IV YEAR **I SEMESTER**

S. No.	Subject	T	P	Credits
1	Computer Organization	4	-	4
2	High Voltage Engineering	4	-	4
3	Switch Gear & Protection	4	-	4
4	Power System Operation & Control	4	-	4
5	Open Elective	4	-	4
6	Elective – I	4	-	4
7	Microprocessors & Microcontrollers Lab	-	3	2
8	Electrical Simulation Lab	-	3	2
	Total			**28**

IV YEAR **II SEMESTER**

S. No.	Subject	T	P	Credits
1	Digital Control Systems	4	-	4
2	Elective – II	4	-	4
3	Elective – III	4	-	4
4	Elective – IV	4	-	4
5	Project	-	-	12
	Total			**28**

Open Elective:

1. Energy Audit, Conservation and Management (for all branches)
2. Instrumentation (for all branches)
3. Non Conventional Sources of Energy (except EEE branch students)
4. Optimization Techniques (except EEE branch students)

Elective – I:

1. VLSI Design
2. Electrical Distribution Systems
3. Optimization Techniques

Elective – II:

1. Advanced Control Systems
2. Extra High Voltage Transmission
3. Special Electrical Machines

Elective – III:

1. Non Conventional Sources of Energy
2. Digital Signal Processing
3. FACTS: Flexible Alternating Current Transmission Systems.

Elective-IV:

1. OOPS through Java
2. UNIX and Shell Programming
3. AI Techniques

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

COMPUTER ORGANIZATION

Objective:

Is to acquaint budding engineers with the basic principles of organization, operation and performance of modern-day computer systems. It covers all aspects of computer technology, from the underlying integrated circuit technology used to construct computer components, to the use of parallel organization concepts in combining those components.

UNIT-I:

Basic Structure of Computers

Computer Types, Functional unit, Basic Operational concepts, Bus structures, Software, Performance, Data Representation. Fixed point representation. Floating – Point Representation, Floating – Point arithmetic Operations.

UNIT-II:

Register Transfer Language and Micro operations

Register Transfer language, Register Transfer Bus and memory transfers, Arithmetic Micro operations, Logic micro operations, shift micro operations, Arithmetic logic shift unit, Instruction codes. Computer Registers-Computer instructions – Instruction cycle.

UNIT–III:

Instructions and Addressing Modes

Memory–Reference Instructions, Input–Output instructions, Data transfer and manipulation, Program control instructions. Stack organization, Instruction formats, Addressing modes. Reduced Instruction set computer.

UNIT-IV:

Micro Programmed Control

Control memory, Address sequencing, micro program example, design of control unit, Hard wired control, Micro programmed control.

UNIT-V:

The Memory System

Memory hierarchy, Basic concepts semiconductor RAM memories, Read-only memories, Cache memories, performance considerations, Virtual memories, secondary storage.

UNIT-VI: Input-Output Organization

Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access.

UNIT-VII:

Pipeline and Vector Processing

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

UNIT-VIII:

Multi Processors

Characteristics or Multiprocessors, Interconnection Structures-Time shared common bus, Multiport memory, Crossbar switch, Multistage switching network, Hypercube interconnection, Interprocessor Arbitration. Shared Memory Multiprocessors.

TEXT BOOKS:

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, PHI/ Pearson.
2. Computer Organization and Architecture by V.Rajaraman and T.Radhakrishnan, PHI Publications.

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings Sixth Edition, PHI/Pearson.
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson.
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int.Edition.
4. Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

HIGH VOLTAGE ENGINEERING

Objective:

This subject deals with the detailed analysis of Breakdown occur in gaseous, liquids and solid dielectrics. Information about generation and measurement of High voltage and current. In addition the High voltage testing methods are also discussed.

UNIT-I:

Introduction to High Voltage Technology

Electric Field Stresses, Gas Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control.

UNIT-II:

Break down phenomenon in gaseous and liquid dielectrics

Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids.

UNIT-III:

Break down phenomenon in solid dielectrics and applications of insulating materials

Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice. Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

UNIT-IV:

Generation of high voltages and High currents

Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

UNIT-V:

Measurement of high voltages and High currents

Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse,

UNIT-VI:

Non-distractive testing of material and electrical apparatus

Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.

UNIT-VII:

High voltage testing of electrical apparatus

Testing of Insulators and bushings, Testing of Isolators and circuit breakers, Testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements.

UNIT VIII:

Industrial Applications to High Voltage Engineering

Electro Static applications – Electro static precipitator, Electro static separator, Electro static coating, Electro Static copying, pulsed power.

TEXT BOOKS:

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition
2. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition.
3. High Voltage Engineering and Technology by Ryan, IET Publishers.

REFERENCE BOOKS:

1. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
2. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New Age International (P)Limited,1995.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

SWITCH GEAR AND PROTECTION

Objective:

This course introduces all varieties of Circuit Breakers and Relays for protection of Generators, Transformers and feeder bus bars from over voltages and other hazards. It emphasizes on Neutral grounding for overall protection.

