III YEAR I SEMESTER

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER SYSTEM ANALYSIS

Course Code:GR20A3012 **L/T/P/C:2/1/0/3**

III year I semester

COURSE OBJECTIVES

1. Basic concepts of Power flow analysis.
2. Concepts related to Power flow equations and numerical analysis.
3. Illustrate about the formation of Z buses and short circuit analysis.
4. Solve faults current for different types of faults.
5. Stability constraints in a synchronous grid.

COURSE OUTCOMES

1. Outline the analysis of power system at different concepts, states and conditions.
2. Formulate the Impedance and admittance matrices and necessity of Power Flow Studies.
3. Solve Power Flow equations using different numerical methods.
4. Evaluate fault currents for different types of faults and analyze short circuit studies.
5. Analyze a power system in Transient state, steady state and Stability Constraints in a grid.

UNIT I
POWER FLOW STUDIES-1

Per-Unit System of Representation. Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems. Ybus formation by Direct Inspection Method, Numerical Problems. Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load Flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

UNIT II
POWER FLOW STUDIES-2

Newton Raphson Method in Rectangular and Polar Co-Ordinates form, Load Flow Solution with and without PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods. - Comparison of Different Load flow Methods – DC load Flow.

UNIT III
FORMATION OF ZBUS

Partial network, Algorithm for the Modification of Zbus Matrix for addition of an element for the following cases: Addition of an element from a new bus and reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old buses (Derivations and Numerical Problems)-Modification of Zbus for the changes in network (Problems).

SHORT CIRCUIT ANALYSIS

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems. Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances. Sequence Networks: Positive, Negative and Zero Sequence Networks, Numerical Problems.

Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems.

UNIT IV

STEADY STATE STABILITY ANALYSIS

Elementary concepts of Steady State, Dynamic and Transient Stability. Description of: Steady State Stability Power Limit, Transfer Reactance, Synchronizing

Power Coefficient, Power Angle Curve and Determination of steady state stability and Methods to improve steady state stability.

UNIT V

POWER SYSTEM TRANSIENT STABILITY ANALYSIS

Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation - Solution of Swing Equation: Point-by-Point Method and Modified Euler's method. Multi machine stability. Methods to improve Transient Stability.

TEXT BOOKS

1. Electric Power Systems by C. L. Wadhwa, New Age International.
2. Modern Power System Analysis by I.J.Nagrath & D.P.Kothari, Tata McGraw- Hill.
3. P.Kundur, "Power System Stability and Control" McGraw Hill Education, 1994

REFERENCES

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
2. Power System Analysis by Hadi Saadat, TMH Edition.
3. A. R. Bergen and V. Vittal, "Power System Analysis", Pearson Education Inc., 1999.
4. B. M. Weedy, B. J. Cory, N. Jenkins, J. Ekanayake and G. Strbac, "Electric Power Systems", Wiley, 2012.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER ELECTRONICS

Course Code:GR20A3013 **L/T/P/C:3/0/0/3**

III year I semester

COURSE OBJECTIVES

1. Provide the students a deep insight into the working of different switching devices with respect to their characteristics.
2. Study advanced converters and switching techniques implemented in recent technology.
3. Analyze different converters and control with their applications.
4. Familiarize the students with the utilization aspects of power engineering, more specifically the techniques of solid-state power conversions and their applications.
5. Evaluate the steady-state and transient state analysis of all the power converters

COURSE OUTCOMES

1. Distinguish between signal level and power level devices and explain the characteristics of power electronic switching devices.
2. Illustrate the performance of controlled rectifiers and AC-DC converters
3. Analyze the operation of DC-DC choppers
4. Discuss the operation of voltage source inverters
5. Illustrate the performance of the AC-AC converters.

UNIT I

POWER SWITCHING DEVICES

Diode, Thyristor, MOSFET, IGBT: I-V Characteristics; R, RC, UJT firing circuits for thyristor; Line and forced commutation circuits of a thyristor; Gate drive circuits for MOSFET and IGBT.

UNIT II

AC-DC CONVERTERS

Single-phase half-wave and full-wave rectifiers, Single-phase full-bridge thyristor rectifier with R-load and highly inductive load; Three-phase full-bridge thyristor rectifier with R-load and highly inductive load; Input current wave shape and power factor.

UNIT III

DC-DC CONVERTERS

Elementary chopper with an active switch and diode, concepts of duty ratio and average voltage, power circuit of a buck converter, analysis and waveforms at steady state, duty ratio control of output voltage. Power circuit of a boost converter, analysis and waveforms at steady state, relation between duty ratio and average output voltage.

UNIT IV

SINGLE-PHASE & THREE-PHASE VOLTAGE SOURCE INVERTER(DC-AC CONVERTERS)

Power circuit of single-phase voltage source inverter, switch states and instantaneous output voltage, square wave operation of the inverter, concept of average voltage over a switching cycle, bipolar sinusoidal modulation and unipolar sinusoidal modulation, modulation index and output voltage.

Power circuit of a three-phase voltage source inverter: (180&120 degree mode), switch states, instantaneous output voltages, average output voltages over a sub-cycle.

UNIT V

AC-AC CONVERTERS

AC Voltage controller with R and RL loads with numerical problems. Cyclo-converters: step up cyclo converters; step down cyclo converters, numerical problems

TEXT BOOKS

1. M. H. Rashid, "Power Electronics: Circuits, Devices, and Applications", Pearson Education India, 2009.

2. P. S. Bimbhra, "Power Electronics", Khanna Publishers.

REFERENCES

1. R. W. Erickson and D. Maksimovic, "Fundamentals of Power Electronics", Springer Science & Business Media, 2007.
2. L. Umanand, "Power Electronics: Essentials and Applications", Wiley India, 2009.
3. B K.Bose "Modern power Electronics and AC Drives" Prentice Hall India Learning Private Limited, 2005.
4. N. Mohan and T. M. Undeland, "Power Electronics: Converters, applications and Design", John Wiley & Sons, 2007.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICROPROCESSORS AND MICROCONTROLLERS

Course Code: GR20A3014 **L/T/P/C:3/0/0/3**

III year I semester

COURSE OBJECTIVES

1. To familiarize the architecture of 8086 Microprocessors.
2. To describe the 8051 Microcontroller architecture.
3. To familiarize in programming the Microprocessors and Microcontrollers.
4. To understand Memory and I/O interfacing of 8086 and 8051.
5. To interface and program various devices with 8051.

