basic principle and operation of Operational amplifier.
2. Summarize different Operational Amplifier's applications.
3. Outline frequency gain for different filters.
4. Illustrate the applications of IC 565.
5. Develop different Multivibrator circuits.

UNIT I
INTEGRATED CIRCUITS

Classification, Introduction to Operational Amplifier, block diagram, 741 OpAmp and its Features, ideal characteristics of op- amp, practical op-amp. Differential mode and common mode operation, Modes of operation-inverting, non-inverting, differential. Inverting amplifier, non-inverting amplifier and Voltage Follower Circuit.
DC Characteristics: Input bias current, Input offset current, input offset voltage and slew rate.

UNIT II
OP-AMP APPLICATIONS

Inverting summing amplifier, Non-Inverting Summing amplifier, Subtractor circuit, differential amplifier, instrumentation amplifier, integrator, differentiator, Voltage to Current and Current to Voltage Converters, Sample & Hold Circuits

UNIT III
FILTERS

Classification of Filters: Active and Passive Filters, Low Pass Filter, High Pass Filter, Narrow Band Pass Filter, Wide Band Pass Filter, Narrow Band Stop Filter, Wide Band Stop Filter, All pass filter.

UNIT IV
TIMERS & PHASE LOCKED LOOPS

Introduction to 555 Timer, Functional Diagram, Monostable Multivibrator and Astable Multivibrator IC565 PLL- Introduction, Block Schematic, Principles and Applications.

UNIT V
OSCILLATORS

Basic principle of an Oscillator, RC Phase shift and Wein bridge Oscillator, Schmitt Trigger Circuit.

TEXTBOOKS

1. "Linear Integrated Circuits", D.Roy Choudhary & Shail B Jain, New Age International Publishers, 2nd edition 2004.
2. "Op-Amps & Linear ICs", – Ramakanth A. Gayakwad, PHI, 2003.

REFERENCES

1. "Electronics Analog and Digital", by I. J. Nagrath, PHI Learning Pvt. Ltd., 2013 Edition.
2. "Electronics Principles", by Malvino, Mc. Graw Hill, Third edition. 2000.
3. "Analysis and Design of Analog Integrated Circuits", P. R. Gray, R. G. Meyer and S. Lewis, John Wiley & Sons, 2001.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DC MACHINES AND TRANSFORMERS

Course code: GR25A2025 **L/T/P/C: 3/0/0/3**
II Year I Semester

COURSE OUTCOMES

1. Interpret the magnetic field in a DC Machine.
2. Summarize concepts of generators and its applications.
3. Select the appropriate DC motors for a given applications.
4. Analyze the performance of single-phase Transformers.
5. Outline the performance of Three-phase Transformers.

UNIT I
INTRODUCTION

Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, Armature windings- lap and wave windings, visualization of magnetic field producedby the field winding excitation with armature winding open, air gap flux density distribution, flux per pole, induced EMF in an armature coil. Principle Electro-mechanical energy conversion.

UNIT II
DC GENERATORS

Principle-Simple Loop generator, commutator action, construction, EMF equation, and commutation – Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation. Types of field excitations – separately excited, self-excited. Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed. Characteristics of all generators, Applications.

UNIT III
DC MOTORS

Working principle of motor, construction, types of motors, and its applications Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction. Armature circuit equation for motoring and generation, Significance of back EMF, V-I characteristics, and torque-speed characteristics self-excited. Speed control methods, Losses,load testing and testing of DC machines.

UNIT IV
SINGLE-PHASE TRANSFORMERS

Construction and operation of single-phase transformers, types of transformers, equivalent circuit, phasor diagram of Transformer No-load and ON-load.

Voltage regulation, losses and efficiency –Maximum Efficiency-Testing - open circuit and short circuit tests,polarity test, back-to-back test, separation of hysteresis and eddy current losses- effect of frequency and supply voltage. Autotransformers - construction, principle, applications and comparison with two winding transformer, Magnetizing current, effect of nonlinear B-H curve of magnetic core material, harmonics in magnetization current. All-day efficiency, KVA rating.

UNIT V

THREE-PHASE TRANSFORMERS

Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of and three-phase transformers, Phase conversion - Scott connection, three-phase to six-phase conversion, Tap-changing transformers. Testing of three phase transformers.

TEXTBOOKS

1. "Electrical Machinery", by P. S. Bimbhra, Khanna Publishers, 2011.
2. "Electric Machines", by I.J. Nagrath and D. P. Kothari, McGraw Hill Education, 2012.

REFERENCES

1. "Performance and design of AC machines", by M. G. Say, CBS Publishers, 2002.
2. "Principles of Electric Machines", by PC Sen Second Edition.
3. "Electric Machinery and Transformers", Bhag S. Guru and Huseyin R. Hiziroglu OUP Higher Education Division Publishers, 2000.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTROMAGNETIC FIELDS

Course Code: GR25A2026 **L/T/P/C: 3/0/0/3**
II Year I Semester

COURSE OUTCOMES

1. Interpret the Electric Field Intensity with respect to free space.
2. Solve the Current Density Equation and Capacitance of different materials.
3. Evaluate Magnetic Field Intensity and Force in Magnetic Fields.
4. Analyze the Maxwell's Equations in Time Varying Fields, Displacement current.
5. Summarize the Electro-Magnetic wave equations & its applications.

UNIT I
STATIC ELECTRIC FIELD

Coulomb's law- Electric Field Intensity-Electrical Field due to Point charge, Line, Surface and Volume Charge distributions. Gauss Law and its Applications-Maxwell's First Law-Work done in moving a point charge in an electrostatic field, Electric potential- Properties of potential function, potential gradient-Electric Dipole-Potential and EFI due to an Electric Dipole-Electrostatic Energy density.