UNIT–I:

Circuit Breakers-1

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages.- Restriking Phenomenon, Average and Max. RRRV - Current Chopping and Resistance Switching - CB ratings and Specifications : – Auto reclosures.

UNIT–II:

Circuit Breakers-2

Description and Operation of Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT–III:

Electromagnetic Protection

Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays.

Relays Classification: Instantaneous, DMT and IDMT types.

Application of relays: Over current/ Under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays.

Universal torque equation; Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison.

UNIT–IV:

Generator Protection

Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.

UNIT–V:

Transformer Protection

Protection of transformers: Percentage Differential Protection. Numerical Problem on Design of CT's Ratio, Buchholtz relay Protection.

UNIT–VI:

Feeder and Bus-Bar Protection

Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay.

Protection of Bus bars – Differential protection.

UNIT–VII:

Static and Digital Relays

Static Relays: Static relay components, static over current relay, static distance relay microprocessor based digital Relays:

UNIT–VIII:

Protection against over voltage and grounding

Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics. Grounded and Ungrounded Neutral Systems.- Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices.

TEXT BOOKS:

1. Switchgear and Protection – by Sunil S Rao, Khanna Publlishers
2. Power System Protection and Switchgear by Badari Ram, D.N Viswakarma, TMH Publications

REFERENCE BOOKS:

1. Fundamentals of Power System Protection by Paithankar and S.R.Bhide.,PHI, 2003.
2. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd.
3. Electrical Power Systems – by C.L.Wadhwa, New Age international (P) Limited, Publishers, 3nd editon
4. A Text book on Power System Engineering by B.L.Soni, Gupta, Bhatnagar, Chakrabarthy, DhanpatRai&o.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

POWER SYSTEM OPERATION AND CONTROL

Objective:

This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

UNIT–I:

Economic Operation of Power Systems-1

Optimal operation of Generators in Thermal Power Stations, - heat rate Curve – Cost Curve – Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation with line losses neglected.

UNIT–II:

Economic Operation of Power Systems-2

Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

UNIT–III:

Hydrothermal Scheduling

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, scheduling problems- Short term Hydrothermal scheduling problem.

UNIT–IV:

Unit Commitment

Optimal unit commitment problem – Need for unit commitment – constraints in unit commitment – cost function formulation – solution methods – dynamic programming.

UNIT–V:

Single Area Load Frequency Control

Modeling of steam turbine, generator, mathematical modeling of speed governing system – Transfer function, modeling of Hydro turbine. Necessity of keeping frequency constant. Definitions of Control area – Single area

control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case.

UNIT–VI:

Two-Area Load Frequency Control

Load frequency control of two area system – uncontrolled case and controlled case, tie-line bias control

UNIT-VII:

Load Frequency Controllers

Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control.

UNIT–VIII:

Reactive Power Control

Overview of Reactive Power control – Reactive Power compensation in transmission systems –advantages and disadvantages of different types of compensating equipment for transmission systems; load compensation – Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation, introduction to flexible alternating current transmission system (FACTS).

TEXT BOOKS:

1. Power System stability & control, Prabha Kundur
2. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari Tata Mc Graw – Hill Publishing Company Ltd, 2nd edition.

REFERENCE BOOKS:

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma., THOMPSON, 3rd Edition.
2. Electric Energy systems Theory – by O.I.Elgerd, Tata Mc Graw-hill Publishing Company Ltd., Second edition.
3. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
4. Power System Analysis by Hadi Saadat – TMH Edition.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

VLSI DESIGN
(Elective -I)

UNIT I

INTRODUCTION : Introduction to IC Technology, The IC Era, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, IC production process, MOS and CMOS Fabrication processes,BiCMOS Technology, Comparison between CMOS and Bipolar technologies.

UNIT II

BASIC ELECTRICAL PROPERTIES of MOS and BiCMOS Circuits: I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans- conductance and Output Conductance, MOS transistor Figure of Merit, The Pass transistor, The nMOS Inverter, Determination of Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter and for an nMOS inverter driven through one or more pass transistors, Alternative forms of pull-up, The CMOS Inverter, MOS transistor circuit model, Bi-CMOS Inverter, Latch-up in CMOS circuits and BiCMOS Latch-up Susceptibility.

UNIT III

MOS and BiCMOS CIRCUIT DESIGN PROCESSES: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2µm Double Metal, Double Poly, CMOS/BiCMOS rules, 1.2µm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask Form.

UNIT IV

BASIC CIRCUIT CONCEPTS: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers,

Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances, Fan-in and fan-out characteristics, Choice of layers, Transistor switches, Realization of gates using nMOS, pMOS and CMOS technologies.