COURSE OUTCOMES

1. Understands the internal architecture of 8086 Microprocessor.
2. Understand the internal architecture, organization of 8051.
3. Analyze the assembly language Programming of Microprocessor and Microcontrollers.
4. Do interfacing design of peripherals like Memory, I/O, A/D, D/A, timer etc.
5. Understand the real time applications of timers and serial communication of 8051.

UNIT-I

8086 ARCHITECTURE

8086Architecture-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.
3. The 8051 Microcontroller, Kenneth J. Ayala, 3rd Edition, Cengage Learning, 2010.

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.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRICAL AND HYBRID VEHICLES
(Professional Elective –I)

Course Code:GR20A3015 **L/T/P/C:3/0/0/3**

III year I semester

COURSE OBJECTIVES

1. Social importance of modern transportation.
2. Demonstrate Vehicle Brake Performance.
3. Analyze power flow control in hybrid drive-train topologies
4. Discuss electric components used in hybrid and electric vehicles.
5. Select the energy storage technology for Hybrid and Electric Vehicles.

COURSE OUTCOMES

1. Summarize the Economic Aspects of EVs compared to ICEs
2. Explain the braking system in EVs and HEVs.
3. Identify various hybrid drive-train topologies
4. Analyze the configuration and control of different motor drives.
5. Interpret the different possible ways of energy storage requirements in Hybrid and Electric Vehicles.

UNITI
ENVIRONMENTAL IMPACT AND HISTORY OF MODERN TRANSPORTATION
Air Pollution and Global Warming, social and environmental importance and Impact of hybrid and electric vehicles, History of Electric Vehicles, History of Hybrid Electric Vehicles, History of Fuel Cell Vehicles.

UNIT II
BRAKING FUNDAMENTALS AND REGENERATIVE BRAKING IN ELECTRIC VEHICLES
General Description of Vehicle Movement, Vehicle Resistance, Dynamic Equation, Tire–Ground Adhesion and Maximum Tractive Effort, Power Train Tractive Effort and Vehicle Speed, Vehicle Power Plant and Transmission Characteristics, Brake Performance.

Braking Energy Consumed in Urban Driving, Importance of Regenerative Braking in Electric and Hybrid Vehicles.

UNIT III
INTRODUCTION TO ELECTRIC AND HYBRID ELECTRIC VEHICLES
Hybrid Electric Drivetrains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies; Introduction to pure EV’s (BEV, FCV).

UNIT IV

ELECTRIC PROPULSION SYSTEMS

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration, and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT V

ENERGY STORAGE REQUIREMENTS IN HYBRID AND ELECTRIC VEHICLES

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems.

TEXT BOOKS

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals", CRC Press, 2010.
2. James Larminie, "Electric Vehicle Technology Explained", John Wiley & Sons, 2003
3. Iqbal Hussain, "Electric & Hybrid Vehicles – Design Fundamentals", Second Edition, CRC Press, 2011

REFERENCES

1. Hybrid Vehicles and the future of personal transportation, Allen Fuhs, CRC Press, 2011.
2. Vehicle Power Management: Modeling, Control and Optimization, Xi Zhang, Chris Mi, Springer, 2011.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOLAR AND WIND ENERGY SYSTEMS
(Professional Elective –I)

Course Code: GR20A3016 **L/T/P/C:3/0/0/3**
III year I semester

COURSE OBJECTIVES

1. Introduction of the basic concepts of Solar and Wind Energies
2. Knowledge on the solar power extraction and collection
3. Information and installation of Wind and Photovoltaic systems
4. Knowledge of PV solar panels and wind generators
5. Applications of wind and Solar power technologies for hybrid power generation.

COURSE OUTCOMES

1. Justify the energy scenario and the consequent growth of the power generation from renewable energy sources
2. Describe the basic physics of solar power generation
3. Implement the power electronic interfaces for solar generation
4. Discuss the basic physics of wind power generation
5. Understand the power electronic interfaces for wind generation

UNIT – I
SOLAR RESOURCE
Introduction, solar radiation geometry and measurement, solar day length, Estimation of solar energy availability, Hourly Global, Diffuse and Beam Radiation on Horizontal Surface under Cloudless Skies, Solar Radiation on Inclined Plane Surface.

UNIT – II
SOLAR THERMAL POWER GENERATION
Technologies, Parabolic trough, central receivers, parabolic dish, Fresnel, solar pond, elementary analysis.

UNIT – III
SOLAR PHOTOVOLTAIC GENERATION
Technologies-Amorphous, monocrystalline, polycrystalline; V-I characteristics of a PV cell, PV module, array, Power Electronic Converters for Solar Systems, Maximum Power Point Tracking (MPPT) algorithms, Converter Control.

UNIT – IV
PHYSICS OF WIND POWER
History of wind power, Indian and Global statistics, Wind physics, Betz limit, Tip speed ratio, stall and pitch control, Wind speed statistics-probability distributions, Wind speed and power-cumulative distribution functions.

UNIT – V
WIND GENERATOR TOPOLOGIES
Review of modern wind turbine technologies, Fixed and Variable speed wind turbines, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent Magnet Synchronous Generators, Power electronics converters.

TEXT BOOKS

1. R. Ranjan, D.P.Kothari, "Renewable Energy Sources and Emerging Technologies" 2nd edition PHI

2. B.H.Khan, "Non- Conventional Energy Resources", 2nd edition, Tata McGraw-Hill, New Delhi
3. T. Ackermann, "Wind Power in Power Systems", John Wiley and Sons Ltd., 2005.
4. G.D Rai "Non – Conventional Energy Resources", 3rd Edition Khanna Publishers.
5. G. M. Masters, "Renewable & Efficient Electric Power Systems", John Wiley and Sons, 2004.

REFERENCES

1. S. P. Sukhatme, "Solar Energy: Principles of Thermal Collection and Storage", McGraw Hill, 1984.

2. G. N. Tiwari and M. K. Ghosal, "Renewable Energy Applications", Narosa Publications, 2004.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRICAL MACHINE DESIGN
(Professional Elective –I)

Course Code:GR20A3017 **L/T/P/C: 3/0/0/3**

III year I semester

COURSE OBJECTIVES
1. Develop knowledge on principles of design of static machines.
2. Principles of design of rotating machines.
3. Understand the design fundamental concepts.
4. Design of machines based on their applications.
5. Solve the problems related to design.

COURSE OUTCOMES
1. Explain the construction and performance characteristics of electrical machines.
2. Distinguish the various factors which influence the design.
3. Analyze Electrical, magnetic and thermal loading of electrical machines.
4. Understand the principles of electrical machine design and carry out a basic design of an ac machine.
5. Summarize use software tools to do design calculations.

