## M.TECH.(PED) - COURSE STRUCTURE

### I - SEMESTER

<table>
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<th>Code No</th>
<th>Name of the Course</th>
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<td>System Identification and Parameter Estimation</td>
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## II-SEMESTER

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## III & IV SEMESTERS

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I SEMESTER
MTEE101 - MACHINE MODELLING AND ANALYSIS

Lecture : 4 Periods / Week  Internal Marks : 40
Tutorial : 1 Period / Week  External Marks : 60
Credits : 3  External Examination : 3 hrs.

UNIT - I
BASIC CONCEPTS OF MODELLING
Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron’s primitive Machine-voltage, current and Torque equations.

UNIT - II
DC MACHINE MODELLING
Mathematical model of separately excited D.C motor – Steady State analysis-Transient State analysis-Sudden application of Inertia Load-Transfer function of Separately excited D.C Motor- Mathematical model of D.C Series motor, Shunt motor-Linearization Techniques for small perturbations

UNIT - III
MODELLING OF 1-PHASE INDUCTION MOTOR
Linear transformation-Phase transformation - three phase to two phase transformation (abc to aβ0) and two phase to three phase transformation (aβ0 to abc) Power equivalence.-Modelling of 1-Phase induction motor-cross field theory-mathematical modelling of 1-phase induction motor

UNIT - IV
MODELLING OF THREE PHASE INDUCTION MACHINE

UNIT - V
MODELLING OF SYNCHRONOUS MACHINE
Synchronous machine inductances – Mathematical model-transformation to the rotor’s dq0 reference frame- Flux linkages in terms of winding currents-referring rotor quantities to the stator- voltage equations in the rotor’s dq0 reference frame-electromagnetic torque-currents in terms of flux linkages-steady state operation- modelling of PM Synchronous motor, modelling of BLDC motor, modelling of Switched Reluctance motor.

TEXT BOOKS:

REFERENCES:
UNIT - I
SINGLE-PHASE CONTROLLED RECTIFIERS

UNIT - II
THREE-PHASE CONTROLLED RECTIFIERS

UNIT - III
AC-AC CONVERTERS
Single Phase AC Voltage Controllers with PWM control-Effects of source and load inductances-Synchronous tap changers-Three Phase AC Voltage controllers-Analysis of Controllers with star and delta connected R and RL load-Effects of source and load inductances-Problems.

UNIT - IV
DC-AC CONVERTERS

UNIT - V
MULTILEVEL INVERTERS
TEXT BOOKS:

REFERENCES:
MTEE103 - CONTROL OF MOTOR DRIVES

Lecture : 4 Periods / Week Internal Marks : 40
Tutorial : 1 Period / Week External Marks : 60
Credits : 3 External Examination : 3 hrs.

UNIT - I
CONVERTER CONTROLLED DC MOTOR DRIVES
Steady state analysis of the single and three phase fully controlled converter fed series and separately excited D.C motor drives: Continuous and discontinuous conduction mode, control of output voltage by sequence and sector control, harmonic analysis

UNIT - II
CHOPPER CONTROLLED DC MOTOR DRIVES
Basic equations of motor operation-DC chopper Drives-Basic class A chopper circuit-Analytical properties of the load voltage waveforms-Analytical waveforms of the load current waveforms-Average current, r.m.s current and power transfer-Problems

UNIT - III
STATOR SIDE CONTROL OF INDUCTION MOTOR

UNIT - IV
ROTOR SIDE CONTROL OF INDUCTION MOTOR
Rotor resistance control- fixed resistance control, variable resistance control-converter controlled resistance control, Slip power recovery schemes- Static Kramer drive-Phasor diagram-Torque expression-Speed control of Kramer drive-Static scherbius drive-Modes of operation.

UNIT - V
VECTOR CONTROL OF INDUCTION MOTOR
Principles of vector control, Direct vector control, derivation of indirect vector control, implementation - block diagram; estimation of flux, flux weakening operation

TEXT BOOKS:

REFERENCES:
Unit - I
Advanced Matrix Theory
Matrix norms – QR decomposition for $3 \times 3$ matrices (Gram-schmidt process) — Eigen values
- Generalized eigenvectors for $3 \times 3$ matrices and for upper triangular matrices of order $4 \times 4$
- Jordan canonical form for $3 \times 3$ matrices and for upper triangular matrices of order $4 \times 4$
- Singular value decomposition for $3 \times 3$, $3 \times 2$, $2 \times 3$ matrices – Pseudo inverse for $3 \times 3$
matrices – Least square approximations for non homogeneous system of equations in 3
variables.

