SYLLABUS

Bachelor of Electrical and Electronics Engineering

3rd Year (V & VI Semester)

(Effective from Session 2015-2016)
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
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<th>Periods</th>
<th>Evaluation Scheme</th>
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## STUDY AND EVALUATION SCHEME OF ELECTRICAL & ELECTRONICS ENGINEERING

### Third Year

#### Semester-VI

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<th>S. No.</th>
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<td>Switchgear &amp; Protection</td>
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<td>NEN-603/ NEC 501</td>
<td>Integrated Circuits</td>
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<td><strong>TOTAL</strong></td>
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</table>
Elective-I
NEN – 011: Digital Control System
NEN – 013: Neural Networks and Fuzzy System
NEN – 014: Special Electrical Machine

Elective-II
NEN – 021: VLSI Design
NEN – 022: Wireless Communication
NEN – 023: Antenna and Wave Propagation
NEN – 024: Mechatronics

Annexure-III

NEE-501: ELEMENTS OF POWER SYSTEM

<table>
<thead>
<tr>
<th>Unit-I</th>
<th>Power System Components:</th>
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<tbody>
<tr>
<td></td>
<td>Single line Diagram of Power system,</td>
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<tr>
<td></td>
<td>Brief description of power system Elements: Synchronous machine, transformer, transmission line, bus bar, circuit breaker and isolator</td>
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<table>
<thead>
<tr>
<th>Unit-II</th>
<th>Supply System</th>
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<tbody>
<tr>
<td></td>
<td>Different kinds of supply system and their comparison, choice of transmission voltage</td>
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<table>
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<tr>
<th>Unit-II</th>
<th>Transmission Lines:</th>
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<tbody>
<tr>
<td></td>
<td>Configurations, types of conductors, resistance of line, skin effect, Kelvin’s law, Proximity effect</td>
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<table>
<thead>
<tr>
<th>Unit-II</th>
<th>Over Head Transmission Lines</th>
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<tbody>
<tr>
<td></td>
<td>Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines,</td>
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<tr>
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<td>Representation and performance of short, medium and long transmission lines, Ferranti effect, Surge impedance loading</td>
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<thead>
<tr>
<th>Unit-III</th>
<th>Corona and Interference:</th>
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<tbody>
<tr>
<td></td>
<td>Phenomenon of corona, corona formation, calculation of potential gradient, corona loss, factors affecting corona, methods of reducing corona and interference.</td>
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<td>Electrostatic and electromagnetic interference with communication lines</td>
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<table>
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<tr>
<th>Unit-III</th>
<th>Overhead line Insulators:</th>
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<tbody>
<tr>
<td></td>
<td>Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency</td>
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<table>
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<tr>
<th>Unit-IV</th>
<th>Mechanical Design of transmission line:</th>
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<tbody>
<tr>
<td></td>
<td>Catenary curve, calculation of sag &amp; tension, effects of wind and ice loading, sag template, vibration dampers</td>
</tr>
<tr>
<td></td>
<td>Insulated cables:</td>
</tr>
<tr>
<td></td>
<td>Type of cables and their construction, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables</td>
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<table>
<thead>
<tr>
<th>Unit-V</th>
<th>Neutral grounding:</th>
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<tbody>
<tr>
<td></td>
<td>Necessity of neutral grounding, various methods of neutral grounding, earthing transformer, grounding practices</td>
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<table>
<thead>
<tr>
<th>Unit-V</th>
<th>Electrical Design of Transmission Line:</th>
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<tbody>
<tr>
<td></td>
<td>Design consideration of EHV transmission lines, choice of voltage, number of circuits, conductor configuration, insulation design, selection of ground wires</td>
</tr>
</tbody>
</table>
**EHV AC and HVDC Transmission:**
Introduction to EHV AC and HVDC transmission lines.