UNIT II
CONDUCTORS & INSULATORS

Behavior of conductors in an electric field-Current density-Conduction and Convection current densities- Ohms Law in Point form- Continuity equation of current-Electric field inside a dielectric material-Polarization and Permittivity-Boundary conditions-Boundary conditions for two perfect dielectric materials. Capacitance-Capacitance of parallel plates, co-axial cable, spherical capacitors- Poisson's equation- Laplace's equation.

UNIT III
STATIC MAGNETIC FIELDS

Biot-Savart's Law-Magnetic Field Intensity-MFI due to a straight current carrying conductor, MFI due to circular conductor- Maxwell's Second Equation-Ampere's Law and its Applications viz MFI due to infinitely long straight conductor only-Maxwell's Third equation-Scalar and Vector Magnetic Potentials.

FORCE IN MAGNETIC FIELDS

Force on a moving point charge-Lorentz force equation- Force on a differential current element-Force between differential current elements-Magnetic Dipole and Magnetic Dipole Moment--Classification of magnetic materials- Magnetization and Permeability-Magnetic Circuits-Inductance-Self and Mutual Inductances-Neuman's Formula only.

UNIT IV
TIME VARYING FIELDS

Faraday's laws of Electromagnetic induction-it's integral and point forms-Maxwell's Fourth Equation- statically and dynamically induced EMFs-simple problems-Modification of Maxwell's equations for time varying fields-Displacement current.

UNIT V

ELECTROMAGNETIC WAVE PROPAGATION

Waves in general- wave propagation in lossy dielectrics-Plane waves in lossless dielectrics, free space, Good conductors-power and the poynting vector, Reflection of a plane wave at normal incidence, oblique incidence.

TEXTBOOKS

1. "Principles of Electromagnetics", by Matthew N.O.Sadiku, Oxford University Publication, Fourth Edition, 2014.
2. "Engineering Electromagnetics", by W.Hayt, John A.Buck McGraw Hill Education, 2012.

REFERENCES

1. "Electromagnetism-Problems with solution", by Pramanik, Prentice Hall India, 2012.
2. "The electromagnetic field in its engineering aspects", by G. W. Carter, Longmans, 1954.
3. "Electromagnetism - Theory and applications", by Pramanik, PHI Learning Pvt. Ltd, New Delhi, 2009

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATABASE FOR ENGINEERS

Course Code: GR25A2027 **L/T/P/C: 1/0/0/1**
II Year I Semester

COURSE OUTCOMES

1. To design ER Diagrams for an application and translate to logical model.
2. To develop database with the creation of tables and populating them with data.
3. To compose queries for retrieving data from the database.
4. To analyze the necessity for normal forms and other database objects in the database.
5. To interpret the need of atomicity, consistency, isolation and durability for a transaction.

UNIT I

Introduction to DBMS, Database System Applications, Database System vs. File System, Instances and Schema, ER Diagrams – Attributes and Entity Sets, Relationships and Relationship sets, Extended ER Features, Conceptual Design with ER Model, Logical Database Design, Construction of Tables using Basic DDL Commands.

To Practice:

1) Practicing ER Diagram for Hostel Management System, Airlines Reservation System.
2) Practicing DDL commands: Creating tables for various relations (in SQL).

UNIT II

Relational Model: Introduction To The Relational Model–Basic Structure, Database Schema, Integrity Constraints over relations, Keys, Construction of tables with integrity constraints using DDL and DML commands, Form of Basic SQL Query (SELECT) , SQL Operators, Use of DISTINCT keyword, Order by Clause.

To Practice:

1) Practicing DDL and DML commands: Creating tables with integrity constraints specified.
2) Practicing DQL command: Queries for above discussed commands.

UNIT III

Exploration of SELECT statement: SQL functions, Aggregate Operators, Group by and Having clauses, Joins, Types of Joins, Nested Queries, Correlated Nested Queries, Set Operators.

To Practice:

1) Practicing DQL/ DRL command: Using Select statement for various purposes as discussed in the chapter

UNIT IV

Other Database Objects: Introduction to Views, Types of Views, Dropping views, Introduction to Sequence, Index and Synonym. Problems with Redundancy, Decomposition and its properties, Functional Dependencies, Normalization, Types of Normal Forms - 1NF, 2NF, 3NF, BCNF, 4NF.

To Practice:

1) Practicing queries to create view and retrieve data through views.
2) Practicing queries to create an index, sequence and synonym.

UNIT V

Transaction Management - Definition, Properties of Transaction, states of Transaction, Concurrent executions, Serializability, Lock based protocols, and Log based recovery.

Granting privileges to users (DCL) and Transaction Control Language (TCL) Commands

To Practice:

1) Practicing DCL commands - Grant, Revoke, Roles

2) Practicing TCL commands - Commit, Rollback, Savepoint.

TEXTBOOKS

1. "Database Management Systems", Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill, 3rd Edition.