UNIT - II
Z – Transforms
Transform of standard functions – Convolution – Initial and Final value problems – Shifting
Theorem – Inverse transform (Using Partial Fraction – Residues) – Solution of difference
Equations using Z – Transform.

Unit – III
Fourier Series
Euler’s formula – Dirichlet’s conditions – General Fourier series in the intervals $(0, 2\pi)$ and
$(-\pi, \pi)$ – Fourier series expansion to different types of wave forms – change of intervals
Harmonic analysis.

Unit – IV
Fast Fourier Transform
Discrete Fourier transform – Discrete convolution – Periodic sequence and circular convolution
Linear convolution through circular convolution – Fast Fourier transform – Decimation in
time algorithm (up to 8 point DFT by Radix-2 FFT ), decimation in frequency algorithm (up to
8 point DFT by Radix-2 FFT ) - Computation of inverse DFT (up to 4 point DFT by Radix-2
FFT ).

Unit - V
Calculus of Variations
Variation and its properties – Euler’s equation – Functional dependent on first and higher
order derivatives – Functional dependent on functions of several independent variables –
Some applications – Direct methods: Ritz method and Galerkin method.
REFERENCE BOOKS:
2. B.S Grewal, “Higher engineering mathematics”, Khanna publishers
3. S.S. Sastry, “Introductory numerical methods”, PHI.
4. A. Nagoor kani, “Digital signal processing”, RBI publications
MTEE1051 - REACTIVE POWER MANAGEMENT

Lecture : 4 Periods / Week  Internal Marks : 40
Tutorial : 1 Period / Week  External Marks : 60
Credits : 3  External Examination : 3 hrs.

UNIT – I
LOAD COMPENSATION
Objectives and specifications – reactive power characteristics – inductive and capacitive approximate biasing – Load compensator as a voltage regulator – phase balancing and power factor correction of unsymmetrical loads- examples.

UNIT – II
STEADY STATE REACTIVE POWER COMPENSATION IN TRANSMISSION SYSTEM
Uncompensated line – types of compensation – Passive shunt, series and dynamic shunt compensation – examples
Transient state reactive power compensation in transmission systems:

UNIT – III
REACTIVE POWER COORDINATION
Objective – Mathematical modelling – Operation planning – transmission benefits – Basic concepts of quality of power supply – disturbances- steady-state variations – effects of under voltages – frequency – Harmonics, radio frequency and electromagnetic interferences

UNIT – IV
DEMAND SIDE MANAGEMENT
Load patterns – basic methods of load shaping – power tariffs- KVAR based tariffs, penalties for voltage flickers and Harmonic voltage levels
Distribution side Reactive Power Management:

UNIT – V
USER SIDE REACTIVE POWER MANAGEMENT
KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations
Reactive power management in electric traction systems and arc furnaces:
Typical layout of traction systems – reactive power control requirements – distribution transformers-Electric arc furnaces – basic operations– furnace transformer – filter requirements – remedial measures – power factor of an arc furnace

TEXT BOOKS:
1. T.J.E.Miller “Reactive power control in Electric power systems”. John Wiley and sons, 1982
MTEE1052 - RELIABILITY SYSTEMS ENGINEERING

Lecture : 4 Periods / Week Internal Marks : 40
Tutorial : 1 Period / Week External Marks : 60
Credits : 3 External Examination : 3 hrs.

UNIT – I
BASICS OF PROBABILITY THEORY & DISTRIBUTION

UNIT – II
RELIABILITY FUNCTIONS
Reliability functions f(t), F(t), R(t), h(t) and their relationships – exponential distribution –
Expected value and standard deviation of exponential distribution – Bath tub curve –
reliability analysis of series parallel networks using exponential distribution – reliability
measures MTTF, MTTR, MTBF.

UNIT – III
MARKOV MODELLING
Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting
state Probabilities. – Markov processes one component repairable system – time dependent
probability evaluation using Laplace transform approach – evaluation of limiting state
probabilities using STPM – two component repairable models.