UNIT I
INTRODUCTION
Major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings, thermal considerations, heat flow, temperature rise, rating of machines, fundamental of DC machine design.

UNIT II
TRANSFORMERS
Sizing of a transformer, main dimensions, KVA output for single and three-phase transformers, window space factor, overall dimensions, operating characteristics, regulation, no load current, temperature rise in transformers, design of cooling tank, methods for cooling of transformers.

UNIT III
INDUCTION MOTORS
Sizing of an induction motor, main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines, design of rotor bars & slots, design of end rings, design of wound rotor, magnetic leakage calculations, leakage reactance of polyphase machines, magnetizing current, short circuit current, circle diagram, operating characteristics.

UNIT IV
SYNCHRONOUS MACHINES
Sizing of a synchronous machine, main dimensions, design of salient pole machines, short circuit ratio, shape of pole face, armature design, armature parameters, estimation of air gap length, design of rotor, design of damper winding, determination of full load field mmf, design of field winding, design of turbo alternators, rotor design.

UNIT V

COMPUTER AIDED DESIGN (CAD)

Limitations of traditional designs, need for CAD analysis, synthesis and hybrid methods, design optimization methods, variables, constraints and objective function, problem formulation. Introduction to FEM based machine design. Introduction to complex structures of modern machines-PMSMs, BLDCs, SRM and claw-pole machines.

TEXT BOOKS

1. A. K. Sawhney, "A Course in Electrical Machine Design", Dhanpat Rai and Sons, 1970.
2. M.G. Say, "Theory & Performance & Design of A.C. Machines", ELBS London.

REFERENCES

1. S. K. Sen, "Principles of Electrical Machine Design with computer programmes", Oxford and IBH Publishing, 2006.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
OPTIMIZATION TECHNIQUES
(Professional Elective –I)

Course Code:GR20A3018 **L/T/P/C: 3/0/0/3**
III year I semester

COURSE OBJECTIVES

1. Develop a systematic approach to handle problems to design of electrical circuit etc; with a goal of maximizing the profit and minimizing cost.
2. Understand the various optimization techniques such as classified optimization, linear programming. One dimensional minimization methods, unconstrained optimization techniques, constrained optimization techniques and dynamic programming.
3. Understand the necessary sufficient conditions for finding the solution of the problems in classical optimization.
4. Comprehend the numerical methods for finding approximate solution of complicated problems.
5. Have a thorough understanding on algorithms utilization.

COURSE OUTCOMES

1. Explain the need in optimization techniques and formulating the optimization problems
2. Apply linear and non linear programming for single and multi variable by prior different algorithm
3. Solve geometric programming with and without constraints
4. Apply dynamic programming concepts in multi stage decision process like inventory allocation and etc.,
5. Apply integer and stochastic programming for different simulation.

UNIT I
LINEAR PROGRAMMING

Formulation – Sensivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints.

UNIT II
SINGLE VARIABLE NON-LINEAR UNCONSTRAINED OPTIMIZATION

One dimensional Optimization methods:- Uni-modal function, elimination methods, ,, Fibonacci method, golden section method, interpolation methods – quadratic & cubic interpolation methods. Multi variable non-linear unconstrained optimization: Direct search method – Univariant method – pattern search methods – Powell's- Hook -Jeeves, Rosenbrock search methods- gradient methods, gradient of function, steepest decent method, Fletcher Reeves method, variable metric method.

UNIT III

GEOMETRIC PROGRAMMING

Polynomials – arithmetic - geometric inequality – unconstrained G.P- constrained G.P

UNIT IV

DYNAMIC PROGRAMMING

Multistage decision process, principles of optimality, examples, conversion of final problem to an initial value problem, application of dynamic programming, production inventory, allocation, scheduling replacement.

UNIT V

INTEGER PROGRAMMING

Introduction – formulation – Gomory cutting plane algorithm – Zero or one algorithm, branch and bound method STOCHASTIC PROGRAMMING: Basic concepts of probability theory, random variables- distributions-mean, variance, correlation, co variance, joint probability distribution-stochastic linear, dynamic programming. Simulation – Introduction – Types- steps – application – inventory – queuing – thermal system.

TEXT BOOKS

1. Optimization theory & Applications / S.S.Rao / New Age International.
2. Introductory to operation Research / Kasan& Kumar / Springar
3. Optimization Techniques theory and practice / M.C.Joshi, K.M.Moudgalya/ Narosa Publications.
4. Optimization Techniques by N V S Raju/PHI

REFERENCES

1. S.D.Sharma / Operations Research
2. Operation Research / H.A.Taha /TMH
3. Optimization in operations research / R.LRardin
4. Optimization Techniques /Benugundu&Chandraputla / Pearson Asia

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
NON-CONVENTIONAL ENERGY SOURCES
(Open Elective-I)

Course Code: GR20A3019 **L/T/P/C:3/0/0/3**
III year I semester

COURSE OBJECTIVES

1. Introduction of the basic concepts of Solar Energy.
2. Explain the Equivalent and VI characteristics of PV cells.
3. Information and installation of Wind energy systems.
4. Understand energy from Bio mass.
5. Explain the principle of Tidal power plants, basic batteries.

COURSE OUTCOMES

1. Describe the concepts of Solar Energy and Solar collectors.
2. Design the PV Solar system with energy backup.
3. Discuss the basic physics of wind power generation.
4. Explain the energy generation from Bio mass, bio gas and geo thermal energy.
5. Design Tidal power system and fuel cells.

UNIT - I

Solar spectrum-Solar Radiation on Earth's surface- Solar radiation geometry-Solar radiation measurements-Solar radiation data-Solar radiation on horizontal and tilted surfaces. Solar Thermal conversion-Flat plate collectors concentrated collectors- construction and thermal analysis- Solar applications-Solar ponds-Heliostat systems-water heater-air heater- solar still.

UNIT - II

Photo voltaic cells-Equivalent circuit- V-I Characteristics- Photovoltaic modules – constructional details- design considerations-Tracking-Maximum power point tracking– algorithms-PV solar system design with energy backup-Solar Thermo electric conversion.

UNIT - III

Fundamentals of wind energy-power available in wind-BetzLimit- Aerodynamics of wind turbine-Wind turbines-Horizontal and vertical axis turbines – their configurations-Wind Energy conversion systems.

UNIT - IV

Various fuels-Sources-Conversion technologies-WetProcesses–Dry Processes-Bio Gas generation–Aerobic and an aerobic digestion- Factorsaffecting generation of bio gas – Classification of bio gas plants-Different Indian digesters-Digester design considerations-Gasification process-Gasifiers – Applications. Geo thermalEnergy-sources-Hydro thermal convective-Geo-pressure resources-Petro-thermal systems(HDR)-Magma Resources-Prime Movers.

UNIT - V

Principle of operation-Open and closed cycles, Energy from Tides-Principle of Tidal Power- -Components of tidal Power plants-Operation Methods-Estimation of Energy in Single and double basin systems-Energy and Power from Waves-Wave energy conversion devices-Fuel Cells-Design and Principle of operation-Types of Fuel Cells-Advantages and disadvantages-Types of Electrodes- Applications-Basics of Batteries –Constructional details of Lead acid batteries- Ni-Cd Batteries.

TEXT BOOKS

1. John Twidell&Wier, Renewable Energy Resources, CRC Press,2009.
2. D.P. Kothari, Singal, Rakesh, Ranjan, Renewable Energy sources and Emerging Technologies, PHI, 2009.

REFERENCES

1. G.D. Rai–Non Conventional Energy sources, Khanna publishers.
2. B.H.Khan, Non Conventional Energy Sources, PHI

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER SYSTEMS LAB

Course Code: GR20A3020 **L/T/P/C:0/0/3/1.5**

III year I semester

COURSE OBJECTIVES

1. Knowledge in the area of Various power systems hardware components
2. Demonstration of characteristics of various relays
3. Analyze various types of faults and its protection
4. Determine transmission line model parameters
5. Develop power management system in Real-time applications

COURSE OUTCOMES

1. Illustrate different components related to power system hardware
2. Distinguish the characteristics of different relays.
3. Perform various types of faults and its protection
4. Design and analyse the transmission line.
5. Integrate various applications that provides intelligent power monitoring, energy management, system optimization, advanced automation, and real-time prediction.

LIST OF EXPERIMENTS

1. Characteristics of Over Current relay for Phase fault
2. Characteristics of Over Current relay for Earth fault
3. Characteristics of Induction Disc type relay
4. Testing of differential relay
5. Characteristics of Over Voltage Relay
6. Characteristics of Under Voltage Relay
7. Testing of Negative sequence Relay

8. To determine Efficiency and Regulation of 3 Phase Transmission model

9. Determination of ABCD parameters for short, medium and long lines

10. Ferranti effect of Transmission line

11. Zones Protection using Distance relay

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER ELECTRONICS LAB

Course Code: GR20A3021 **L/T/P/C:0/0/4/2**

III year I semester

COURSE OBJECTIVES

1. Develop hands-on experience in analyzing, designing and carrying out experiments on various power converters.
2. Familiarize with switching devices and their applications in power control.
3. Familiarize with power converters in various systems for power control.
4. Analyze and simulate different Converters using Simulation.
5. Conduct experiments with converters and compare the results with theoretical concepts and simulations.

COURSE OUTCOMES

1. Choose appropriate switching devices & firing circuits based on their characteristics and application.
2. Design and analyze the operation of power switching converters.
3. Develop practical control circuits for various real time applications.
4. Analyze and evaluate the operation of Inverters & Cyclo converters.
5. Judge power electronic converter performance for various applications in virtual platforms and AC Voltage controllers.

1. Characteristics of SCR, IGBT, MOSFET.

2. R, RC and UJT firing circuits.

3. Single-phase Half Controlled Converter with R-load.

4. Single-phase Fully Controlled Converter with R-load.

5. Open loop analysis of Buck Converter.

6. Open loop analysis of Boost Converter.

7. Performance analysis of Single-phase Full Bridge Inverter with R & RL load.

8. Performance analysis of Single-phase Cyclo-converter with R & RL load.

9. Practical validation of Three Phase Fully Controlled Converter.

10. Operation of Single Phase AC Voltage Controller.

11. Operation of Three Phase Half Controlled Converter using Simulation.

12. Operation of Buck-Boost Converter using Simulation.

13. Performance and analysis of speed control of single-phase Induction Motor using simulation.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MICROPROCESSORS AND MICROCONTROLLERS LAB

Course Code:GR20A3022 **L/T/P/C:0/0/3/1.5**
III year I semester

COURSE OBJECTIVES

1. To introduce the basics of microprocessors and its applications.
2. To provide in depth knowledge of 8051 Microcontrollers.
3. To expertise working with programming.
4. To impart the I/O interfacing concepts for developing real time systems.
5. To encourage the students in building real time applications.

COURSE OUTCOMES

1. Familiarize with the assembly level programming using 8086.
2. Judge the difference between Assembly language and Embedded C Programming
3. Design circuits for interfacing different modules to microcontrollers.
4. Experiment 8051 with different types of communicating devices.
5. Execute various programs which can resemble to the real time applications.

List of Experiments

Task-1: Using 8086 Processor Kits and/or Assembler

Assembly Language Programs to 8086 to Perform

- Arithmetic, Logical, String Operations on 16 Bit and 32-Bit Data.
- Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

Task-2: Using 8051 Microcontroller Kit

- LED's to 8051.
- Interfacing LCD to 8051.
- Interfacing Matrix Keypad to 8051.
- Interfacing DC Motor to 8051.

Task-3: Arduino Programming

- LEDs interfacing
- Switches and LED's interfacing
- 2*16 LCD
- Serial Communication
- Device control
- Reading sensors using ADC
- DC Motor control

III YEAR II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROGRAMMABLE LOGIC CONTROLLERS

Course Code:GR20A3091 **L/T/P/C:3/0/0/3**

III year II semester

COURSE OBJECTIVES

1. Familiarize with the PLC Architecture, I/O Modules and Programming structure of PLC.
2. Discuss input instructions and output instructions of PLC.
3. Understand the working of Registers and conversion examples.
4. Apply Timer and Counter for different industrial applications.
5. Implement analog operations and PID Control of PLC and Robot Application with PLC.

COURSE OUTCOMES

1. Understand the Architecture, I/O Modules and programming structure of PLC.
2. Develop the ladder logic using input and output instructions of PLC.
3. Describe characteristics of Registers and Conversion Examples
4. Apply PLC functions to Timing and Counting Applications.
5. Analyze the analog operations and PID Control of PLC, demonstrate Robot Application with PLC.

UNIT I

PLC BASICS

PLC System, I/O Modules and Interfacing, CPU Processor, Programming Equipment Programming Formats, Construction of PLC Ladder Diagrams, Devices connected to I/O Modules.

UNIT II

PLC PROGRAMMING

Input Instructions, Outputs, Operational Procedures, Programming examples using contacts and coils. Drill press operation.

UNIT III

DIGITAL LOGIC GATES

Programming in the Boolean Algebra System, Conversion examples Ladder diagrams for process control: Ladder Diagrams & Sequence Listings, Ladder Diagram Construction and Flow chart for Spray Process System.

PLC REGISTERS

Characteristics of Registers, Module addressing, Holding registers, Input registers, Output registers.

UNIT IV

PLC FUNCTIONS

Timer functions & Industrial Applications, Counters, Counter function Industrial Applications. Arithmetic functions, Number Comparison Functions, Number Conversion Functions.

DATA HANDLING FUNCTIONS

SKIP, Master Control Relay, Jump, Move, FIFO, FAL, ONS, CLR and Sweep functions and their applications.

UNIT V

BIT PATTERN AND CHANGING A BIT SHIFT REGISTER

Sequence Functions and Applications, Controlling of Two-Axis and Three Axis Robots with PLC, Matrix Functions.

ANALOG PLC OPERATION

Analog Modules and Systems, Analog Signal Processing, Multi Bit Data Processing, Analog Output Application Examples. PID principles, Position indicator with PID Control, PID Modules, PID Tuning, PID Functions

TEXT BOOKS

1. "Programmable Logic Controllers - Principle and Applications" by John W Webb and Ronald A Reiss, Fifth edition, PHI, 2009.

REFERENCES

1. "Programmable Logic Controllers - Programming Method and Applications" by Jr. Hackworth and F.D Hackworth Jr., Pearson, 2003.
2. "Introduction to Programmable Logic Controllers", Gary Dunning, Delmar Thomas Learning, 3rd Edition, 2005.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SENSORS MEASUREMENTS AND INSTRUMENTATION

Course Code: GR20A3092 **L/T/P/C: 2/1/0/3**
III year II semester

COURSE OBJECTIVES

1. To Memorize, monitor, analyze and control any physical system.
2. Demonstration on construction and working of different types of meters.
3. Interpret the use of modern tools necessary for electrical projects.
4. Compose different techniques for precise measurement of electrical and non-electrical quantities.
5. Design and create novel products and solutions for real life problems.

COURSE OUTCOMES

1. Outline the fundamentals and measurement of different electrical quantities.
2. Calculate unknown values in AC & DC Bridges.
3. Summarize Oscilloscopes and evaluate the usage of Digital voltmeters.
4. Identify working principles of various Sensors
5. Know how to design the various applications related to sensors and its applications

UNIT-I:
FUNDAMENTALS OF ELECTRICAL MEASUREMENTS

Ammeters & Voltmeters PMMC & Moving Iron Instruments C.T.s and PTs Ratio and Phase angle errors. Measurement of Power and power factor. Measurement of Active and Reactive power.

UNIT-II:
MEASUREMENT OF ENERGY AND OTHER ELECTRICAL QUANTITIES

Single phase & Three phase energy meters, Crompton's Potentiometer AC potentiometers. Measurement of resistance, Inductance and Capacitance by bridges: Wheatstone bridge, Meggar Kelvin Double Bridge, Maxwell's Bridge, Anderson’s bridge, Schering Bridge.

UNIT-III:
OSCILLOSCOPE AND DIGITAL VOLTMETERS

Cathode Ray Oscilloscope, Time base Horizontal & Vertical Amplifier, Measurement of phase and frequency. Sampling Oscilloscope, Digital storage Oscilloscope. Digital Voltmeters-Successive Approximation, Ramp, Dual slope Integration.

UNIT-IV:
SENSOR FUNDAMENTAL PRINCIPLES

Sensors / Transducers, principles, classification, parameters, characterizations, Introduction to mechanical &Electro Mechanical Sensors: Resistive type, Inductive sensors, Capacitive Sensors, Force and displacement/ position sensor, LVDT.

UNIT V:
SENSOR APPLICATIONS

Working Principles: Flow - rate sensors, Pressure Sensors, Temperature Sensors, Ultrasonic sensor, Acceleration Sensors.

TEXT BOOKS

1. Electrical & Electronic Measurement & Instruments by A.K.ShawneyDhanpat Rai & Sons Publications.
2. Sensors & Transducers By D. Patranabis , PHI Publications

REFERENCES

1. Sensors and Their Applications XII by S. J. Prosser, E. Lewis CRC Press
2. Handbook of modern sensors by JACOB FRADEN Springer AIP Press
3. Electrical Measurements and Measuring Instruments, by Er. R K Rajput by S. Chand Publishing**.**
4. Measurement Systems by Ernest O Doebelin by Mc Graw Hill.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ECONOMICS AND ACCOUNTING FOR ENGINEERS

Course Code:GR20A2004 **L/T/P/C:3/0/0/3**

III year II semester

COURSE OBJECTIVES

1. To provide the student with a clear understanding of demand analysis, elasticity of demand and demand forecasting;
2. To provide the insight on theory of production and cost analysis.
3. To describe different types of markets and competition and to elaborate the different forms of organisation and different methods of pricing.
4. To make the students understand various capital budgeting techniques
5. To Provide an insight of fundamental of accounting and emphasis on describe final accounts preparation

COURSE OUTCOMES

1. The student will be able to understand the concepts of economics and Demand concepts, elasticity and techniques for forecast demand of products
2. The student will be able to plan the production levels in tune with maximum utilization of organizational resources and with maximum profitability.
3. To understand the types of markets, types of competition and to estimate the cost of products and decide the price of the products and services produced
4. The student will be able to analyze the profitability of various projects using capital budgeting techniques and
5. The student is able will be able prepare the financial statements and more emphasis on preparation of final accounts.

UNIT I

INTRODUCTION & DEMAND ANALYSIS

Definition and Scope: Introduction to Economics, Nature and Scope of Managerial Economics. ***Demand Analysis***: Demand Determinants, Law of Demand and its exceptions. ***Elasticity of Demand***: Definition, Types, Measurement and Significance of Elasticity of

Demand. ***Demand Forecasting***, Factors governing demand forecasting, methods of demand forecasting.

UNIT II

PRODUCTION & COST ANALYSIS

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Laws of Returns, Internal and External Economies of Scale. ***Cost Analysis*:** Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

UNIT III

MARKETS AND FORMS OF BUSINESS ORGANIZATIONS

Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. ***Pricing*:** Objectives and Policies of Pricing. Methods of Pricing. ***Business:*** Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types.