REFERENCES

1. "Database System Concepts", Silberschatz, Korth, McGraw hill, V edition.
2. "Introduction to Database Systems", C.J. Date, Pearson Education.
3. "Database Systems design, Implementation, and Management", Rob &Coronel, 5th Edition.
4. "Database Management Systems", P. Radha Krishna, HI-TECH Publications, 2005.
5. "Database Management System", Elmasri Navate, Pearson Education.
6. "Database Management System", Mathew Leon, Leo.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
VALUE ETHICS AND GENDER CULTURE

Course Code: GR25A2002 **L/T/P/C:1/0/0/1**
II year I semester

COURSE OUTCOMES

1. To enable the student to understand the core values that shapes the ethical behaviour. And Student will be able to realize the significance of ethical human conduct and self-development.
2. Students will be able to inculcate positive thinking, dignity of labour and religious tolerance.
3. The students will learn the rights and responsibilities as an employee and a team member.
4. Students will attain a finger grasp of how gender discrimination works in our society and how to counter it.
5. Students will develop a better understanding on issues related to gender and Empowering students to understand and respond to gender violence.

UNIT I

VALUES AND SELF-DEVELOPMENT

Social values and individual attitudes, Importance of cultivation of values, Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

- A Case study on values and self-development

UNIT II

PERSONALITY AND BEHAVIOUR DEVELOPMENT

Positive thinking, punctuality, avoiding fault finding, Free from anger, Dignity of labour, religious tolerance, Aware of self-destructive habits.

- A Case study on Personality

UNIT III

INTRODUCTION TO PROFESSIONAL ETHICS

Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

- A Case study on professional ethics

UNIT IV

INTRODUCTION TO GENDER

Definition of Gender, Basic Gender Concepts and Terminology, Attitudes towards Gender, Social Construction of Gender.

- A Case study/ video discussion on attitudes towards gender

UNIT-V

GENDER-BASED VIOLENCE

The concept of violence, Types of Gender-based violence, the relationship between gender, development and violence, Gender-based violence from a human rights perspective.

- A Case study/ video discussion on gender-based violence in view of human rights

TEXTBOOKS

1. Professional Ethics Includes Human Values (2nd Edition) By R Subramanian, Oxford University Press, 2017.
2. Ethics in Engineering Practice & Research, Caroline Whit beck, 2e, Cambridge University Press 2015.
3. A Bilingual Textbook on Gender" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad, Telangana State in the year 2015.

REFERENCES

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "I Fought For My Life…and Won."Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
3. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e , Cengage learning, 2015.
4. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRINCIPLES OF ANALOG ELECTRONICS LAB

Course Code: GR25A2028 **L/T/P/C: 0/0/2/1**
II Year I Semester

COURSE OUTCOMES

1. Demonstrate the working of Operational Amplifiers.
2. Design Operational Amplifiers as inverting and non-inverting amplifier.
3. Perform mathematical operations using Operational Amplifier
4. Analyze the characteristics of Low Pass and High Pass Filters.
5. Examine the application of 555 timer.

LIST OF EXPERIMENTS

Any ten experiments should be conducted.

1. Implement Inverting Amplifier using Operational Amplifier
2. Determine the gain of Non-Inverting Amplifier using Operational Amplifier
3. Design of Operational Amplifier as proportional Amplifier
4. Construct an Operational Amplifier based proportional Amplifier.
5. Implement Subtractor Circuit using Operational Amplifier
6. Develop a differentiator Circuit using Operational Amplifier
7. Implement mathematical Integrator Circuit using Operational Amplifier
8. Develop a mathematical Differentiator Circuit using Operational Amplifier
9. Construct the Low Pass Filter circuit to plot the frequency characteristics.
10. Analyze the High Pass Filter circuit to plot the frequency characteristics.
11. Design an inverter using operational amplifier.
12. Construct 555 timer to generate a square wave.

TEXTBOOKS

1. "Linear Integrated Circuits", D.Roy Choudhary & Shail B Jain, New Age International Publishers, 2nd edition 2004.
2. "Op-Amps & Linear ICs", – Ramakanth A. Gayakwad, PHI, 2003.

REFERENCES

1. "Electronics Analog and Digital", by I. J. Nagrath, PHI Learning Pvt. Ltd., 2013 Edition.
2. "Electronics Principles", by Malvino, Mc. Graw Hill, Third edition. 2000.
3. "Analysis and Design of Analog Integrated Circuits", P. R. Gray, R. G. Meyer and S. Lewis, John Wiley & Sons, 2001.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DC MACHINES AND TRANSFORMERS LAB

Course Code: GR25A2029 **L/T/P/C: 0/0/2/1**
II Year I Semester

COURSE OUTCOMES

1. Identify various parts of electrical DC machines and Transformers.
2. Develop knowledge helpful for application of DC machines and Transformers.
3. Explain and control of different DC Machines.
4. Distinguish the performance of different machines using different testing methods.
5. Determine the parameters of equivalent circuit of single-phase transformer and 3-phase to 2-phase conversion or vice-versa.

LIST OF EXPERIMENTS
Any ten experiments should be conducted.

1. Swinburne's Test and Speed Control of a D.C Shunt Motor
2. Brake Test on a DC Shunt Motor
3. Brake Test on a DC Compound Motor
4. Open Circuit Characteristics of a D.C. Shunt Generator
5. Load test on a D.C. Shunt Generator
6. Load test on a D.C. Series Generator
7. Load test on a D.C. Compound Generator
8. Hopkinson Test
9. Fields Test
10. Separation of Core Losses of a DC machine
11. OC, SC and Load tests on Single Phase Transformer
12. Scott connection.

TEXTBOOKS

1. "Electrical Machinery", by P. S. Bimbhra, Khanna Publishers, 2011.
2. "Electric Machines", by I.J. Nagrath and D. P. Kothari, McGraw Hill Education, 2012.