UNIT – IV
FREQUENCY & DURATION TECHNIQUES
Frequency and duration concept – Evaluation of frequency of encountering state, mean
cycletime, for one , two component repairable models – evaluation of cumulative probability
and cumulative frequency of encountering of merged states.

UNIT – V
GENERATION SYSTEM RELIABILITY ANALYSIS
Reliability model of a generation system– recursive relation for unit addition and removal –
load modeling - Merging of generation load model – evaluation of transition rates for merged
state model – cumulative Probability, cumulative frequency of failure evaluation – LOLP,
LOLE.

TEXT BOOKS:
1. R. Billinton, R.N.Allan "Reliability Evaluation of Engineering System", Plenum Press,
   New York, reprinted in India by B.S.Publications, 2007
2. R. Billinton, R.N.Allan "Reliability Evaluation of Power systems", Pitman Advance
   Publishing Program, New York, reprinted in India by B.S.Publications, 2007

REFERENCES:
1. Alessandro Birolini “Reliability systems engineering theory and practice”, 6th
MTEE1053 - ELECTROMAGNETIC INTERFERENCE AND COMPATABILITY

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UNIT – I
INTRODUCTION
Sources of EMI, Conducted and radiated interference - Characteristics - Designing for electromagnetic compatibility (EMC) - EMC regulation - typical noise path - use of network theory - methods of eliminating interferences.

UNIT – II
METHOD OF HARDENING
Cabling - capacitive coupling - inductive coupling - shielding to prevent magnetic radiation - shield transfer impedance, Grounding - safety grounds - signal grounds single point and multipoint ground systems - hybrid grounds - functional ground layout - grounding of cable shields - ground loops-guard shields

UNIT – III
BALANCING, FILTERING AND SHIELDING

UNIT – IV
DIGITAL CIRCUIT NOISE AND LAYOUT
Frequency versus time domain- analogy versus digital circuits- digital logic noise- internal noise sources- digital circuit ground noise -power distribution-noise voltage objectives measuring noise voltages-unused inputs-logic families

UNIT – V
ELECTROSTATIC DISCHARGE, STANDARDS AND LABORATORY TECHNIQUES
Static Generation - human body model - static discharges-ED protection in equipment design- ESD versus EMC, Industrial and Government standards - FCC requirements - CISPR recommendations-Laboratory techniques- Measurement methods for field strength-EMI

TEXT BOOKS:

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**UNIT – I  
INDUSTRIAL POWER CONTROLLERS**  
Uninterrupted power supplies (UPS), online UPS, offline UPS, high frequency online UPS, programmable logic controllers, Voltage stabilizers-servo mechanism, single phase & three phase servo voltage stabilizers

**UNIT – II  
AMPLIFIERS IN INDUSTRIAL ELECTRONIC CIRCUITS & INDUSTRIAL TIMING CIRCUITS**  

**UNIT III  
OPTOELECTRONIC DEVICES AND CONTROL**  
Introduction, photo emitters, lasers, liquid crystal displays, photoconductive sensors, photodiodes, phototransistors, LASERS/photo SCRs, opto-couplers, solid state relays (light operated relays), optical fiber.

**UNIT – IV  
STEPPER MOTORS & SERVO MOTORS CONTROL**  

**UNIT – V  
HEATING & WELDING CONTROL**  
Induction heating, Effects of supply frequency & source voltage on induction heating, Dielectric heating, Effect of variation of supply voltage & frequency on dielectric heating, Welding, Resistance welding-theory & classification, scheme of AC resistance welding, Ignitron-heat control by change of firing angles in ignitrons, complete control in resistance welding by a sequence timer.

**TEXT BOOKS:**
1. G.K.Mithal and Dr.Maneesha Gupta “Industrial and Power Electronics”, Khanna Publisher, 2007

**REFERENCES:**
UNIT - I
INTRODUCTION

UNIT - II
MODELLING & SIMULATION OF POWER SEMICONDUCTOR DEVICES
Modelling and simulation of diode, SCR, TRIAC, IGBT and Power Transistors - Application of numerical methods to power electronic switches - Simulation of gate/base drive circuits and snubber circuits (using MATLAB and PSPICE).

UNIT - III
MODELLING & SIMULATION OF RECTIFIERS
Mathematical modelling and simulation of single phase and three phase semi, fully controlled rectifiers with R, R-L and R-L-E loads using MATLAB/SIMULINK.