**Text Books**
3. Asfaq Hussain, “Power System”, CBS Publishers and Distributors,

**Reference Books**
Unit-I
Power semiconductor Devices:
Power semiconductor devices their symbols and static characteristics, specifications of switches, types of power electronic circuits, Operation, steady state & switch characteristics & switching limits of Power Transistor. Operation and steady state characteristics of Power MOSFET and IGBT
Thyristor – Operation V-I characteristics, two transistor model, methods of turn-on Operation of GTO, MCT and TRIAC

Unit-II
Power Semiconductor Devices (Contd.)
Protection of devices, Series and parallel operation of thyristors Commutation techniques of thyristor
DC-DC Converters:

Unit-III
Phase Controlled Converters
Single phase half wave controlled rectifier with resistive and inductive loads, effect of freewheeling diode.
Single phase fully controlled and half controlled bridge converters. Performance Parameters
Three phase half wave converters, three phase fully controlled and half controlled bridge converters, Effect of source impedance Single phase and three phase dual converters

Unit-IV
AC Voltage Controllers
Principle of On-Off and phase controls
Single phase ac voltage controller with resistive and inductive loads
Three phase ac voltage controllers (various configurations and comparison only)
Single phase transformer taps changer, industrial applications.
Cyclo Converters
Basic principle of operation, single phase to single phase, three phase to single phase and three phase to three phase cyclo converters, output voltage equation and their applications.

Unit-V
Inverters
Single phase series resonant inverter, Single phase bridge inverters, Three phase bridge inverters
Voltage control of inverters, Harmonics reduction techniques, Single phase and three phase current source inverters

Text Books:

Reference Books:
4. M.S. Jamil Asghar, “Power Electronics” Prentice Hall of India Ltd.
Unit-I
The Control System:
Open loop & closed control; servomechanism, Physical examples. Transfer functions, Block diagram algebra, Signal flow graph, Mason’s gain formula Reduction of parameter variation and effects of disturbance by using negative feedback

Unit-II
Time Response analysis:
Standard test signals, time response of first and second order systems, time response specifications, steady state errors and error constants
Design specifications of second order systems: Derivative error, derivative output, integral error and PID compensations, design considerations for higher order systems, performance indices

Unit-III
Control System Components:
Constructional and working concept of ac servomotor, synchros and stepper motor
Stability and Algebraic Criteria concept of stability and necessary conditions, Routh-Hurwitz criteria and limitations.
Root Locus Technique:
The root locus concepts, construction of root loci

Unit-IV
Frequency response Analysis: Frequency response, correlation between time and frequency responses, polar and inverse polar plots, Bode plots
Stability in Frequency Domain:
Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, constant M&N circles

Unit-V
Introduction to Design:
The design problem and preliminary considerations lead, lag and lead-lag networks, design of closed loop systems using compensation techniques in time domain and frequency domain.

Review of state variable technique:
Review of state variable technique, conversion of state variable model to transfer function model and vice-versa, diagonalization, Controllability and observability and their testing.

Text Books:
3. B.C. Kuo & Farid Golnaraghi, “Automatic Control System” Wiley India Ltd.

Reference Books:
UNIT-I:
Introduction to Digital Computer and Microprocessor:
Digital Computers: General architecture and brief description of elements, instruction execution, instruction format, and instruction set, addressing modes, programming system, higher level languages.
Buses and CPU Timings: Bus size and signals, machine cycle timing diagram, instruction timing, processor timing.
Microprocessor and Microprocessor Development Systems: Evolution of Microprocessor, Microprocessor architecture and its operations, memory, inputs-outputs (I/Os), data transfer schemes interfacing devices, architecture advancements of microprocessors, typical microprocessor development system.

UNIT-II:
8-bit Microprocessors.
8085 microprocessor: pin configuration, internal architecture. Timing & Signals: control and status, interrupt: ALU, machine cycles,
Instruction Set of 8085:
Addressing Modes: Register addressing, direct addressing; register indirect addressing, immediate addressing, and implicit addressing.
Instruction format, op-codes, mnemonics, no. of bytes, RTL, variants, no. of machine cycles and T states, addressing modes.
Instruction Classification: Data transfer, arithmetic operations, logical operations, branching operation, machine control; Writing assembly Language programs, Assembler directives.