UNIT IV

CAPITAL BUDGETING

Capital and its significance, Types of Capital, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value (NPV) Method and Internal Rate of Return (IRR) (simple problems) and Profitability Index (PI)

UNIT V

INTRODUCTION TO FINANCIAL ACCOUNTING

Accounting Concepts and Conventions - Double-Entry Bookkeeping. ***Accounting Cycle:*** Journal, Ledger, Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

TEXT BOOKS

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2009.
2. Managerial Economics: Analysis, Problems and Cases - P. L. Mehta, Edition, 13. Publisher, Sultan Chand, 2007.
3. Financial Accounting -1: S P Jain and K. L. Narang, Kalyani Publishers,2005.

REFERENCES

1. Peterson, Lewis and Jain: Managerial Economics, Pearson, 2009
2. Mithani : Managerial Economics , HPH, 2009
3. Lipsey&Chrystel, Economics, Oxford University Press, 2009
4. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.2009
5. Horngren : Financial Accounting, Pearson, 2009.
6. Dr. S. N. Maheswari and Dr. S.K. Maheshwari: Financial Accounting, Vikas, 2009.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MODERN POWER ELECTRONICS
(Professional Elective –II)

Course Code:GR20A3093 **L/T/P/C:3/0/0/3**
III year II semester

COURSE OBJECTIVES

1. A deep insight in to the working of different switching devices with respect to their characteristics.
2. Analysis of different resonant converters and control with their applications.
3. Knowledge on Multilevel Inverters and switching techniques implemented in recent technology.
4. Analysis of DC power supplies.
5. Knowledge on AC power supplies.

COURSE OUTCOMES

1. Define the advances in power electronic devices.
2. Articulate power electronic resonant converters in power control applications.
3. Evaluate the design and control of multi-level inverters.
4. Articulate DC power supplies in Power electronic applications
5. Evaluate the design and control of AC power supplies and uninterruptable power supplies.

UNIT I
MODERN POWER SEMICONDUCTOR DEVICES

Modern power semiconductor devices- MOS turn Off Thyristor (MTO) - Emitter Turn Off Thyristor (ETO) Integrated Gate- Commutated Thyristor (IGCTs)-MOS-controlled Thyristors (MCTs)-Static Induction circuit comparison of their features.

UNIT II
RESONANT PULSE INVERTERS

Resonant pulse inverters-series resonant inverters- with unidirectional & Bidirectional switches. Analysis of half bridge resonant inverter - evaluation of currents and Voltages of a simple resonant inverter-Analysis full bridge resonant inverter with bidirectional switches.

UNIT III
MULTILEVEL INVERTERS

Multi level concept-Classification of multilevel inverters- Diode clamped multilevel inverter-principle of operation, main features. Improved Diode Clamped inverter-principle of operation-Flying capacitors multilevel inverter principle of operation-main features.

UNIT IV
DC POWER SUPPLIES

DC power supplies-classification-switched mode dc power supplies-fly back Converter - forward converter- push pull converter-half bridge converter-Full bridge converter-Resonant dc power supplies-bidirectional dc power supplies-Applications.

UNIT V

AC POWER SUPPLIES

AC power supplies classification-switched mode ac power supplies. Resonant AC power supplies-bi directional ac power supplies-multi stage conversions-control circuits-applications. Introduction-power line disturbances-power conditioners-uninterruptible Power supplies applications.

TEXT BOOKS

1. Power Electronics—Mohammed H.Rashid Pearson Education—Third Edition

REFERENCES

1. Power Electronics—Ned Mohan, Tore M.Undeland and William P. Robbins —John Wiley and Sons Second Edition.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

HVDC TRANSMISSION SYSTEMS
(Professional Elective –II)

Course Code:GR20A3094 **L/T/P/C:3/0/0/3**

III year II semester

COURSE OBJECTIVES
1. Evaluation of technical and economical aspects of HVDC transmission.
2. Development of HVDC converter analysis
3. Focusing on HVDC control
4. Analysis of harmonics and their rectification.
5. Impact of AC system performance on DC system

COURSE OUTCOMES
1. Compare the differences between HVDC and HVAC transmission.
2. Analyze the rectifier and inverter commutating circuits.
3. Discuss the different control strategies.
4. Estimate the requirement of HVDC filters.
5. Explain the role of AC system faults on HVDC system.

UNIT-I
HVDC TRANSMISSION
Introduction, equipment required for HVDC systems, Comparison of AC and DC Transmission, Limitations of HVDC transmission lines, reliability of HVDC systems, comparison of HVDC link with EHVAC link, HVDC convertors, HVDC –VSC transmission System: VSC system components, Control of Active and reactive power, Applications of VSC systems.

UNIT-II
HVDC CONVERTORS OPERATION AND ANALYSIS
Thyristors and their characteristics, silicon rectifiers IGBT's ,HVDC voltage source converters principle and operation , 6 pulse convertor configuration, ideal communication process without gate control, DC output voltage , gate control of valves, analysis of voltage wave forms with overlap angle, analysis of communication circuits , equivalent circuit of rectifier, Inverter operation with overlap, Equivalent circuit of inverter , complete equivalent circuit of HVDC link, power factor and reactive power of converters, analysis of 12 pulse converter, power flow in HVDC links, Power flow and current control , power loss in DC systems, operation and analysis of VSC converters, VSC inverter operation , power flow in VSC-DC transmission, comparison between CSC(classical HVDC) and VSC-HVDC system.

UNIT-III
HVDC CONVERTER CONTROL
AC transmission and its control , necessary of dc link control, rectifier control , inverter control, constant beta control, constant gamma control, compounding of rectifiers, current compounding of inverter , complete HVDC system characteristics , power reversal in DC link, voltage dependent current order limit(VDCOL), system control hierarchy ,individual phase control, cosine control of phase delay, linear control phase delay , equidistance pulse control, pulse frequency control , constant current control, inverter exhibition angle control, constant

power control, control system for HVDC converter ,inverter operation problem, control of VSC converters.

UNIT-IV

HARMONICS IN HVDC SYSTEM

Harmonics due to converter , characteristic current harmonics in the 12 pulse converter , harmonics in VSC converter , harmonic model and equivalent circuit ,design of AC filters , single tuned and double tuned high pass filters , second order filters and C-Type filter, Reactive power considerations of AC filters , Active filters and their applications, filters with VSC-HVDC schemes.

UNIT-V

FAULTS ON AC SIDE OF CONVERTER STATION

3-phase symmetrical fault and asymmetrical faults, commutation failure, DC circuit breaker, AC-DC system interaction short circuit rates and its effects

GROUNDING AND GROUND ELECTRODES

Advantages and Problems with ground return, hvdc systems-grounding, the current field in the earth near an electrode, resistance of electrodes.