UNIT - IV
MODELLING & SIMULATION OF CHOPPERS
Mathematical modelling and simulation of buck, boost and buck-boost converters with R, R-L and R-L-E loads using MATLAB/SIMULINK.

UNIT - V
MODELLING & SIMULATION OF INVERTERS
Mathematical modelling and simulation of single phase and three phase half and full bridge inverter with R and R-L loads using MATLAB/SIMULINK.

TEXT BOOKS:

REFERENCES:
UNIT – I
MODEL PARAMETERIZATIONS

UNIT – II
LEAST SQUARE ESTIMATION
Recursive least squares (RLS), Consistency of estimation, Weighted LS, Parametric models, LS estimation, generalized least squares (GLS) and instrumental variable (IV) method.

UNIT – III
PROPERTIES OF LEAST SQUARE ESTIMATION
Persistently exciting input signal, Likelihood functions and maximum likelihood estimation (MLE), Singular value decomposition (SVD), Stochastic approximation algorithm (STA), Model order and structure determination.

UNIT – IV
KALMAN FILTERING

UNIT – V
MULTI VARIABLE SYSTEM REPRESENTATION
Multi-variable system representation, controllability and observability indices, Feedback system identification and Identification cycle.

TEXT BOOKS:

REFERENCES:
LIST OF EXPERIMENTS

(Minimum five experiments from each cycle can be conducted)

Cycle – I:
Simulation based experiments using PSCAD, MATLAB, and PSpice

1. Switching characteristics of power MOSFET & IGBT.
3. Performance of Three phase IGBT based AC Voltage controller with RL load.
5. Performance of Three phase bridge inverter with SPWM control.
7. Cascade speed control of a dc motor drive.
8. Characteristics of induction machines under balanced and symmetrical conditions for
   the following
   a. dq model in synchronous reference frame
   b. dq model in stator reference frame
   c. dq model in rotor reference frame.

Cycle – II:

15. Speed control & performance of 3 phase slip ring Induction motor by Static Rotor
    Resistance Control.

[Signature]
HEAD

Dept. of Electrical and Electronics Engg.
Lakireddy Bali Reddy College of Engineering
M.TECH.(PED) A.Y. 2014-15 Page 26 of 39
II SEMESTER
MTEE201 - SWITCHED MODE POWER CONVERSION

Lecture : 4 Periods / Week  Internal Marks : 40
Tutorial : 1 Period / Week  External Marks : 60
Credits : 3  External Examination : 3 hrs.

UNIT – I
NON ISOLATED SWICHMODE POWER CONVERSION
Analysis & Designing of Buck converters, Boost converters, Buck-Boost converters, Cuk converters-continuous and discontinuous modes, applications, problems

UNIT – II
ISOLATED SWICHMODE POWER CONVERSION

UNIT – III
SOFT SWITCIIING CONVERTERS
Classification of Resonant converters-Basic resonant circuits- Series resonant circuit-Parallel resonant circuits- Resonant switches, Concept of Zero voltage switching-Principle of operation, analysis of M-type and L-type Buck or boost Converters-Concept of Zero current switching-Principle of operation-Analysis of M-type and L-type Buck or boost Converters.

UNIT – IV
POWER FACTOR CORRECTION CIRCUITS
Introduction, Definition of PF and THD, Power Factor Correction , Energy Balance in PFC Circuits , Passive Power Factor Corrector, Basic Circuit Topologies of Active Power Factor Correctors , System Configurations of PFC Power Supply, CCM Shaping Technique , Current Mode Control, Voltage Mode Control, Other PFC Techniques.

UNIT – V
CONTROL METHODS FOR SWITCHING POWER CONVERTERS
Control methods for buck, boost and forward dc-dc converters using State-space Modeling, Converter Transfer Functions, Pulse Width Modulator Transfer Functions, and Linear Feedback Design Ensuring Stability

TEXT BOOKS:

REFERENCES:
2. L. Umanand “Power Electronics Essentials & Applications”, Wiley India Private Limited.
UNIT - I
VECTOR CONTROL OF INDUCTION MOTOR
Principles of vector control, Direct vector control, derivation of indirect vector control, implementation – block diagram; estimation of flux, flux weakening operation

UNIT - II
SENSORLESS VECTOR CONTROL OF INDUCTION MOTOR
Slip and Speed Estimation at low performance, Rotor Angle and Flux linkage Estimation at high performance -rotor Speed Estimation Scheme- estimators using rotor slot harmonics, Model Reference adaptive systems, Extended Kaman Filter, injection of auxiliary signal on salient rotor.