UNIT V

SCALING OF MOS CIRCUITS: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to subthreshold currents, Limits on logic levels and supply voltage due to noise, Limits due to current density, Some architectural Issues, Introduction to Switch Logic and Gate Logic

UNIT VI

SEMICONDUCTOR INTEGRATED CIRCUIT DESIGN: Introduction to Programmable Logic Devices (PLDs), Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Implementation approaches in VLSI Design- Full Custom Design, Semicustom Design, Gate Arrays, Standard Cells, Complex Programmable Logic Devices (CPLDs), Field Programmable Gate Arrays(FPGAs), Design Issues.

UNIT VII

DIGITAL DESIGN USING HDL: Digital system design process, VLSI Circuit Design Process, Hardware Simulation, Hardware Synthesis, History of VHDL, VHDL requirements, Levels of Abstraction, Elements of VHDL, Packages, Libraries and Bindings, Objects and Classes, Variable assignments, Sequential statements, Usage of subprograms, Comparison of VHDL and Verilog HDL.

UNIT VIII

VHDL MODELLING : Simulation, Logic Synthesis, Inside a logic Synthesizer, Constraints, Technology Libraries, VHDL and Logic Synthesis, Functional Gate-Level verification, Place and Route, Post Layout Timing Simulation, Static Timing, Major Netlist formats for design representation, VHDL Synthesis-Programming Approach.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems - Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
2. VLSI Design-A.Shanthi and A.Kavita, New Age International Private Limited, 2006 First Edition.
3. VLSI Design-K.Lal Kishore and V.S.V.Prabhakar,I.K.International Publishing House Private Limited, 2009 First Edition.

REFERENCES:

1. VLSI Design By Debaprasad Das,Oxford University Press,2010.
2. VLSI Design By A.Albert Raj & T.Latha,PHI Learning Private Limited,2010.
3. Principles of VLSI and CMOS Integrated Circuits By Richa Jain & Amrita Rai, S.Chand & Company Limited,First Edition,2012.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

ELECTRICAL DISTRIBUTION SYSTEMS

(ELECTIVE-I)

UNIT – I:

General Concepts

Introduction to distribution systems, Load modeling and characteristics. Coincidence factor, contribution factor loss factor - Relationship between the load factor and loss factor. Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

UNIT – II:

Distribution Feeders

Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system.

UNIT – III:

Substations

Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT – IV:

System Analysis

Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT – V:

Protection

Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, line sectionalizes, and circuit breakers

UNIT – VI:

Coordination

Coordination of Protective Devices: General coordination procedure, residual current circuit breaker RCCB (Wikipedia).

UNIT – VII:

Compensation for Power Factor Improvement

Capacitive compensation for power-factor control. Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), Power factor correction, capacitor allocation - Economic justification - Procedure to determine the best capacitor location.

UNIT – VIII:

Voltage Control

Voltage Control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

TEXT BOOK:

1. "Electric Power Distribution system, Engineering" – by Turan Gonen, Mc Graw-hill Book Company.

REFERENCE BOOKS:

1. Electric Power Distribution – by A.S. Pabla, Tata Mc Graw-hill Publishing company, 4th edition, 1997.
2. Electrical Power Distribution Systems by V.Kamaraju, Right Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

OPTIMIZATION TECHNIQUES

(ELECTIVE-I)

UNIT – I:

Introduction to Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

UNIT – II:

Classical Optimization Techniques

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – III:

Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

UNIT – IV:

Transportation Problem

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method + testing for optimality of balanced transportation problems.

UNIT – V:

Unconstrained Nonlinear Programming:

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

UNIT – VI:

Unconstrained Optimization Techniques

Univariate method, Powell's method and steepest descent method.

UNIT – VII:

Constrained Nonlinear Programming:

Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT – VIII:

Dynamic Programming:

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

TEXT BOOKS:

1. "Engineering optimization: Theory and practice"-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research" by H.S. Kasene & K.D. Kumar, Springer(India), Pvt .LTd.

REFERENCE BOOKS:

1. "Optimization Methods in Operations Research and systems Analysis" – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – by Dr. S.D.Sharma.
3. "Operations Research: An Introduction" – by H.A. Taha, PHI Pvt. Ltd., 6th edition
4. Linear Programming – by G. Hadley.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

MICROPROCESSORS AND MICROCONTROLLERS LAB

Any 8 of the following are to be conducted

I. Microprocessor 8086:

Introduction to MASM/TASM.

1. Arithmetic operation – Multi byte addition and subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
4. Modular Program: Procedure, Near and Far implementation, Recursion.
5. Dos/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.
6. Interfacing 8255-PPI
7. Programs using special instructions like swap, bit/byte, set/reset etc.
8. Programs based on short, page, absolute addressing.
9. Interfacing 8259 – Interrupt Controller.
10. Interfacing 8279 – Keyboard Display.

Any 2 of the following experiments are to be conducted :

Microcontroller 8051

11. Reading and Writing on a parallel port.
12. Timer in different modes.
13. Serial communication implementation.
14. Understanding three memory areas of 00 – FF (Programs using above areas) Using external interrupts.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

ELECTRICAL SIMULATION LAB

Following experiments are required to be conducted:

1. Simulation of transient response of RLC circuits
   a. Response to pulse input
   b. Response to step input
   c. Response to sinusoidal input
2. Analysis of three phase circuit representing the generator transmission line and load. Plot three phase currents & neutral current using PSPICE.
3. Simulation of single-phase full converter using RL & E loads and single phase AC voltage controller using RL & E loads
4. Plotting of Bode plots, root locus and Nyquist plots for the transfer functions of systems up to 5th order
5. Power flow solution of Power System
6. Modelling of transformer and simulation of lossy transmission line.
7. Simulation of Op-Amp based Integrator & Differentiator circuits.
8. Transfer function analysis of a given circuit.

Any 2 of the following experiments are to be conducted :

1. Simulation of Resonant pulse commutation circuit and Buck chopper.
2. Simulation of single phase inverter with PWM control.
3. Dynamic stability analysis of Power Systems
4. Switching Transients.

REFERENCE BOOKS:

1. Pspice for circuits and electronics using PSPICE – by M.H.Rashid, M/s PHI Publications
2. Pspice A/D user's manual – Microsim, USA
3. Pspice reference guide – Microsim, USA
4. MATLAB user's manual – Mathworks, USA
5. MATLAB - control system tool box – Mathworks, USA
6. SIMULINK user's manual – Mathworks, USA
7. EMTP User's Manual

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

ENERGY AUDIT, CONSERVATION & MANAGEMENT

(Open Elective)

Unit-I:

Basic Principles of Energy Audit

Energy audit- definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes, and energy saving potential.

Unit-II:

Energy Management

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting, Energy manager, Qualities and functions, language, Questionnaire - check list for top management.

Unit-III:

Lighting

Modification of existing systems-Replacement of existing systems-priorities: Definition of terms and units, luminous efficiency - Polar curve - Calculation of illumination level - Illumination of inclined surface to beam - Luminance or brightness - Types of lamps - Types of lighting - Electric lighting fittings (luminaries) - Flood lighting - White light LED and conducting Polymers - Energy conservation measures.

Unit-IV:

Power Factor

Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on p.f., motor controllers

Unit-V:

Energy Instruments

Energy Instruments- watt-hour meter, data loggers, thermocouples, pyrometers, lux meters, tong testers, Power analyzer.

Unit-VI:

Space Heating and Ventilation

Ventilation, Air-Conditioning (HVAC) and Water Heating: Introduction-Heating of buildings-Transfer of Heat-Space heating methods-Ventilation and air-conditioning-Insulation-Cooling load-Electric water heating systems-Energy conservation methods.

Unit-VII:

Economic Aspects and Analysis

Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Energy efficient motors (basic concepts).

Unit-VIII:

Computation of Economic Aspects

Calculation of simple payback method, net present worth method- Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.

TEXT BOOKS:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995-
3. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.

REFERENCE BOOKS:

1. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998
2. Energy management hand book by W.C.Turner, John wiley and sons
3. Energy management and good lighting practice : fuel efficiency-booklet12-EEO

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

INSTRUMENTATION

(Open Elective)

Objective:

Instrumentation is essential in monitoring and analysis of any Physical system and its control. This course deals with different types of transducers, digital voltmeters, oscilloscopes and measurement of non electrical quantities.

UNIT-I:

Characteristics of Signals

Measuring Systems, Performance Characteristics, - Static characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors.

UNIT-II:

Signals and their representation

Signal and their representation: Standard Test, periodic, aperiodic, modulated signal, sampled data, pulse modulation and pulse code modulation

UNIT-III:

Transducers

Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of resistor, inductor, LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, guage factor, Thermistors, Thermocouples, Synchros, Piezo electric transducers, photo diodes.

UNIT-IV:

Digital Voltmeters

Digital voltmeters- Successive approximation, ramp, dual-Slope integration continuous balance type-Micro processor based ramp type DVM digital frequency meter-digital phase angle meter-

UNIT-V:

Oscilloscope

Cathode ray oscilloscope-time base generator-horizantal and vertical amplifiers- Measurement of phase and frequency-lissajous patterns-Sampling oscilloscope-analog and digital type data loger, transient recorder.

UNIT-VI:

Signal Analyzers

Wave Analyzers- Frequency selective analyzers, Heterodyne, Application of Wave analyzers- Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, spectral displays, vector impedance meter, Q meter. Peak reading and RMS voltmeters

UNIT-VII:

Measurement of Non-Electrical Quantities-I

Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force,Torque.

UNIT-VIII:

Measurement of Non-Electrical Quantities-II

Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

TEXT BOOKS:

1. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpatrai & Co.

REFERENCE BOOKS:

1. Measurements Systems, Applications and Design – by D O Doeblin
2. Principles of Measurement and Instrumentation – by A.S Morris, Pearson /Prentice Hall of India
3. Electronic Instrumentation-by H.S.Kalsi Tata MCGraw-Hill Edition, 1995.
4. Modern Electronic Instrumentation and Measurement techniques – by A.D Helfrick and W.D.Cooper, Pearson/Prentice Hall of India.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

NON–CONVENTIONAL SOURCES OF ENERGY

(Open Elective)

Objective:

It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, Geothermal energy and ocean energy as alternative energy sources.

UNIT–I:

Principles of Solar Radiation:

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II:

Solar Energy Collection:

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT-III:

Solar Energy Storage and Applications:

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-IV:

Wind Energy:

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

UNIT-V:

Bio-Mass:

Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-

gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-VI:

Geothermal Energy:

Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT-VII:

Ocean Energy:

OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-VIII:

Direct Energy Conversion:

Need for Direct Energy Conversion, Carnot cycle, limitations, principles of Direct Energy Conversion. Power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

1. Non-Conventional Energy Sources /G.D. Rai
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa

REFERENCE BOOKS:

1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
3. Non-Conventional Energy Systems / K Mittal /Wheeler
4. Solar Energy /Sukhame.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – I Sem.

OPTIMIZATION TECHNIQUES

(Open Elective)

UNIT – I:

Introduction and Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

UNIT – II:

Classical Optimization Techniques

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – III:

Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

UNIT – IV:

Transportation Problem

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

UNIT – V:

Unconstrained Nonlinear Programming:

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

UNIT – VI:

Unconstrained Optimization Techniques

Univariate method, Powell's method and steepest descent method.

UNIT – VII:

Constrained Nonlinear Programming:

Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT – VIII:

Dynamic Programming:

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

TEXT BOOKS:

1. "Engineering optimization: Theory and practice"-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research" by H.S. Kasene & K.D. Kumar, Springer(India), Pvt .LTd.

REFERENCE BOOKS:

1. "Optimization Methods in Operations Research and systems Analysis" – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – by Dr. S.D.Sharma.
3. "Operations Research: An Introduction" – by H.A. Taha, PHI Pvt. Ltd., 6th edition
4. Linear Programming–by G.Hadley.

IV YEAR **II SEMESTER**

S. No.	Subject	T	P	Credits
1	Digital Control Systems	4	-	4
2	Elective – II	4	-	4
3	Elective – III	4	-	4
4	Elective – IV	4	-	4
5	Project	-	-	12
	Total			**28**

Open Elective:

1. Energy Audit, Conservation and Management (for all branches)
2. Instrumentation (for all branches)
3. Non Conventional Sources of Energy (except EEE branch students)
4. Optimization Techniques (except EEE branch students)

Elective – I:

1. VLSI Design
2. Electrical Distribution Systems
3. Optimization Techniques

Elective – II:

1. Advanced Control Systems
2. Extra High Voltage Transmission
3. Special Electrical Machines

Elective – III:

1. Non Conventional Sources of Energy
2. Digital Signal Processing
3. FACTS: Flexible Alternating Current Transmission Systems.

Elective-IV:

1. OOPS through Java
2. UNIX and Shell Programming
3. AI Techniques

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – II Sem.

DIGITAL CONTROL SYSTEMS

UNIT – I:

Introduction to signals

Introduction of continuous and discrete time signals, shifting and scaling operator, periodic and nonperiodic signals, linear time invariant and causal systems

UNIT-II:

Introduction to z-transforms

Z-Transform and theorems, finding inverse and method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

UNIT-III:

Sampling and reconstruction

Introduction, sampling theorem, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

UNIT – IV:

State space analysis

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations

UNIT – V:

Controllability and observability

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability. Controllability and Observability conditions for Pulse Transfer Function

UNIT – VI:

Stability analysis

Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stablility test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT – VII:

Design of discrete time control system by conventional methods

Transient and steady – State response Analysis – Design based on the frequency response method –Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

UNIT – VIII:

State feedback controllers and observers

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.

TEXT BOOK:

1. Discrete-Time Control systems – K. Ogata, Pearson Education/PHI, 2nd Edition

REFERENCE BOOKS:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control and State Variable Methods by M.Gopal, TMH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – II Sem.

ADVANCED CONTROL SYSTEMS

(ELECTIVE – II)

Objective:

This subject deals with state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

UNIT – I:

State space analysis

State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms –Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.

UNIT – II:

Controllability and observability

Tests for controllability and observability for continuous time systems – Time varying case, minimum energy control, time invariant case, Principle of Duality, Controllability and observability form Jordan canonical form and other canonical forms.

UNIT – III:

Multi input multi output(MIMO) system

Models of MIMO system, matrix representation, transfer function representation, poles and zeros, decoupling, introduction to multi variable Nyquist plot and singular values analysis

UNIT – IV:

Describing function analysis

Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase-plane analysis.