TEXT BOOK

1. HVDC transmission by S Kamakshaiah and V Kamaraju, Tata McGraw Hills Publications.

REFERENCES

1. K.R.Padiyar., HVDC Power Transmission System(English) 2nd edition.
2. Arillaga., High Voltage Direct Transmission,(London)Peter Peregrinus, 1981.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED CONTROL SYSTEMS
(Professional Elective –II)

Course Code:GR20A3095 **L/T/P/C:3/0/0/3**
III year II semester

COURSE OBJECTIVES

1. Understand the basics of advanced control systems.
2. Analyze different types of linear and nonlinear systems.
3. Summarize phase-plane analysis of nonlinear control systems.
4. Understand the describing function analysis of nonlinear control systems.
5. Understand the optimal control theory.

COURSE OUTCOMES

1. Design controllers using the concept of state feedback and pole placement tech.
2. Find the stability of Linear and Nonlinear continuous time systems..
3. Relate the concepts of phase-plane analysis to nonlinear control systems.
4. Demonstrate non-linear system behavior by phase plane and describing function methods.
5. Perform the stability analysis of nonlinear systems by lyapunov method develop design skills in optimal control problems.

UNIT – I
STATE FEEDBACK CONTROLLER AND STATE OBSERVERS

Design of state feedback controller using pole placement technique, Ackerman's formula, Stability Improvements by State Feedback, Necessary and Sufficient Conditions for Arbitrary Pole Placement, Design of State Observer, Compensator Design by the Separation Principle.

UNIT –II
NON-LINEAR SYSTEMS ANALYSIS

Introduction, Common Nonlinear System Behaviours, Common Nonlinearities in Control Systems, Fundamentals, Describing Functions of Common Nonlinearities, Stability Analysis by Describing Function Method, Concept of Phase Plane Analysis, Construction of Phase Portraits, System Analysis on the Phase Plane.

UNIT –III
LIAPUNOV STABILITY ANALYSIS

Stability of Equilibrium State in the Sense of Liapunov, Graphical Representation of Stability, Asymptotic Stability and Instability, Sign-Definiteness of Scalar Function, Second Method of Liapunov, Stability Analysis of Linear Systems, Krasovski's Theorem, Liapunov Function Based on Variable Gradient Method

UNIT – IV
DESCRIBING FUNCTION ANALYSIS

Describing Functions for Common Types of Nonlinearities, Describing Function Analysis, Stability and Limit Cycles.

Phase Plane Analysis :

Analytical Methods for constructing Trajectories, Graphical Methods for constructing Trajectories, Isocline Method, Delta Method, Pell's Method, Lienard's Method, Classification of Singular Points, Phase-Plane Analysis of Linear control system, Phase-plane Analysis of Non-linear control system, Minimum Time Trajectory, Optimum Switching Curve.

UNIT – V

OPTIMAL CONTROL THEORY

Introduction, Optimal control problems, Mathematical procedures for optimal control design: Calculus of variations, Pontryagin's optimum policy, Bang-Bang Control, Hamilton-Jacobi Principle.

TEXT BOOKS

1. Advanced Control Systems, B. N. Sarkar, PHI Learning Private Limited.
2. M. Gopal, Control System Principles and Design Tata – McGraw Hill, 1997
3. Nonlinear Systems by Hassan K Khalil , Prentice Hall Publications.

REFERENCES

1. Control Systems theory and applications, S.K Bhattacharya, Pearson.
2. Control Systems, N.C.Jagan, BS Publications.
3. Advanced Control Theory, Somanath Majhi, Cengage Learning.
4. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", Eleventh Edition, Prentice Hall, Pearson Education, 2008

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPERATING SYSTEMS
(Professional Elective –II)

Course Code:GR20A2075 **L/T/P/C:3/0/0/3**
III year II semester

COURSE OBJECTIVES
1. Understand main concepts of OS and to analyze the different CPU scheduling policies.
2. Understand process synchronization and deadlock management.
3. Understand memory management and virtual memory techniques.
4. Appreciate the concepts of storage and file management.
5. Study OS protection and security concepts.

COURSE OUTCOMES
1. Explain different functions and types of operating system and implement various process management concepts for maximization of CPU throughput
2. Analyse synchronization problems and design a deadlock management scheme.
3. Optimize memory management for improved system performance.
4. Demonstrate disk management, implement disk scheduling and file system interface
5. Describe and frame protection and security policy for OS.

UNIT I
OPERATING SYSTEM OVERVIEW: Objectives and functions, Computer System Architecture, Evolution of Operating Systems, System Services, System Calls, System Programs, OS Structure, Virtual machines.
PROCESS MANAGEMENT: Process concepts, CPU scheduling-criteria, algorithms with evaluation, Preemptive / Non-Preemptive Scheduling, Threads, Multithreading Models.

UNIT II
CONCURRENCY: Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors.
DEADLOCKS: Principles of deadlock–system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock.

UNIT III
MEMORY MANAGEMENT: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation.
VIRTUAL MEMORY: Demand paging, page replacement algorithms, Allocation of Frames, Thrashing.

UNIT IV
MASS-STORAGE STRUCTURE: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, swap-space management.
FILE SYSTEM IMPLEMENTATION: Access Methods, File system structure, file system implementation, directory implementation, allocation methods, free-space management.

UNIT V

PROTECTION: Goals and Principles of Protection, Implementation of Access Matrix, Access control, Revocation of Access Rights.

SECURITY: The Security problem, program threats, system and network threats, implementing security defenses.

TEXT BOOKS

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
3. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
4. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley.

REFERENCES

1. Modern Operating Systems, Andrew S Tanenbaum 3rd Edition PHI.
2. Operating Systems, R. Elmasri, A. G. Carrick and D. Levine, Mc Graw Hill.
3. Operating Systems in depth, T. W. Doeppner, Wiley.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MACHINE LEARNING
(Open Elective –II)

Course Code:GR20A3123 **L/T/P/C:3/0/0/3**
III year II semester

COURSE OBJECTIVES

1. Recognize the basic terminology and fundamental concepts of machine learning.
2. Understand the concepts of Supervised Learning models with a focus on recent advancements.
3. Relate the Concepts of Neural Networks Models of supervised Learning
4. Discover Unsupervised learning paradigms of machine learning
5. Understand the concepts of Reinforcement learning and Ensemble methods

COURSE OUTCOMES

1. Explain the concepts and able to prepare the dataset for different Machine learning models..
2. Identify and Apply appropriate Supervised Learning models.
3. Design Neural Network models for the given data.
4. Perform Evaluation of Machine Learning algorithms and ModelSelection.
5. Devise un-supervised Reinforcement learning model .