UNIT - III
CONTROL OF SYNCHRONOUS MOTOR DRIVES
Synchronous motor and its characteristics- Control strategies-Constant torque angle control power factor control, constant flux control, flux weakening operation, Load commutated inverter fed synchronous motor drive, motoring and regeneration, phasor diagrams.

UNIT - IV
CONTROL OF SWITCHED RELUCTANCE MOTOR DRIVES
SRM-principle of operation, Design aspects of stator and rotor pole arcs, torque equation, torque-speed characteristics-Stator Excitation-techniques of sensor less operation-converter topologies- SRM Waveforms-SRM drive design factors-Torque controlled SRM-Torque Ripple- Instantaneous Torque control -using current controllers-flux controllers.

UNIT - V
CONTROL OF BLDC MOTOR DRIVES

TEXT BOOKS:
1. R. Krishnan “Electric Motor Drives Modelling, Analysis & control”, Pearson Education

REFERENCES:
3. Peter Vas “Sensor less Vector Direct Torque control”, Oxford University Press.
4. Venkataratnam “Special electrical Machines”, University press.
MTEE203 - DSP PROCESSORS AND FPGA

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<td>3 hrs.</td>
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UNIT – I
INTRODUCTION TO DSP
Introduction, A Digital signal-processing system, the sampling process, Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Basic Architectural features of DSP processor TMS320F28X, Memory Mapping.

UNIT – II
I/O & EVENT MANAGERS
Pin Multiplexing (MUX) and General Purpose I/O Overview, Peripheral interrupt expansion unit. Overview of the Event manager (EV), Compare UNITs, Capture UNITs and Quadrature Encoder Pulse (QEP) Circuit

UNIT – III
DSP PROGRAMMING
Instruction Set: data transfer, arithmetic and logical instructions, conditional, bit operating instructions and Programming-arithmetic operations, logical operations and generation of pulses

UNIT – IV
FPGA
Introduction, CPLD Vs FPGA - Types of FPGAs, Configurable logic Blocks (CLB), Input/output Block (IOB) - Programmable Interconnect Point (PIP)

UNIT – V
HDL PROGRAMMING
Instruction set- data transfer, arithmetic instructions, logical instructions, conditional, bit operating instructions. Programming-arithmetic operations, logical operations and generation of pulses.

TEXT BOOKS:
1. TMS320F28X datasheets (Texas Instruments).

REFERENCES:
# MTEE204 - MODERN CONTROL THEORY

<table>
<thead>
<tr>
<th>Lecture</th>
<th>4 Periods / Week</th>
<th>Internal Marks</th>
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<td>External Examination</td>
<td>3 hrs.</td>
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## UNIT – I
### MODAL CONTROL
Introduction to controllability and observability- Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement, Full order observer and reduced order observer.

## UNIT – II
### DESCRIBING FUNCTION ANALYSIS
Introduction to Non Linear Systems, behaviour of nonlinear systems, properties of Nonlinear Systems, Types of Nonlinearities – Saturation – Dead Zone – Hysteresis-Relay-Backlash etc, Introduction to Linearization of nonlinear systems, Describing function (DF)– Derivation of general DF, DF for different nonlinearities -saturation, Dead-Zone-Dead-Zone and Saturation, Hysteresis-Backlash .Stability analysis of Non – Linear systems through describing functions.

## UNIT – III
### PHASE PLANE ANALYSIS
Introduction to phase plane analysis, singular points, and their classification, limit cycle and behaviour of limit cycle- Analytical method, Isoclines method, and delta method for constructing Trajectories, phase plane analysis of nonlinear control systems.

## UNIT – IV
### STABILITY ANALYSIS

## UNIT – V
### OPTIMAL CONTROL
Introduction, Formulation of optimal control problems- Minimum time, Minimum energy, minimum fuel problems- State regulator problem- Output regulator problem-Tracking problem, calculus of variations – fundamental concepts, minimization of functional, Linear quadratic regulator, Linear Quadratic Gaussian(LQG)

## TEXT BOOKS:

## REFERENCES:
**MTEE2051 - POWER QUALITY**

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**UNIT – I**

**OVERVIEW OF POWER QUALITY**

Power quality (PQ) problem, Voltage sag, Swell, Surges, Harmonics, over voltages, spikes, Voltage fluctuations, Transients, interruption overview of power quality phenomenon, Remedies to improve power quality, power quality monitoring.

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**UNIT – II**

**VOLTAGE SAGS AND INTERRUPTIONS**

Sources of sags and interruptions-Estimating Voltage sag performance-Fundamental principles of protection-Solutions at the End-User level-Evaluating the economics of different ride-through alternatives-Motor starting sags-Utility system fault-clearing issues

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**UNIT – III**

**HARMONICS**


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**UNIT – IV**

**POWER QUALITY MONITORING**

Monitoring considerations-Historical perspective of power quality measuring instruments-Power quality measurement equipment-Assessment of power quality measurement data-Application of intelligent systems-Power quality monitoring standards.

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**UNIT – V**

**POWER QUALITY BENCHMARKING**

Introduction, Benchmarking process, power quality contracts, power quality insurance, power quality state estimation, power quality in distribution planning

**Wiring and Grounding:** Definitions and resources, reasons for grounding, typical wiring and grounding problems, solutions to wiring and grounding problems

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**TEXT BOOKS:**


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**REFERENCES:**

**MTEE2052 - ADVANCED DIGITAL SIGNAL PROCESSING**

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**UNIT – I**
**DIGITAL FILTER STRUCTURE**

Block diagram representation-Equivalent Structures-FIR and IIR digital filter Structures All pass Filters-tunable IIR Digital Filters-IIR tapped cascaded Lattice Structures-FIR cascaded Lattice structures-Parallel-Digital Sine-cosine generator-Computational complexity of digital filter structures.

**UNIT – II**
**DIGITAL FILTER DESIGN**

Preliminary considerations-Bilinear transformation method of IIR filter design-design of Low pass high pass-Band pass- and Band stop- IIR digital filters-Spectral transformations of IIR filters, FIR filter design-based on Windowed Fourier series- design of FIR digital filters with least-mean-Square-error-constrained Least-square design of FIR digital filters

**UNIT – III**
**DSP ALGORITHM IMPLEMENTATION**

Computation of the discrete Fourier transform- Number representation-Arithmetic operations-handling of overflow-Tunable digital filters-function approximation

**UNIT – IV**
**ANALYSIS OF FINITE WORD LENGTH EFFECTS**


**UNIT – V**
**POWER SPECTRUM ESTIMATION**


**TEXT BOOKS:**

**REFERENCES:**
3. Auntonian “Digital Filter Analysis and Design”, TMH
MTEE2053 - POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS
Lecture : 4 Periods / Week  
Internal Marks : 40
Tutorial : 1 Period / Week  
External Marks : 60
Credits : 3  
External Examination : 3 hrs.

UNIT – I
SOLAR ENERGY & INTEGRATION
Introduction to PV-Cells, Array, Solar power extraction using PV-Cells, I-V Characteristics, PV-Inverters without D.C to D.C converters, Grid interfacing-with isolation, without isolation, Maximum power point tracking-Methods, PV-Inverters with D.C. to D.C. converters-on low frequency side and high frequency side with isolation, without isolation, design aspects of DC -D.C converter.

UNIT – II
WIND ENERGY & INTEGRATION

UNIT – III
FUEL CELLS

UNIT – IV
MICROGRIDS
Concept of micro grid, need and applications, formation of micro grid, issues of integration, protection and control of micro grid, integration of renewable energy sources.

UNIT – V
ENERGY STORAGE SYSTEMS
Energy storage parameters, Lead acid batteries-construction features-operating limits-Maintenance, Ultra capacitors-double layer capacitor-high energy capacitor-applications, Flywheels, superconducting magnetic storage system, storage heat

TEST BOOKS:
1. Farret, M. Godoy simoe, “Integration of alternative sources of energy”, Felix publisher.
REFERENCES:
MTEE2061 - HVDC AND FACTS

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UNIT – I
HVDC TRANSMISSION
Types of dc links, schematic of HVDC transmission system, greatz circuit, converter control characteristics, principle of D.C link control, starting and stopping of D.C link,