UNIT-V:

Stability analysis

Stability in the sense of Lyapunov, Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

UNIT – VI:

Modal control

Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement.

UNIT-VII:

Calculus of variations

Minimization of functionals of single function, Constrained minimization. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrangine Equation.

UNIT – VIII:

Optimal control

Linear quadratic optimal regulator (LQR) problem formulation, optimal regulator design by parameter adjustment (Lyapunov method), optimal regulator design by continuous time algebraic riccatti equation (CARE), optimal controller design using LQG framework.

TEXT BOOKS:

1. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998
2. Automatic Control Systems by B.C. Kuo, Prentice Hall Publication.

REFERENCE BOOKS:

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996
2. Control Systems Engineering by I.J. Nagarath and M.Gopal, New Age International (P) Ltd.
3. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw-Hill Companies, 1997.
4. Systems and Control by Stainslaw H. Zak , Oxford Press, 2003.
5. Optimal control theory: an Introduction by Donald E.Kirk by Dover publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – II Sem.

EXTRA HIGH VOLTAGE TRANSMISSION

(Elective-II)

Unit – I:

Preliminaries:

Necessity of EHV AC transmission – advantages and problems–power handling capacity and line losses mechanical considerations – resistance of conductors – properties of bundled conductors – bundle spacing and bundle radius- Examples.

Unit – II:

Voltage gradients of conductors:

Electrostatics – field of sphere gap – field of line changes and properties – charge – potential relations for multi-conductors – surface voltage gradient on conductors – distribution of voltage gradient on subconductors of bundle – Examples.

Unit – III:

Corona effects – I:

Power loss and audible noise (AN) – corona loss formulae – charge voltage diagram – generation, characteristics – limits and measurements of AN – relation between 1-phase and 3-phase AN levels – Examples.

Unit – IV:

Corona effects – II:

Radio interference (RI) - corona pulses generation, properties, limits – frequency spectrum – modes of propagation – excitation function – measurement of RI, RIV and excitation functions – Examples.

UNIT – V:

Basic Concepts of DC Transmission

Economics & Terminal equipment of HVDC transmission systems: Types of HVDC Links – Apparatus required for VDC Systems – Comparison of AC &DC Transmission, Application of DC Transmission System – Planning & Modern trends in D.C. Transmission.

UNIT – VI:

Analysis of HVDC Converters and System Control

Choice of Converter configuration – analysis of Graetz – characteristics of 6 Pulse & 12 Pulse converters –Cases of two 3 phase converters in star –star mode – their performance. Principal of DC Link Control – Converters Control Characteristics – Firing angle control – Current and extinction angle control – Effect of source inductance on the system; Starting and stopping of DC link; Power Control.

UNIT-VII:

Reactive Power Control in HVDC

Reactive Power Requirements in steady state-Conventional control strategies-Alternate control strategies sources of reactive power-AC Filters – shunt capacitors-synchronous condensers.

UNIT – VIII:

Harmonics and Filters

Generation of Harmonics, Characteristics harmonics, calculation of AC Harmonics, Non- Characteristics harmonics, adverse effects of harmonics – Calculation of voltage & Current harmonics – Effect of Pulse number on harmonics. Types of AC filters, Design of Single tuned filters –Design of High pass filters.

TEXT BOOKS:

1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (p) Ltd.
2. HVDC Transmission – J.Arrillaga.
3. Direct Current Transmission – by E.W.Kimbark, John Wiley & Sons.

REFERENCE BOOKS:

1. HVDC Power Transmission Systems: Technology and system Interactions – by K.R.Padiyar, New Age International (P) Limited, and Publishers.
2. EHVAC and HVDC Transmission Engineering and Practice – S.Rao.
3. Power Transmission by Direct Current – by E.Uhlmann, B.S.Publications
4. HVAC and DC Transmission by S. Rao.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – II Sem.

SPECIAL ELECTRICAL MACHINES

(Elective – II)

Unit I:

Switched Reluctance Motor

Principle of operation, design of stator and rotor pole arc, Power Converter for switched reluctance motor.

Unit II:

Stepper Motors

Construction, principle of operation, theory of torque production, hybrid stepping motor, variable reluctance stepping motor.

Unit III:

Brushless DC Motor

Construction, principle of operation, theory of brushless DC Motor as variable speed synchronous motor.

Unit IV:

Linear Induction Motor

Construction, principle of operation, application of linear induction drive for electric traction.

Unit V:

Permanent Magnet Motors

Hysteresis loop, Permanent Magnet DC Motors, equivalent circuit, electrically commutated DC Motor.

Unit VI:

Control of special Machines – I

Stepper motors (open loop control, closed loop control). Characteristics of stepper motor in open-loop drive. Comparison of open loop and closed loop systems.