REFERENCES

1. "Performance and design of AC machines", by M. G. Say, CBS Publishers, 2002.
2. "Principles of Electric Machines", by PC Sen Second Edition.
3. "Electric Machinery and Transformers", Bhag S. Guru and Huseyin R. Hiziroglu OUP Higher Education Division Publishers, 2000.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SENSORS MEASUREMENTS AND INSTRUMENTATION LAB

Course Code:GR25A2030 **L/T/P/C:0/0/2/1**
II year I semester

COURSE OUTCOMES

1. Determine the unknown electrical parameters using various types of bridges.
2. Construct basic programs for computer-controlled data acquisition, measurement, and transfer of data across the sensor network for different types of sensors.
3. Analyze and interpret the experimental data by monitoring and capturing.
4. Experiment on various sensor output configurations using measuring instruments.
5. Measure physical and electrical quantities using Sensors/Transducers.

LIST OF EXPERIMENTS

Any ten experiments should be conducted.

1. Measurement of unknown Resistance by Kelvin double Bridge.
2. Measurement of unknown Inductance by Anderson's Bridge.
3. Measurement of unknown Capacitance by Desauty's Bridge.
4. Measurement One-cycle data of a periodic waveform from a DSO.
5. Voltage and Current Detection Circuitry using AT mega microcontroller.
6. Temperature, Pressure and Humidity Detection Circuitry.
7. Measurement of displacement with the help of LVDT.
8. Measurement of distance with the help of Ultrasonic Sensor.
9. Measurement of Flow rate using Flow sensor.
10. Measurement of moist level using soil moisture sensor and rainfall sensor.
11. Calibration and Testing of single-phase Energy meter.
12. Measurement of three-dimensional coordinates using accelerometer sensor.

TEXTBOOKS

1. "Electrical and Electronic Measurement and Instruments", by A.K.Shawney Dhanpat Rai & Sons Publications.
2. "Sensors and Transducers", by D. Patranabis, PHI Publications.

REFERENCES

1. "Sensors and Their Applications XII", by S. J. Prosser, E. Lewis CRC Press.
2. "Electrical Measurements and Measuring Instruments", by Er. R K Rajput by S. Chand Publishing.
3. "Measurement Systems", by Ernest O Doebelin by Mc Graw Hill.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

JAVA PROGRAMMING FOR ENGINEERS LAB

Course Code: GR25A2007 **L/T/P/C:0/0/2/1**
II year I semester

Course Outcomes

1. Write basic Java programs, Identify classes, objects, members of a class and relationships among them needed for a specific problem.
2. Write Java application programs using OOP principles.
3. Demonstrate the concepts of polymorphism and inheritance.
4. Write JAVA programs to demonstrate method overloading and overriding.
5. Explain the benefits of exceptional handling, multithreading, packages and applets in Java.

Task 1:

a) Write a Java program that prints all real solutions to the quadratic equation ax2 +bx + c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2 -4ac is negative, display a message stating that there are no real solutions.

b) The Fibonacci sequence is defined by the following rule: The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonacci sequence.

Task 2:

a) Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer. (use Scanner class to read input)

b) Write a Java program to multiply two given matrices.

c) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java.util)

Task 3:

a) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.

b) Write a Java program for sorting list of names. Read input from command line.

c) Write a Java program to make frequency count of words in a given text.

Task 4:

Write java programs that implement the following

a) Create a Student class and calculate the total and average marks.

b) Constructor overloading.

Task 5:

Write a Java program to implement
a) Single inheritance
b) Multilevel inheritance

Task 6:

Write a java program to implement
a) method overriding
b) dynamic method dispatch

Task 7:

a) Write a java program to implement multiple inheritance.

b) Write a Java program to define an interface called **AreaCalculator** with a method **calculateArea ().** Create two classes **Circle** and **Rectangle** that implement this interface.

Task 8:

Write java programs that uses the following keywords
a) this
b) super
c) static
d) final

Task 9

a) Write a Java program for handling Checked Exceptions.
b) Write a Java program for handling Unchecked Exceptions.

Task 10

Write a Java program that creates three threads. First thread displays "Good Morning" one second, the second thread displays "Hello" every two second and the third thread displays "Welcome" every three seconds.

Task 11

Write a Java program to create a user-defined package called math operations.
Inside the package, create a class Addition with a method to add two numbers.
Import and use this package in another class to display the sum.

Task 12

a) Develop an applet that displays a simple message.

b) Develop an applet that receives an integer in one text field and computes its factorial value and returns it in another text field when the button named "Compute" is clicked

Task 13:

a) Write a Java program for handling mouse events.
b) Write a Java program for handling key events.

Text Books:

1. Java; the complete reference, 7th editon, Herbert Schildt, TMH.
2. Introduction to Java programming, Sixth edition, Y.Daniel Liang, Pearson Education.

Reference Books:

1. Java: How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.
2. Big Java, 2nd edition, Cay Horstmann, Wiley Student Edition, Wiley India Private Limited.

II YEAR II SEMESTER

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER GENERATION AND DISTRIBUTION

Course Code: GR25A2031 **L/T/P/C: 3/0/0/3**

II Year II Semester

COURSE OUTCOMES

1. Illustrate the basic concepts of Conventional Power Generation.
2. Explain the environmental benefits of renewable sources of power generation.
3. Examine the impact of government policies, market trends on economics of power generation.
4. Compare the performance and suitability of DC and AC distribution systems for different applications.
5. Analyze the performance of different types of substation layouts and their specific requirements.

UNIT I

CONVENTIONAL POWER GENERATION

The History of Electricity in India, Conventional Sources (Qualitative): Hydro station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant.