UNIT-III:
16-bit Microprocessors: Architecture:
Architecture of INTEL 8086 (Bus Interface Unit, Execution unit), register organization, memory addressing, memory segmentation.
Operating Modes
Instruction Set of 8086
Addressing Modes: Instruction format:
Discussion on instruction Set: Groups: data transfer, arithmetic , logic string, branch control transfer, processor control.
Interrupts: Hardware and software interrupts, responses and types.
UNIT-IV
Fundamental of Programming: development of algorithms, flowcharts in terms of structures,(series, parallel, if-then-else etc.)
Assembler Level Programming: memory space allocation (mother board and user program)
Assembler level programs (ASMs)
UNIT-V
Peripheral Interfacing:
I/O programming: Programmed I/O, Interrupt Driven I/O, DMA I/O interface: serial and parallel communication, memory I/O mapped I/Os, Peripheral Devices: 8237 DMA controller, 8255-Programmable peripheral interface, 8253/8254 Programmable timer/counter. 8259 programmable Interrupt Controller.

Text Books:

**Reference Books:**
5. Brey, Barry B. “INTEL Microprocessors” Prentice Hall (India)
7. M. Rafiquzzaman, “Microprocessors- Theory and applications” PHI
9. Renu Singh & B.P.Singh, “Microprocessor and Interfacing and applications” New Age International
NEC-508: FUNDAMENTALS OF E.M.THEORY

Unit I
Review of Vector analysis, Rectangular, Cylindrical and Spherical coordinates and their transformation, divergence, gradient and curl in different coordinate systems, Electric field intensity, Electric Flux density, Energy and potential.

Unit-II
Current and conductors, Dielectrics and capacitance, Poisson’s and Laplace’s equations.

Unit-III
Steady magnetic field, magnetic forces, materials and inductance, Time varying field and Maxwell’s equation.

Unit-IV
Uniform Plane waves, Plane wave reflection and dispersion

Text Books:

Reference Books:
NEE-551: POWER ELECTRONICS LABORATORY

Note: The minimum of 10 experiments is to be performed out of which at least three should be software based.

1. To study V-I characteristics of SCR and measure latching and holding currents.
2. To study UJT trigger circuit for half wave and full wave control.
3. To study single-phase half wave controlled rectified with (i) resistive load (ii) inductive load with and without free wheeling diode.
4. To study single phase (i) fully controlled (ii) half controlled bridge rectifiers with resistive and inductive loads.
5. To study three-phase fully/half controlled bridge rectifier with resistive and inductive loads.
6. To study single-phase ac voltage regulator with resistive and inductive loads.
7. To study single phase cyclo-converter
8. To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor
9. To study operation of IGBT/MOSFET chopper circuit
10. To study MOSFET/IGBT based single-phase series-resonant inverter.
11. To study MOSFET/IGBT based single-phase bridge inverter.

Software based experiments(PSPICE/MATLAB)

12. To obtain simulation of SCR and GTO thyristor.
13. To obtain simulation of Power Transistor and IGBT.
14. To obtain simulation of single phase fully controlled bridge rectifier and draw load voltage and load current waveform for inductive load.
15. To obtain simulation of single phase full wave ac voltage controller and draw load voltage and load current waveforms for inductive load.
16. To obtain simulation of step down dc chopper with L-C output filter for inductive load and determine steady-state values of output voltage ripples in output voltage and load current.

Text/Reference Books:

3. Randal Shaffer, “Fundamentals of Power Electronics with MATLAB” Firewall Media,
Note: The minimum of 10 experiments are to be performed from the following, out of which at least three should be software based.

1. To determine response of first order and second order systems for step input for various values of constant ‘K’ using linear simulator unit and compare theoretical and practical results.
2. To study P, PI and PID temperature controller for an oven and compare their performance.
3. To study and calibrate temperature using resistance temperature detector (RTD)
4. To design Lag, Lead and Lag-Lead compensators using Bode plot.
5. To study DC position control system
6. To study synchro-transmitter and receiver and obtain output vs input characteristics
7. To determine speed-torque characteristics of an ac servomotor.
8. To study performance of servo voltage stabilizer at various loads using load bank.
9. To study behavior of separately excited dc motor in open loop and closed loop conditions at various loads.