UNIT – II
MULTI TERMINAL DC LINKS & SYSTEMS
Types-Series, Parallel and series-parallel systems, Converter fault types-D.C fault, A.C fault-protection against over-current and over-voltage in converter station, types of harmonics in HVDC systems, types of filters-AC and DC filters

UNIT – III
FACTS CONCEPTS
Power flow in AC systems-Definitions of FACTS-Basic types of FACTS controllers-power flow control- constraints of maximum transmission line loading-loading capability limits-dynamic stability considerations-benefits from FACTS controllers

UNIT – IV
SERIES & SHUNT COMPENSATIONS
Concepts of static series compensation using GCSC, TCSC and TSSC, applications, Static Synchronous Series Compensator (SSSC)-Principles of shunt compensation–Variable Impedance type & switching converter type- Static Synchronous Compensator (STATCOM) configuration, characteristics and control

UNIT – V
UNIFIED POWER FLOW CONTROLLER

TEXT BOOKS:

REFERENCES:

HEAD
Dept. of Electrical and Electronics Engg
LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
M.TECH.(PED) A.Y. 2014-15
MTEE2062 - HYBRID ELECTRIC VEHICLES

Lecture : 4 Periods / Week  
Internal Marks : 40

Tutorial : 1 Period / Week  
External Marks : 60

Credits : 3  
External Examination : 3 hrs.

UNIT – I
INTRODUCTION
History of hybrid electric vehicles, social and environmental importance of hybrid electric vehicles, impact of modern drive-trains on energy supplies. Conventional Vehicles- Basics of vehicle performance, vehicle power source characterization, transmission characteristics and mathematical models to describe vehicle performance.

UNIT – II
HYBRID ELECTRIC DRIVE-TRAINS
Electric Drive-trains: Basic concepts of electric traction, introduction to various electric drives-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. Basic concepts of hybrid traction- introduction to various hybrid drives-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT – III
ELECTRIC PROPULSION
Introduction to electric components used in hybrid and electric vehicles. Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, Switched Reluctance Motor drives, drive system efficiency.

UNIT – IV
DRIVE SYSTEM
Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor and power electronics, selecting the energy storage technology, Communications, supporting subsystems

UNIT – V
ENERGY MANAGEMENT STRATEGIES
Introduction, classification and comparison of different energy management strategies, implementation issues of energy management strategies
Case Studies: Design of -Hybrid Electric Vehicle (HEV), Battery Electric Vehicle (BEV)

TEXT BOOKS:

REFERENCES:
2. Chris MI, M. Abul and David Wenzhong Gao, “Hybrid Electrical Vehicle Principles and Application with Practical Perspectives”.

M.TECH.(PED)  A.Y. 2014-15
UNIT – I
INTRODUCTION TO ARTIFICIAL INTELLIGENCE SYSTEMS
Neural networks, Fuzzy Logic, Genetic algorithms. Basic concepts of Neural networks-Humans and Soft Computing techniques, Organization of the Brain, Biological Neuron, Artificial Neural Networks, McCulloch-Pitts Model, ANN Architectures, Learning strategy (Supervised, Unsupervised, Reinforcement).

UNIT – II
FEED FORWARD NEURAL NETWORKS

UNIT – III
FUZZY LOGIC-I
Introduction to Fuzzy sets - Properties, Operations, relations, Fuzzy membership functions - different types. Fuzzification, Membership value assignment, development of rule base.

UNIT – IV
FUZZY LOGIC-II

UNIT – V
GENETIC ALGORITHM

TEXT BOOKS:

REFERENCES:
2. Peter Vas “artificial intelligence based Electrical Machines and Drives”, Oxpord University Press.
LIST OF EXPERIMENTS

(Minimum five experiments from each cycle can be conducted)

Cycle - I: Simulation based experiments using PSCAD, MATLAB, and PSPICE

1. Performance of capacitor start & capacitor run single phase Induction motor.
6. Speed control of PM synchronous motor by voltage control method
7. Speed control of BLDC motor by voltage control method

Cycle - II:

8. PIC Microcontroller based Power factor correction with Boost converter
9. Speed control of BLDC motor by voltage control method.
10. Speed control of Switched Reluctance Motor with eddy current load.
12. Speed control of PMSM Drive.
13. Digital to Analog converter (DAC) and Analog to Digital converter (ADC) using DSP.
14. Generation of sinusoidal signal using DSP.
15. Generation of three phase sine triangle PWM pulses using DSP.