UNIT II

NON CONVENTIONAL POWER GENERATION

Non-Conventional Sources (Qualitative): Ocean Energy, Tidal Energy, Wave Energy, wind Energy, Fuel Cells, and Solar Energy, Cogeneration and energy conservation and storage.

UNIT III

ECONOMICS OF POWER GENERATION

Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor,Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

UNIT IV

D.C. DISTRIBUTION & A.C DISTRIBUTION

Classification of DC Distribution Systems. - Comparison of DC vs. AC, Under-Ground vs. Over-Head Distribution Systems. - Requirements and Design features of Distribution Systems.

-Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed at one end and both ends (equal/unequal Voltages) and Ring Main Distributor.

Introduction of AC distribution, Single phase, 3-phase, 3 phases 4 wire system, bus bar arrangement, Selection of site for substation. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

UNIT V

SUBSTATIONS

Classification of Substations, Comparison of Outdoor and Indoor Sub-stations, Transformer Sub-stations, Pole mounted Sub-stations, Underground Sub-stations, Equipment in a transformer sub-station and its symbols, Bus-bar Arrangements in Sub-stations, Terminal and Through Sub-stations, Key diagrams of 66/11 kV & 11 kV/400 V indoor Sub-station.

TEXTBOOKS

1. "A Text Book on Power Systems Engineering", A Chakrabarti, M L Soni, P V Gupta & US Bhatnagar Dhanpat Rai & Co. Pvt..Ltd.
2. "Generation, Distribution and Utilization of Electrical Energy", C.L. Wadhwa Second Edition, New AgeInternational,2009.

REFERENCES

1. "Electrical Power systems", C.L.Wadhwa New age Publishers 7th Edition 2017.
2. "The Transmission and Distribution of Electrical Energy", H.Cotton & H. Barber- Third Edition, ELBS, B.I.Pub.,1985.
3. "Power generation technologies", Paul Breeze Third Edition, Elsevier Publishers 2019.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

AC MACHINES

Course Code: GR25A2032 **L/T/P/C: 2/1/0/3**

II Year II Semester

COURSE OUTCOMES

1. Illustrate the concepts of rotating magnetic fields.
2. Interpret the need for electrical Induction Machines.
3. Identify the working of single and three phase AC machines.
4. Analyze Machine Variables in direct and quadrature axis form for salient pole type.
5. Summarize the concept of harmonic created in supply system, need for reduction and design of synchronous machines for reducing them.

UNIT I

FUNDAMENTALS OF AC MACHINE WINDINGS

Physical arrangement of windings in stator and cylindrical rotor; slots for windings; single turn coil - active portion and overhang; full-pitch coils, concentrated winding, distributed winding, winding axis, Air-gap MMF distribution with fixed current through winding concentrated and distributed, sinusoidal distributed winding, winding distribution factor. Introduction to revolving magnetic field in 3-phase and 1-phase machines.

UNIT II

INDUCTION MACHINES

Construction, Types (squirrel cage and slip-ring), Torque Slip Characteristics, Starting and Maximum Torque. Equivalent circuit. Phasor Diagram, Losses and Efficiency. Effect of parameter variation on torque speed characteristics (variation of rotor and stator resistances, stator voltage, frequency). Methods of starting, braking and speed control for induction motors. Generator Operation. Self-Excitation. Doubly-Fed Induction Machines.

UNIT III

SYNCHRONOUS GENERATORS

Synchronous Generator: Basic principle of operation, construction of salient & non-salient pole synchronous machines, generated EMF, effect of distribution and chording of winding, harmonics causes, reduction and elimination. Armature reaction, synchronous reactance, leakage reactance, Phasor diagram of non-salient type alternator. Voltage regulation-EMF, MMF, ZPF and ASA Methods. Two reaction theory- direct and quadrature axis reactance, Phasor diagram, slip test, synchronizing to infinite bus bars and parallel operation, steady state power-angle characteristics.

UNIT IV

SYNCHRONOUS MOTORS

Synchronous Motor: Principle of operation, Phasor diagrams, torque and torque angle, effect of change in load, effect of change in excitation, V and inverted V curves. Synchronous condenser, hunting and damping. Methods of starting of synchronous motors. Testing of Synchronous motors.

UNIT V

SINGLE-PHASE INDUCTION MOTORS

Constructional features-double revolving field theory, equivalent circuit, determination of parameters. Types of 1-phase induction motors, Split-phase starting methods and applications.

TEXTBOOKS

1. "Electric Machinery", by A.E.Fitzgerald and C.Kingsley, McGraw Hill Education,2013.
2. "Performance and design of AC machines", by M.G.Say CBSPublishers,2002.

REFERENCES

1. "Electrical Machinery", by P.S.Bimbhra Khanna Publishers,2011.
2. "Electric Machines", by I.J.Nagrath and D.P. Kothari, McGraw Hill Education,2010.
3. "Alternating Current Machines", by A.S.Langsdorf, McGraw Hill Education,1984.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CONTROL SYSTEMS

Course Code: GR25A2033 **L/T/P/C: 3/0/0/3**
II Year II Semester
COURSE OUTCOMES

1. Summarize the basic elements and structures of feedback control systems.
2. Analyze the concept of time response, steady state response, errors.
3. Formulate Routh-Hurwitz table, root locus for the linear time-invariant systems.
4. Outline the stability of the system using Nyquist and Bode plots.
5. Develop control system models for state space models, to express state transition matrix and calculation of variables.

UNIT I
CONCEPTS OF CONTROL SYSTEMS AND TRANSFER FUNCTION REPRESENTATION
Open loop and closed loop control systems, different examples of control systems, classification of control systems, characteristics and effects of feedback, impulse response and transfer functions, translational and rotational mechanical systems, Transfer function of DC and AC Servomotor, Synchro transmitter and receiver, Block diagram reduction techniques, signal flow graphs, reduction using Mason's gain formula.

UNIT II
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.

UNIT III
STABILITY ANALYSIS &ROOT LOCUS TECHNIQUE
Concept of stability, Routh stability criterion, Routh Hurwitz stability criterion Root locus concept, construction of root loci, effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT IV
STABILITY ANALYSIS IN FREQUENCY DOMAIN
Frequency domain specifications, Bode diagrams, Determination of frequency domain specifications and transfer function from the Bode diagram- Phase and Gain margin, stability analysis from Bode plots. Polar plots, Nyquist plots and applications of Nyquist criterion to find the stability.

UNIT V
STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS
Concepts of state, state variables and state vector, derivative of state model from transfer function, derivative of transfer function from state model, diagonalization, Solution of State Equation, state transition matrix and its properties, Controllability and Observability.

TEXTBOOKS

1. “Control Systems”, by A. Anand Kumar 2 nd edition, PHI Learning Private Limited

2. “Automatic Control Systems”, by B.C.Kuo 8th edition, 2003, John Wiley and Son’s

REFERENCES

1. “Control Systems Engineering”, I. J. Nagrath and M. Gopal New Age International (P) Limited Publishers, 2nd edition.

2. “Control Systems Engineering”, by John Wiley by NISE 3 rd Edition.

3. “Modern Control Engineering”, by Katsuhiko Ogata Prentice Hall of India Pvt Ltd, 3rd edition,1998.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRINCIPLES OF DIGITAL ELECTRONICS

Course Code: GR25A2034 **L/T/P/C: 3/0/0/3**
II Year II Semester

COURSE OUTCOMES

1. Summarize the working of logic gates with applications, design of logic gates with diodes and transistors.
2. Develop the applications using Combinational logic circuits by minimizing the function using K-Map.
3. Make use of different types of counters for applications.
4. Examine types of Memories and application of ROM as PLDs.
5. Model Analog to Digital and Digital to Analog Converter.

UNIT I
NUMBER SYSTEMS AND LOGIC FAMILIES
Logic gates, Boolean algebra, Boolean Postulates, realization of Boolean functions with logic gates, number systems, one's and two's complements arithmetic, Binary codes: BCD, Weighted codes: -2421,8421, Gray code, error detecting and correcting codes, Hamming code.

UNIT II
MINIMIZATION TECHNIQUES
Standard and Canonical form representation for logic functions, minimization of logical functions using Boolean Postulates and Theorems, K-map representation, and simplification of logic functions using K-Map, don't care terms.
Combinational Logic Circuits: Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, carry look ahead adder, digital comparator, parity checker/generator, priority encoders.

UNIT III
SEQUENTIAL CIRCUITS:
SR Latch, the clocked SR flip flop, J- K, T and D types flip-flops, Triggering of Flip Flops, Analysis of Clocked Sequential Circuits, Flip-Flop Excitation Tables, Conversion from one Flip-Flop to other.

REGISTERS: Analysis procedure, design procedure, Registers with parallel load, Shift registers; Serial Transfer, Serial Addition. Ripple Counters; Binary Ripple Counter, BCD Ripple Counter, Synchronous Counters; Binary Counter, Up-Down Counter.

UNIT IV
MEMORIES AND PLDs
Memory organization and operation, expanding memory size, classification and characteristics of memories, ROM, EPROM, E^2PROM and RAM.

PROGRAMMABLE LOGIC DEVICES: ROM as a Programmable Read Only Memory (PROM), Programmable Array Logic (PAL) and Programmable Logic Array (PLA).

UNIT V

DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS

Digital to Analog converters: Weighted resistor D/A converter, R-2R Ladder D/A Converter, Specifications for D/A converters. Analog to Digital converters: Sample and hold circuit, Flash type A/D converter, Successive approximation type A/D converter, Counter Type A/D converter, Specifications of A/D converters.

TEXTBOOKS

1. "Fundamentals of Digital Circuits", Anand. Kumar, Prentice Hall India, 2016.
2. "Digital logic and Computer design", M. M. Mano,Pearson Education India, 2016.

REFERENCES

1. “A Textbook of Digital Electronics”, R.S. Sedha, S.Chand, 2005
2. "Modern Digital Electronics", R. P. Jain, McGraw Hill Education, 2009.
3. “Fundamentals of Logic Design’, Charles H. Roth, Jr., Larry L. Kinney, Raghunandan G. H, Cengage, 1st Edition, 2020

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICROPROCESSORS AND MICROCONTROLLERS

Course Code: GR25A2035 **L/T/P/C:3/0/0/3**
II Year II Semester

COURSE OUTCOMES

1. Summarize the internal architecture of 8086 Microprocessor.
2. Analyze assembly level programs of 8086 Microprocessors.
3. Illustrate the internal architecture of 8051.
4. Build skills in writing assembly level programs on the 8051.
5. Develop real-time systems on the 8051 Microcontroller using external interface peripherals.

UNIT I

8086 ARCHITECTURE

8086 Architecture- Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Instruction formats, addressing modes, Instruction Set, Assembler Directives, Macros.

UNIT II

ASSEMBLY LANGUAGE PROGRAMMING OF 8086 AND INTERFACING

Simple Programs involving Logical, Branch and Call Instructions, Sorting, Evaluating Arithmetic Expressions, String manipulations, Signal Descriptions of 8086, Common Function Signals, Minimum and Maximum Mode Signals.