Software based experiments (Use MATLAB, LABVIEW software etc.)
10. To simulate PID controller for transportation lag.
11. To determine time domain response of a second order system for step input and obtain performance parameters.
12. To convert transfer function of a system into state space form and vice-versa.
13. To plot root locus diagram of an open loop transfer function and determine range of gain ‘k’ for stability.
14. To plot a Bode diagram of an open loop transfer function.
15. To draw a Nyquist plot of an open loop transfers functions and examine the stability of the closed loop system.

Reference Books:
1. K.Ogata, “Modern Control Engineering” Prentice Hall of India.
A. Study Experiments
1. To study 8085 based microprocessor system
2. To study 8086 and 8086A based microprocessor system
3. To study Pentium Processor

B. Programming based Experiments (any four)
4. To develop and run a program for finding out the largest/smallest number from a given set of numbers.
5. To develop and run a program for arranging in ascending/descending order of a set of numbers.
6. To perform multiplication/division of given numbers.
7. To perform conversion of temperature from °F to °C and vice-versa.
8. To perform computation of square root of a given number.
9. To perform floating point mathematical operations (addition, subtraction, multiplication and division).

C. Interfacing based Experiments (any four)
10. To obtain interfacing of RAM chip to 8085/8086 based system.
11. To obtain interfacing of keyboard controller.
12. To obtain interfacing of DMA controller.
13. To obtain interfacing of PPI.
14. To obtain interfacing of UART/USART.
15. To perform microprocessor based stepper motor operation through 8085 kit.
16. To perform microprocessor based traffic light control.
17. To perform microprocessor based temperature control of hot water.
Unit-I
Representation of Power System Components:
Synchronous machines, Transformers, Transmission lines, One line diagram, Impedance and reactance diagram, per unit System
Symmetrical components:
Symmetrical Components of unbalanced phasors, power in terms of symmetrical components, sequence impedances and sequence networks.

Unit-II
Symmetrical fault analysis:
Transient in R-L series circuit, calculation of 3-phase short circuit current and reactance of synchronous machine, internal voltage of loaded machines under transient conditions
Unsymmetrical faults:
Analysis of single line to ground fault, line-to-line fault and Double Line to ground fault on an unloaded generators and power system network with and without fault impedance.
Formation of Zbus using singular transformation and algorithm, computer method for short circuit calculations

Unit-III Load Flows:
Introduction, bus classifications, nodal admittance matrix (Ybus), development of load flow equations,
load flow solution using Gauss Siedel and Newton-Raphson method, approximation to N-R method, line flow equations and fast decoupled method

Unit-IV
Power System Stability:
Stability and Stability limit, Steady state stability study, derivation of Swing equation, transient stability studies by equal area criterion and step-by-step method. Factors affecting steady state and transient stability and methods of improvement

Unit-V Traveling Waves:
Wave equation for uniform Transmission lines, velocity of propagation, surge impedance, reflection and transmission of traveling waves under different line loadings. Bewlay’s lattice diagram, protection of equipments and line against traveling waves.

Text Books:

Reference Books:
Unit I: Introduction to Protection System:
Introduction to protection system and its elements, functions of protective relaying, protective zones, primary and backup protection, desirable qualities of protective relaying, basic terminology.

Relays:
Electromagnetic, attracted and induction type relays, thermal relay, gas actuated relay, design considerations of electromagnetic relay.

Unit-II: Relay Application and Characteristics:
Amplitude and phase comparators, over current relays, directional relays, distance relays, differential relay

Static Relays:
Comparison with electromagnetic relay, classification and their description, over current relays, directional relay, distance relays, differential relay.

Unit-III Protection of Transmission Line:
Over current protection, distance protection, pilot wire protection, carrier current protection, protection of bus, auto re-closing,

Unit-IV: Circuit Breaking:
Properties of arc, arc extinction theories, re-striking voltage transient, current chopping, resistance switching, capacitive current interruption, short line interruption, circuit breaker ratings.

Testing Of Circuit Breaker:
Classification, testing station and equipments, testing procedure, direct and indirect testing

Unit-V Apparatus Protection:
Protection of Transformer, generator and motor.

Circuit Breaker:
Operating modes, selection of circuit breakers, constructional features and operation of Bulk Oil, Minimum Oil, Air Blast, SF6, Vacuum and d. c. circuit breakers.