Unit VII:

Control of special Machines – II

Control of switched reluctance motor for fraction type load. Control of brushless dc motor, rotor position sensing and switching logic for brushless dc motor.

Unit VIII:

Electric Motors for traction drives

AC motors, DC motors, single sided linear induction motor for traction drives, Comparison of AC and DC traction.

TEXT BOOKS:

1. Special electrical Machines, K.Venkata Ratnam, University press, 2009, New Delhi.
2. Brushless Permanent magnet & reluctance motor drives, clarenden press, T.J.E. Miller, 1989, Oxford.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – II Sem.

NON–CONVENTIONAL SOURCES OF ENERGY

(ELECTIVE-III)

Objective:

It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, Geothermal energy and ocean energy as alternative energy sources.

UNIT – I:

Principles of Solar Radiation:

Physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II:

Solar Energy Utilization.

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors, solar applications- solar heating/cooling technique, photovoltaic energy conversion.

UNIT-III:

Wind Energy:

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

UNIT-IV:

Maximum Power Extraction.

Maximum power point tracking for wind and photovoltaic power systems, battery energy storage system.

UNIT-V:

Bio-Mass:

Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-

gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-VI:

Geothermal Energy:

Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT-VII:

Ocean Energy:

Ocean thermal energy conversion, Principles utilization, setting of Ocean thermal energy conversion plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-VIII:

Direct Energy Conversion:

Need for Direct energy conversion, Carnot cycle, limitations, principles of Direct energy conversion. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

1. Non-Conventional Energy Sources /G.D. Rai
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa

REFERENCE BOOKS:

1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
3. Non-Conventional Energy Systems / K Mittal /Wheeler
4. Solar Energy /Sukhatme / TMH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – II Sem.

DIGITAL SIGNAL PROCESSING

(Elective – III)

UNIT-I:

Introduction:

Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

UNIT-II:

Discrete Fourier Series:

Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT. Relation between Z-transform and DFS

UNIT-III:

Fast Fourier Transforms:

Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, and FFT for composite N

UNIT-IV:

Realization of Digital Filters:

Review of Z-transforms, Applications of Z – transforms, solution of difference equations of digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function,

UNIT-V:

IIR Digital Filters:

Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples: Analog-Digital transformations

UNIT-VI:

FIR Digital Filters:

Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique,

Comparison of IIR & FIR filters.

UNIT-VII:

Multirate Digital Signal Processing:

Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.

UNIT-VIII:

Introduction to DSP Processors:

Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, multiport memory, VLSI Architecture, Pipelining, Special addressing modes, On-Chip Peripherals. Architecture of TMS 320C5X-Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Registrar, Index Registrar, Auxiliary Register Compare Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, some flags in the status registers, On-chip registers, On-chip peripherals

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
3. Digital Signal Processing - a computer based approach, TMH, 2001, New Delhi.

REFERENCE BOOKS:

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing: MH.Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007.
5. Digital Signal Processors – Architecture, Programming and Applications,, B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – II Sem.

FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS (FACTS)

(Elective – III)

Unit-I:

Introduction:

Transmission interconnections, power-flow in an AC System, loading capability limits, Power flow and Dynamic stability considerations, importance of controllable parameters.

Unit-II:

Basics of FACTS:

Opportunities for FACTS, basic types of FACTS controllers, benefits from FACTS controllers, Requirements and Characteristics of High Power devices – Voltage and Current rating, losses and speed of switching, parameter trade-off of devices.

Unit-III:

VSC Based Converters:

Basic concept of Voltage source converter, Single phase full wave bridge converter, Single phase-leg (pole) operation, Square-wave voltage harmonics for a single phase Bridge, 3 Phase full wave bridge converter, basic concept of current source converters, comparison of current source converters with voltage source converters.

Unit-IV:

Shunt Converters:

Objectives of shunt compensation, mid-point voltage regulation for line segmentation, End of line voltage support to prevent voltage instability, improvement of transient stability, Power oscillation damping.

Unit-V:

Var Controllers:

Methods of controllable var generation: variable impedance type static var generators – TCR and TSR, TSC, FC-TCR, TSC-TCR, switching converter type var generators, hybrid var generators.

Unit-VI:

Shunt Controllers:

SVC and STATCOM: The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping, operating point control and summary of compensation control.

Unit VII:

Series Controllers:

Static series compensators: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC.

Unit-VIII:

Combined Controllers:

UPFC: Basic Operating Principles, IPFC: Basic Operating Principles and Characteristics

TEXT BOOKS:

1. "Understanding FACTS" N.G.Hingorani and L.Guygi, IEEE Press. Indian Edition is available:—Standard Publications, 2001.
2. "Flexible a c transmission system (FACTS)" Edited by YONG HUE SONG and ALLAN T JOHNS, Institution of Electrical Engineers, London.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – II Sem.