Memory and I/O Interfacing: Memory Interfacing of 8086,8255 PPI, Various Modes of Operation, and Interfacing to 8086, Interfacing keyboard, Display, Stepper Motor Interfacing, D/A and A/D Converter.

UNIT III

THE 8051 ARCHITECTURE

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers, and Counters

UNIT IV

INSTRUCTION SET AND PROGRAMMING

Addressing modes: Introduction, Instruction syntax, Data types, Subroutines Immediate addressing, Register addressing, Direct addressing, Indirect addressing, Relative addressing, indexed addressing, Bit inherent addressing, bit direct addressing.
8051 Instruction set: Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction. Assembly language programs, C language programs.

UNIT V

EXTERNAL COMMUNICATION INTERFACE

Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232, USB.

Applications:

LED, LCD, and keyboard interfacing. Stepper motor interfacing, DC Motor interfacing, sensor interfacing.

TEXTBOOKS

1. "Advanced Microprocessors and Peripherals", A. K. Ray and K. M. Bhurchandani, 2nd Edition, Tata McGraw-Hill, 2006.
2. "Microprocessors and Interfacing", D.V. Hall, 2nd Edition, Tata McGraw-Hill, 2006.

REFERENCES

1. "The 8051 Microcontroller and Embedded Systems using Assembly and C" – Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, 2nd Edition, Pearson Education, 2008.
2. "Microcontrollers: Theory and Applications", Ajay V. Deshmukh, Tata McGraw-Hill Education, 2005.
3. "The 8051 Microcontroller", Kenneth J. Ayala, 3rd Edition, Cengage Learning, 2010.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENVIRONMENTAL SCIENCE

(Common to all Branches)

Course Code: GR25A2001 **L/T/P/C: 1/0/0/1**
II Year II Semester

COURSE OUTCOMES

1. Understand the structure, function, and significance of ecosystems.
2. Analyze the classification, utilization, and sustainable management of natural resources, along with alternative energy options.
3. Evaluate biodiversity at genetic, species, and ecosystem levels, its values, threats, and conservation methods under national and international frameworks.
4. Identify types, sources, and impacts of environmental pollution, and apply suitable control technologies while assessing global environmental challenges and protocols.
5. Interpret environmental policies, legislation, and the EIA process to propose management plans addressing contemporary environmental and sustainability issues.

UNIT I
ECOSYSTEMS

Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem value, services and carrying capacity, Field visits.

UNIT II
NATURAL RESOURCES

Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT III
BIODIVERSITY AND BIOTIC RESOURCES

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT IV
ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES

Environmental Pollution: Classification of pollution, **Air Pollution**: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition

and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT V

ENVIRONMENTAL POLICY, LEGISLATION & EIA

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition.

Slogan and Poster making on Environmental Management Plan, Contemporary Environmental Issues (Climate change – Impact on air, water, biological and Socioeconomical aspects); Sustainable development goals (SDGs); Global environmental challenges; Environmental policies.

TEXT BOOKS

1. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.
2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University
   Grants Commission.
3. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCES

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PRINCIPLES OF DIGITAL ELECTRONICS LAB

Course Code: GR25A2036 **L/T/P/C: 0/0/2/1**
II Year II Semester

COURSE OUTCOMES

1. Make use of function realization using logic gates.
2. Design Combinational logic circuits.
3. Analyze the types of Flip-Flops used in registers.
4. Develop Sequential logic circuits.
5. Construct a parity checking circuit.

LIST OF EXPERIMENTS

Any ten experiments should be conducted.

1. Design and verification of basic logic gates.
2. Simplify the given Boolean expression realize them using universal gates.
3. Construct half and full adder circuit using basic logic gates.
4. Develop a half subtractor/full subtractor circuit using basic logic gates.
5. Construct a parallel adder circuit using basic logic gates.
6. Design and implementation of subtractor
7. Develop a Multiplexer using basic logic gates.
8. Design and implementation of Decoder
9. Construct a Magnitude comparator using basic logic gates.
10. Design and verify Odd and Even Parity.
11. Implementation and verification of truth table for R-S, J-K, D and T flip-flop.
12. Experiment with J-K flip-flop as D flip-flop.

TEXTBOOKS

1. "Fundamentals of Digital Circuits", A. Kumar, Prentice Hall India, 2016.
2. "Digital logic and Computer design", M. M. Mano, Pearson Education India, 2016.

REFERENCES

1. "A Textbook of Digital Electronics", R.S. Sedha, S.Chand, 2005
2. "Modern Digital Electronics", R. P. Jain, McGraw Hill Education, 2009.
3. "Switching Theory and Logic Design", Godse, Technical Publication, 2010.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

AC MACHINES LAB

Course Code: GR25A2037 **L/T/P/C: 0/0/2/1**
II Year II Semester

COURSE OUTCOMES

1. Assess the performance of different machines using different testing methods.
2. Determine the parameters of equivalent circuit of single-phase induction motor.
3. Make use of various methods to find regulation of an Alternator.
4. Analyze various characteristics of three phase induction motor.
5. Experiment with synchronous machine to find direct and quadrature axis reactance.

LIST OF EXPERIMENTS

Any ten experiments should be conducted.