Text Books:
2. B. Ravindranath and M. Chander, Power system Protection and Switchgear, Wiley Eastern Ltd.

Reference Books:
5. T.S.M Rao,“Power System Protection: Static Relays with Microprocessor Applications” Tata Macgraw Hill”.
EEC 501 INTEGRATED CIRCUITS

Unit-I
The 741 IC Op-Amp: Bias circuit, short circuit protection circuitry, the input stage, the second stage, the output stage, and device parameters; DC Analysis of 741: Small Signal Analysis of input stage, the second stage, the output stage; Gain, Frequency Response of 741; a Simplified Model, Slew Rate, Relationship Between f, and SR.

8

Unit-II
Linear Applications of IC op-amps: An Overview of Op-Amp (ideal and non ideal) based Circuits V-I and I-V converters, generalized Impedance converter, simulation of inductors.
Filters: First and second order LP, HP, BP BS and All pass active filters, KHN, Tow-Thomas and State Variable Biquad filters; Sinusoidal oscillators.

8

Unit-III

8

Unit-IV

8

Unit-V
D/A and A/D converters Integrated Circuit Timer: The 555 Circuit, Implementing a Monostable Multivibrator Using the 555 IC, Astable Multivibrator Using the 555 IC.
Phase locked loops (PLL): Ex-OR Gates and multipliers as phase detectors, Block Diagram of IC PLL, Working of PLL and Applications of PLL.

8

Text Book:

Reference Books:
DEPARTMENTAL ELECTIVES

ELECTIVE – I

NEE – 011/NEN-011: Digital Control System

L T P
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UNIT-I
Signal Processing in Digital Control:
Basic digital control system, advantages of digital control and implementation problems, basic discrete time signals, z-transform and inverse z-transform, modeling of sample- hold circuit., pulse transfer function, solution of difference equation by z-Transform method.

UNIT-II
Design of Digital Control Algorithms:
Steady state accuracy, transient response and frequency response specifications, digital compensator design using frequency response plots and root locus plots.

UNIT-III
State Space Analysis and Design:
State space representation of digital control system, conversion of state variable models to transfer functions and vice versa, solution of state difference equations, controllability and observability, design of digital control system with state feedback.

UNIT-IV
Stability of Discrete System:
Stability on the z-plane and Jury stability criterion, bilinear transformation, Routh stability criterion on rth plane.
Lyapunov’s Stability in the sense of Lyapunov, stability theorems for continuous and discrete systems, stability analysis using Lyapunov’s method.

UNIT-V
Optimal digital control:
Discrete Euler Lagrange equation, max. min. principle, optimality & Dynamic programming. Different types of problem and their solutions.

Text Books:

Reference Books:
Unit-I
Discrete-Time Signals And Systems:
Sequences, discrete time systems, LTI systems, frequency domain representation of discrete time signals and systems, discrete time signals and frequency domain representation, Fourier Transform.

Discrete Fourier Transform:
Discrete Fourier transforms, properties, linear convolution using DFT, DCT

Unit-II
Sampling of Continuous Time Signals:
Sampling and reconstruction of signals, frequency domain representation of sampling, discrete time processing of continuous time signals, continuous time processing of discrete time signals, changing the sampling rate using discrete time processing, multi rate signal processing, digital processing of analog signals, over sampling and noise shaping in A/D and D/A conversion

Unit-III
Transform Analysis of LTI Systems:
Frequency response of LTI systems, system functions, frequency response for rational system functions, magnitude-phase relationship, all pass systems, minimum phase systems, and linear systems with generalized linear phase
Overview of finite precision numerical effects, effects of coefficient quantization, Effects of round-off noise in digital filters, zero-input limit cycles in fixed point realizations of IIR digital filters.

Unit-IV
Filter Design Techniques:
Design of D-T IIR filters from continuous – time filters, design of FIR filters by windowing, Kaiser Window method, optimum approximations of FIR filters, FIR equiripple approximation

Unit-V
Efficient computation of the DFT:
Goertzel algorithm, decimation in time and decimation in frequency, FFT algorithm, practical considerations, implementation of the DFT using convolution, effects of finite register length.