OOPS THROUGH JAVA

(Elective IV)

UNIT - I :

Basic of Object Oriented Programming (OOP) :

Need for OO paradigm, A way of viewing world - Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of oop concepts, coping with complexity, abstraction mechanisms.

UNIT - II :

Java Basics :

Data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, classes and objects - concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

UNIT - III :

Inheritance :

Hierarchical abstrctions, Base class object, subtype, substitutability, forms of inheritance - specilization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism, abstract classes.

UNIT - IV :

Packages and Interfaces :

Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT - V :

Exception handling and Multithreading :

Concepts of exception handling, benefits exception handling, Termination or presumptive models, exception hierachy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT - VI :

Applets :

Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Applet to applet communication, secure applet.

UNIT - VII :

Event Handling :

Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user interface components - labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels - scrollpane, dialogs, menubar, graphics, layout manager - layout manager types - boarder, grid, flow, card and grid bag.

UNIT - VIII :

Swings :

Intruction, limitations of AWT, MVC architecture, components, containers, exploring swing - J Applet, J Frame and J Component, Icons and Labels, text fields, buttons - The JButton class, check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees and Tables.

TEXT BOOKS :

1. Java : The complete reference, 7/e, Herbert schildt, TMH.
2. Java : How to Program, 8/e, Dietal, Dietal, PHI

REFERENCE BOOKS :

1. Learn Object Oriented Programming using Java, Venkateswarlu, E V Prasad, S. Chand.
2. Programming in Java2, Dr K Soma Sundaram, JAICO Publishing house.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – II Sem.

UNIX AND SHELL PROGRAMMING

(Elective IV)

UNIT - I :

Introduction to Unix :- Architecture of Unix, Features of Unix, Unix Commands - PATH, man, echo, printf, script, passwd, uname, who date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip.

UNIT - II :

Unix Utilities : Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmast, ulimit, ps, w, finger, arp, ftp, telnet, rlogin. Text processing utilities and backup utilities, detailed commands to be covered are tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio.

UNIT - III :

Introduction to Shells :

Unix Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command - Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization.

Filters :

Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, Words or Lines, Comparing Files.

UNIT - IV :

Grep :

Operation, grep Family, Searching for File Content.

Sed :

Scripts, Operation, Addresses, Commands, Applications, grep and sed.

UNIT - V :

awk :

Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User - Defined Functions, Using System commands in awk, Applications, awk and grep, sed and awk.

UNIT - VI :

Interactive Korn Shell :

Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process.

Korn Shell Programming :

Basic Script concepts, Expressions, Decisions : Making Selections, Repetition, Special Parameters and Variables, Changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

UNIT - VII :

Interactive C Shell :

C Shell features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, On-Off Variables, Startup and Shutdown Scripts, Command History, Command Execution Scripts.

C Shell Programming :

Basic Script concepts, Expressions, Decisions : Making Selections, Repetitio, Special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

UNIT - VIII :

File Management :

File Structure, System Calls for File Management - create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API - opendire, readdir, closedir, mkdir, rmdir, umask.

TEXT BOOKS :

1. Unix and shell Programming Behrouz A. Forouxan, Richard F. Gilberg. Thomson.
2. Your Unix the ultimate guide, Sumitabha Das, TMH, 2nd Edition, 2007-2008 Page 34 or 95.

REFERENCES :

1. Unix for programmers and users, 3rd edition, Graham Class, King Ables, Pearson Education.
2. Unix programming environment, Kernighan and Pike, PHI / Pearson Education.
3. The Complete Reference Unix, Rosen, Host, Klee, Farber, Rosinski, Second Edition, TMH.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electrical and Electronics Engineering – II Sem.

ARTIFICIAL INTELLEGENT TECHNIQUES
(Elective IV)

UNIT-I:

Introduction to AI Techniques

Introduction, Humans and Computers, -knowledge representation-learning process-learning tasks, Methods of AI techniques

Unit-II:

Neural Networks

Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models. Introduction-neural network models-architectures, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model Applications.

Unit–III:

ANN paradigm

Back propagation-RBF algorithms-Hope field networks.

Unit-IV:Genetic Algorithms

Introduction-encoding-fitness function-reproduction operators

Unit-V:

Genetic Modeling

Genetic operators-cross over and mutation-generational cycle-convergence of genetic algorithm

Unit – VI:

Classical and Fuzzy Sets

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

Unit-VII:

Fuzzy Logic System Components

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

Unit-VIII:

Application of AI techniques

load forecasting-load flow studies-economic load dispatch-load frequency control-reactive power control-speed control of dc and ac motors

TEXT BOOK:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by S.Rajasekaran and G.A. Vijayalakshmi Pai – PHI Publication.

2. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.

REFERENCE BOOK:

1. Neural Networks, Algorithms, Applications and programming Techniques by James A. Freeman, David M. Skapura.

2. Introduction to Neural Networks using MATLAB 6.0 by S N Sivanandam, S Sumathi, S N Deepa, TMGH.