1. Sumpner's test.
2. Heat run test on transformer.
3. Hysteresis loss determination.
4. Brake Test on Slip Ring Induction Motor.
5. No load and Blocked Rotor Tests on Squirrel Cage Induction Motor.
6. Equivalent Circuit of a Single-Phase Induction Motor.
7. Regulation of an Alternator by Synchronous Impedance Method and MMF Method.
8. Determination of X_d and X_q of a Salient Pole Synchronous Machine from Slip Test.
9. V and inverted V curves of a 3-Phase Synchronous Motor.
10. Induction Generator.
11. Rotor-resistance starter for Slip Ring Induction Motor.
12. Star-delta starter for Squirrel Cage Induction Motor.

TEXTBOOKS

1. "Electric Machinery", A.E.Fitzgerald and C.Kingsley, McGraw Hill Education,2013.
2. "Performance and design of AC machines", M.G. Say CBSPublishers,2002.

REFERENCES

1. "Electrical Machinery", P.S.Bimbhra Khanna Publishers,2011.
2. "Electric Machines", I.J.Nagrath and D.P. Kothari, McGraw Hill Education,2010.
3. "Alternating Current Machines", A.S.Langsdorf, McGraw Hill Education,1984.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

CONTROL SYSTEMS LAB

Course Code: GR25A2038 **L/T/P/C: 0/0/2/1**
II Year II Semester

COURSE OUTCOMES

1. Make use of simulation packages for simple control system programs.
2. Examine the characteristics of synchros.
3. Analyze the root locus and bode plots.
4. Develop the transfer function of DC motor/generator.
5. Interpret the performance of servomotor and PID controller.

LIST OF EXPERIMENTS
Any ten experiments should be conducted.

1. Obtain the Transfer function from zeros and poles and vice versa.
2. Find the Step response, Ramp response and Impulse response for a given transfer function.
3. Draw Root Locus from a Transfer function.
4. Draw Bode Plot and Nyquist Plot from a Transfer function.
5. Derive State Model from a Transfer function.
6. Determine Transfer function of DC motor/Generator.
7. Derive Zeros and poles from state model.
8. Obtain the Time Response of second order system of a given transfer function.
9. Study of Characteristics of DC Servomotor.
10. Design a PID Controller for a given Control System.
11. Characteristics of Synchros.
12. Study of Characteristics of AC Servomotor

TEXTBOOKS

1. "Control Systems", by A. Anand Kumar 2 nd edition, PHI Learning Private Limited
2. "Automatic Control Systems", by B.C.Kuo 8th edition, 2003, John Wiley and Son's

REFERENCES

1. "Control Systems Engineering", I. J. Nagrath and M. Gopal New Age International (P) Limited Publishers, 2nd edition
2. "Control Systems Engineering", by John Wiley by NISE 3 rd Edition.
3. "Modern Control Engineering", by Katsuhiko Ogata Prentice Hall of India Pvt Ltd, 3rd edition,1998.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PCB DESIGN LAB

Course Code: GR25A2103 **L/T/P/C: 0/0/2/1**
II Year II Semester

COURSE OUTCOMES

1) Understand the design and fabrication process of PCBs.
2) Design schematic diagrams and convert them to PCB layouts.
3) Apply routing and layout techniques using EDA tools.
4) Generate Gerber files and perform DRC/ERC effectively.
5) Fabricate, assemble, and test basic single-layer PCBs.

Module I: Fundamentals of PCB Design

 Types of PCBs: Single-layer, Double-layer, Multilayer

 PCB materials and manufacturing process

 PCB design rules and standards (IPC standards)

 Introduction to EDA tools (e.g., KiCad, Eagle, Altium, EasyEDA)

Lab Activity:

 Exploring the user interface of PCB design software.

 Setting up design rules.

Module II: Schematic Design

 Creating circuit schematics using PCB CAD tools.

 Component library management

 Electrical rule checking (ERC)

 Netlist generation

Lab Activity:

 Designing a basic power supply or LED flasher circuit.

 Performing ERC and generating netlist.

Module III: PCB Layout and Routing

 Importing netlist to layout editor.

 Footprint assignment and component placement

 Manual vs auto-routing

 Design Rule Check (DRC)

Lab Activity:

 Placing components and routing for the schematic designed earlier.

 Performing DRC and correcting errors.

Module IV: PCB Output Files and Fabrication

 Generating Gerber files, drill files, and BOM.

 Understanding layers (Top, Bottom, Soldermask, Silkscreen)

 PCB printing, photoresist method, and etching.

 Introduction to SMD and through-hole assembly

Lab Activity:

 Generate Gerber files and preview using Gerber viewer.

 Fabricate a basic single-layer PCB (simulation or actual lab process)

Module V: Mini Project and Testing

 Assembling components on fabricated PCB.

 Soldering and desoldering techniques.

 Continuity testing and troubleshooting

 Mini project: Design a simple power supply, logic gate trainer, or timer circuit.

Lab Activity:

 Complete mini project: From schematic to testing of PCB.

TEXTBOOKS

1. Walter C. Bosshart “Printed Circuit Board Design and Technology” Tata McGraw Hill
2. Clyde F. Coombs “Printed Circuit Boards: Design and Technology”: McGraw-Hill
3. Peter Dalmaris “PCB Design Using KiCad 6”

REFERENCES

1. Kraig Mitzner “Complete PCB Design Using OrCAD Capture and PCB Editor.”
2. James Angus “Electronic Product Design”

IPC Standards:

1. IPC-2221: Generic Standard on Printed Board Design

2. IPC-7351: Generic Requirements for Surface Mount Design

Software Tools (Free/Open Source Recommended):

1. KiCad (Open source)
2. EasyEDA (Online tool)
3. Eagle CAD (Free for education)
4. LTSpice / Tinkercad for circuit simulation (optional)