Fourier Analysis of Signals Using DFT:
DFT analysis of sinusoidal signals, time-dependent Fourier transforms: Block convolution, Fourier analysis of non – stationary and stationary random signals, spectrum analysis of random signals using estimates of the autocorrelation sequence

Text Books:

Reference Books:
Unit-I
Neural Networks-1(Introduction & Architecture)
Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, 
Neural network architecture: single layer and multilayer feed forward networks, recurrent 
networks. Various learning techniques; perception and convergence rule, 
Auto-associative and hetro-associative memory 

Unit-II
Neural Networks-II (Back propagation networks)
Architecture: perceptron model, solution, single layer artificial neural network, multilayer 
perception model; back propagation learning methods, effect of learning rule co-efficient 
;back propagation algorithm, factors affecting backpropagation training, applications. 

Unit-III
Fuzzy Logic-I (Introduction)
Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, 
Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion. 

Unit-IV
Fuzzy Logic –II (Fuzzy Membership, Rules)
Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications 
and Fuzzy algorithms, Fuzzyfication & Defuzzifications, Fuzzy Controller, Industrial 
aplications. 

Unit-V
Fuzzy Neural Networks: 
L-R Type fuzzy numbers, fuzzy neutron, fuzzy back propogation (BP), architecture, 
learning in fuzzy BP, inference by fuzzy BP, applications. 

Text Books:
1. Kumar Satish, “Neural Networks” Tata Mc Graw Hill 
Algorithm: Synthesis and Applications” Prentice Hall of India. 

Reference Books:
3. Siman Haykin, “Neural Networks” Prentice Hall of India 
4. Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.
NEE-603/NEN -014: SPECIAL ELECTRICAL MACHINE

L T P

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UNIT-I
Poly-phase AC Machines:
Construction and performance of double cage and deep bar three phase induction motors; e.m.f. injection in rotor circuit of slip ring induction motor, concept of constant torque and constant power controls, static slip power recovery control schemes (constant torque and constant power)

UNIT-II
Single phase Induction Motors:
Construction, starting characteristics and applications of split phase, capacitor start, capacitor run, capacitor-start capacitor-run and shaded pole motors.

Two Phase AC Servomotors:
Construction, torque-speed characteristics, performance and applications.

UNIT-III Stepper Motors:
Principle of operation, variable reluctance, permanent magnet and hybrid stepper motors, characteristics, drive circuits and applications.

Switched Reluctance Motors:
Construction; principle of operation; torque production, modes of operation, drive circuits.

UNIT-IV
Permanent Magnet Machines:
Types of permanent magnets and their magnetization characteristics, demagnetizing effect, permanent magnet dc motors, sinusoidal PM ac motors, brushless dc motors and their important features and applications, PCB motors. Single phase synchronous motor; construction, operating principle and characteristics of reluctance and hysteresis motors; introduction to permanent magnet generators and applications

UNIT-V
Single Phase Commutator Motors:
Construction, principle of operation, characteristics of universal and repulsion motors; Linear Induction Motors. Construction, principle of operation, Linear force, and applications.

Text Books:

Reference Books:
DEPARTMENTAL ELECTIVES
ELECTIVE – II

NEN-021 : VLSI DESIGN

UNIT-I
Introduction to integrated circuit technology. CMOS fabrication, the p-well process, n-well process, twin tub process. Bi-CMOS technology. Basic electrical properties of MOS circuits, Ids-Vds relationship, MOS transistor thershed voltage Vt, Transconductance and output conductance, MOS transistor figure of merit.

UNIT-II
The n-MOS inverter, pull-up to pull-down ratio, CMOS inverter and its characteristics, latch –up in CMOS circuits, stick diagrams, n-MOS design style, CMOS design style, lambda based design rules, Body effect, sheet resistance, capacitances of layers, Gate delays, Delay estimation, logical efforts, Scaling models and scaling factors, limitation of scaling, Limits of miniaturization.

UNIT-III

UNIT-IV
Full Custom Design, Semi Custom Design, Programmable Logic structures, Field Programmable Gate arrays (FPGA), Configurable Logic Block (CLB), Application-Specific Integrated Circuits (ASICs)

UNIT-V

Text Books:
2. CMOS VLSI Design, A Circuits and Systems Perspective by Neil H.E. Weste, David Harris, Ayan Banerjee, Pearson Education.