UNIT-I
INTRODUCTION
Introduction to Machine learning, Supervised learning, Unsupervised learning, Reinforcement learning. Deep learning.
Feature Selection: Filter, Wrapper, Embedded methods.
Feature Normalization:- min-max normalization, z-score normalization, and constant factor normalization
Dimensionality Reduction : Principal Component Analysis(PCA), Linear Discriminant Analysis(LDA)

UNIT-II
SUPERVISED LEARNING – I (REGRESSION/CLASSIFICATION)
Regression models: Simple Linear Regression, multiple linear Regression. Cost Function, Gradient Descent, Performance Metrics: Mean Absolute Error(MAE),Mean Squared Error(MSE)
R-Squared error, Adjusted R Square.
Classification models: Decision Trees-ID3,CART, Naive Bayes, K-Nearest-Neighbours (KNN), Logistic Regression, Multinomial Logistic Regression
Support Vector Machines (SVM) - Nonlinearity and Kernel Methods

UNIT-III
SUPERVISED LEARNING – II (NEURAL NETWORKS)
Neural Network Representation – Problems – Perceptrons , Activation Functions, Artificial Neural Networks (ANN) , Back Propagation Algorithm.
Convolutional Neural Networks - Convolution and Pooling layers, , Recurrent Neural Networks (RNN).

Classification Metrics: Confusion matrix, Precision, Recall, Accuracy, F-Score

UNIT-IV

MODEL VALIDATION IN CLASSIFICATION

Cross Validation - Holdout Method, K-Fold, Stratified K-Fold, Leave-One-Out Cross Validation.

Bias-Variance tradeoff, Regularization , Overfitting, Underfitting.

Ensemble Methods: Boosting, Bagging, Random Forest.

UNIT-V

UNSUPERVISED LEARNING

Clustering-K-means, K-Modes, K-Prototypes, Gaussian Mixture Models, Expectation-Maximization.

Reinforcement Learning: Exploration and exploitation trade-offs, non-associative learning, Markov decision processes, Q-learning.

TEXT BOOKS

1. Machine Learning – Tom M. Mitchell, -MGH
2. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press,2012
3. R. S. Sutton and A. G. Barto. Reinforcement Learning - An Introduction. MIT Press.1998.

REFERENCES

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer2009
2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer,2007.
3. Machine Learning Yearning, AndrewNg.
4. Data Mining–Concepts and Techniques -Jiawei Han and Micheline Kamber,Morgan Kaufmann

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
POWER SYSTEM ANALYSIS LAB

Course Code:GR20A3096 **L/T/P/C:0/0/3/1.5**
III year II semester

COURSE OBJECTIVES

1. Compute different power system parameters
2. Analyse various load flow solutions
3. Outline distinct types of faults and its protection
4. Perform load flow, short circuit and transient stability analysis
5. Generalise power system problems and its solutions

COURSE OUTCOMES

1. Mathematically model various parameters in power system
2.To solve different load flow problems
3. Summarise different protection scheme for the faults
4. Formulate the different algorithms for load flows and stability problems
5. To develop and design solutions for power system problems

LIST OF EXPERIMENTS

1.Computation of line parameters
2.Formation of bus Admittance matrix
3. a) Load Flow solution using Newton Raphson method in polar coordinates
b)Load Flow solution using Newton Raphson method in Rectangular coordinates
4. Unsymmetrical fault Analysis: LG, LL, LLG Fault
5. Z–Bus Building Algorithm
6. a)Obtain Symmetrical Components of a set of Unbalanced currents.
b)Obtain the original Unbalanced phase voltages from Symmetrical Components
7. Zones Protection
8. Short circuit analysis
9. Tripping sequence of protective devices
10. Transient Stability analysis
11. Power flow solution of power system model

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SENSORS MEASUREMENTS AND INSTRUMENTATION LAB

Course Code: GR20A3097 **L/T/P/C:0/0/3/1.5**
III year II semester

COURSE OBJECTIVES

1. To introduce the concepts and phenomenon of various types of sensors and Instrumentation
2. To demonstrate the designing and conducting experiments on sensors, to analyze and interpret data using basic programs.
3. To demonstrate various types of bridges for measurement of resistance, inductance capacitance etc. and their hardware set ups.
4. To provide students with the scientific necessary skills to create an instrumentation line with various actuators
5. To gain knowledge about the measuring instruments, the methods of measurement and the use of different transducers

COURSE OUTCOMES

1. Measure common physical and electrical quantities using common sensors available
2. Construct basic programs for computer-controlled data acquisition, measurement and transfer of data across the sensor network for different types of sensors.
3. Establish competence in laboratory reporting in addition to the proper instrumentation of test systems and appropriate capture and interpretation of experimental test data.
4. Apply the statistics and uncertainty analysis and analyze the dynamic response using measuring instruments like DSO and Function Generator and record measuring data
5. Define various types of bridges in measurements, analyze and process the obtained measures

List of Experiments

Task-1: Voltage and Current Detection Circuitry

Task-2: Temperature and Pressure and Humidity Detection Circuitry

Task-3: Measure one-cycle data of a periodic waveform from a DSO and use values to compute the RMS value

Task-4: Position by LVDT/ Pot

Task-5: Distance(Ultrasonic) sensor

Task-6: Light sensor

Task-7: Rainfall sensor& Soil moisture sensor

Task-8: Measurement of Power and Energy

Task-9: Accelerometer sensor

Task-10: Measurement of Resistance by bridges

Task-11: Measurement of Inductance by bridges

Task-12: Measurement of Capacitance by bridges

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MINI PROJECT WITH SEMINAR

Course Code:GR20A3141 **L/T/P/C: 0/0/4/2**

III Year II Semester

Course Objectives:

1. Demonstrate a wide range of skills learned to deliver a project.
2. Encourage multidisciplinary research through the integration learned.
3. Develop problem solving, analysis, synthesis and evaluation skills.
4. Encourage teamwork.
5. Improve communication and presentation skills during project work.

Course Outcomes:

1. Formulate hypothesis for the problem statement with sound technical knowledge from selected project domain.
2. Design Engineering Solution to the problem statement with systematic approach.
3. Analyse and develop an efficient solution for implementation of the project.
4. Apply the theoretical concepts while providing solution to the problem statement with teamwork and multidisciplinary approach.
5. Demonstrate professionalism with ethics while preparing and presenting the project work.