References:
5. Principles of C-MOS VLSI Design A systems Perspective by Neil H.E. Weste, Kamrau Eshraghian, Pearson Education
NEN -022: WIRELESS COMMUNICATION

Unit-I

Unit-II

Unit-III
Characteristics of speech signals, quantisation techniques, vocoders, linear predictive coders, time division multiple access, space division multiple access, and frequency division multiple access.

Unit-IV
Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems.

Text Book:

Reference Books:
4. R. Pandya, “Mobile and personal communication system”, PHI.
UNIT-I
Network Theorems
Directional Properties of Dipole Antenna.
Antenna Gain, Effective Area, Antenna Terminal impedance, Practical Antennas and Methods of Excitation, Antenna Temperature and Signal. To Noise Ratio.
UNIT-II
Antenna Arrays: Two Element Array, Horizontal Patterns in Broadcast Arrays, Linear Arrays, Multiplication of Patterns, effect of the earth on vertical patterns, Binomial array.
UNIT-III
Wave Propagation: Modes of Propagation, Plane Earth Reflection. Space wave and Surface Wave, Reflection and refraction waves by the Ionosphere Tropospheric Wave. Ionosphere Wave Propagation in the Inosphere, Virtual Height, MUF Critical frequency, Skip Distance, Duct Propagation, Space wave.
UNIT-IV
Practical Antenas:
VLF and LF transmitting antennas, effect of antenna height, Field of short dipole, electric field of small loop antenna, Directivity of circular loop antenna with uniform current, Directivity of Circular loop antenna with uniform current, Yagi-Uda array: Square corner yagi-uda hybride, circular polarization
Rhombic Antenna Weight and Leg length
Parabolic Reflectors Properties, Comparison with corner reflectors
Horn Antenna: Length and Aperture
Introduction to Turstile Antenna
Effect of ground on antenna performance.
Broadband Antenna: Frequency independent concept, RUMSEY’Ss Principle, Frequency independent planar log spiral antenna, Frequency independent conical spiral Antenna.

Text Books:

Reference Books:
5. Roy, Sitesh Kumar & Mitra, Monojit / “Microwave Semiconductor Devices” / Prentice Hall (India).
1. Mechatronics and its scope:
Sensors and transducers- Displacement, position & proximity, velocity, force, pressure and level.
Signal conditioning amplification, filtering & data acquisition.

2. Pneumatic and Hydraulic actuation systems:
Directional control valves, pressure control valves and cylinders. process control valves.
Building blocks of Mechanical spring, mass and damper. Drives- Electrical Drives, Fluid systems, hydraulic, servo, closedloop controllers.


4. Case Studies of Mechatronic Systems:
Industrial Robot and its control
Automobile Engine Control
Electromechanical disc-control.

5. Vehicle suspension Control:

References:
INTEGRATED CIRCUITS LAB

**Objective:** - To design and implement the circuits to gain knowledge on performance of the circuit and its application. These circuits should also be simulated on Pspice.
1. Log and antilog amplifiers.
2. Voltage comparator and zero crossing detectors.
3. Second order filters using operational amplifier for:
   a. Low pass filter of cutoff frequency 1 KHz.
   b. High pass filter of frequency 12 KHz.
   c. Band pass filter with unit gain of pass band from 1 KHz to 12 KHz.
5. Determine capture range; lock in range and free running frequency of PLL.
6. Voltage regulator using operational amplifier to produce output of 12V with maximum load current of 50 mA.
7. A/D and D/A convertor.
8. Voltage to current and current to voltage convertors.
9. Function generator using operational amplifier (sine, triangular & square wave)
10. Astable and monostable multivibrator using IC 555.
NEN=652: ELECTRICAL and ELECTRONICS CAD LAB

1. Design of Single phase transformer.
3. Design of DC motor.
4. Design of DC generator.
5. Design of Single phase alternator.
7. Design of lag, lead and lag-lead compensator.
10. Design of Analog Filter
12. Design of voltage controller Oscillator

Text Books: