# MEPE – 201 Solid State controllers of Drives

**UNIT – 1**
Microprocessor based control of converters such as rectifiers. Chopper.

**UNIT-II**
Microprocessor based control of Inverters cyclo-converters. Use of PLL

**UNIT-III**
Field oriented control (Vector control) and programmable controllers for three phase drives.
Steady state and transient analysis of phase controlled converter fed and chopper fed DC drives torque speed curves.

**UNIT-IV**
Steady state and transient analysis of three phase induction motor drives
(i) Variable stator voltage control (ii) Variable frequency controls (iii) V/F control (iv) slip recovery scheme (v) Vector control. Torque speed curves.

**UNIT-V**
Steady state and transient analysis of three-phase synchronous motor drives
(i) VSI and CSI fed PWM controlled drive (ii) True mode and self control mode of tion scheme (iv) Switched Reluctance scheme.
operation (iii) Brushless e
Torque speed curves.

BOOKS:
Ned Mohan, T.M. Undeland, W.P. Robbins, Power Electronics-Converters, Applications and design",John Wiley & amp; Sons.
J.M.D. Murphy, F.O. Turnbull, "Power Electronic Control of AC motors", Pergamon Press.
P.C. Sen, D.C. drive, Pergamon Press
B.K. Bose, Power Electronics & amp; AC drive prentice Hall.
Dubey G.K. "Power semi Conductor controller drives, Prentice Hall.
Vedam Subramanyam, "Electrical Drives".
T.J.E. Miller, Switched Reluctance & P.M. B.L. DC motor, Pergamon Press

# MEPE – 202 Advanced Microprocessor and Application

**UNIT – 1**

Review of basic microprocessor and microcomputer concepts and the architecture and instruction set of a typical 8 bit microprocessor.

**UNIT-II**

ADVANCED PROCESSORS

Over view of 16-bit/32-bit/64 bit Intel based microprocessors. Arithmetic and I/O co-processor architecture. Register details, operation-addressing modes & instruction set of a typical 16-bit microprocessor assembly language programming for the processor introduction to multiprocessing.

**UNIT-III**

PROGRAMMIABLE SUPPORT CHIPS

Programmable parallel interface chip (e.g. 8255) functional schematic. Pin function operating mode interface with microprocessor chip programming serial communication interface chip (e.g. 8251) functional schematic pin function. Operating mode interface with processor mode and command words for the chip programmable interrupt controller (8259) functional schematic pin function single and cascaded operation interface with microprocessor and I/O devices programmable interval timer (8253) functional schematic pin functions. Modes of operations.

**UNIT-IV**

ANALOG INPUT AND OUTPUT

Microprocessor compatible ADC & DAC chips interfacing ADC with multiplexer with ADC,
microprocessor use of sample and hold circuit a
interfacing DAC with microprocessor.

**UNIT-V**

MICROCONTROLLER

Hardware and software integration in microprocessor control system. An overview of 8-bit microcontroller architecture and instruction set.

CASE STUDY

Example of microprocessor application: Data acquisition system open loop close loop controller

BOOKS:


1. Advanced Microprocessor ,TMH — A.K.Ray, K.M.Bhurchandi
2. Microprocessor — Gaonkar
3. Microprocessor,Hardware & Programming — Douglas V Hall

# MEPE – 203 Power Electronics App. To Power System

**UNIT I**

Power System components models formation of bus admittance matrix, algorithm for formation of bus impedance matrix. Reactive power capability of an alternator, transmission line model & loadability, Reactive power transmission & associated difficulties, Regulated shunt compensation, Models of OLTC & Phase shifting transformer, load flow study.

**UNIT II**

Sensitivity analysis: Generation shift distribution factors, line outage distribution factors, Compensated shift factors. Power systems security levels, contingency selection & evaluation, security constrained economic dispatch. Pre-contingency corrective rescheduling.

**UNIT-III**

Voltage stability: Proximity indicators e.g. slope of PV curve, Minimum Eigen value of reduced load flow Jacobian participation factors based on modal analysis and application.

**UNIT-IV**

Flexible ac transmission system, reactive power control, brief description and definition of FACT's controllers, shunt compensators, configuration and operating characteristics of TCR, FC-TCR, TSC, Comparisons of SVCs.

**UNIT-V**

Thyristers controlled series capacitor (TCSC) Advantages of the TCSC, Basic principle and different mode of operation, analysis variable reactance model and transient stability model of TCSC.

**Reference Books**


1. Modern power system analysis D.P. Kothari, I.J. Nagrath, TMH, 2003
2 Power generation operation and contrl A.J. Wood, B.F. Woolenberg, jhonwieldy, 1996
3. Understanding facts: Concepts and technologies of flexible AC transmission system IEEE Press,2001 N.G. Hingorani, L. Gyugyi
4. Power system stability and control IEEE press P. Kundur, 1994
5. Thyristor Based FACTS controllers for electrical Transmission systems- R.M. Mathur, R.K. Verma, Wieldy Inter science, 2002

# MEPE – 204 Modeling and Simulation of Drives

**UNIT-I**

Mathematical modeling of electrical machines, Reference frame theory, Transformation of variables between reference frames, analysis of AC and DC machine Linearised equations of AC and DC machine.

**UNIT-II**

Stability analysis Four Quadrant operation of Drive, Motor characteristics thermal effects in electrical machines, Rating, Selection of motor and its size.

**UNIT – III**

Open loop and closed loop control of converter and chopper fed DC motors.

**UNIT-IV**

Analysis of CSI and VSI fed AC drive, Generalized operation of induction motor with impressed voltage of non sinusoidal waveform, analysis using equivalent circuit harmonic losses, Derating, Scalar Control of induction motor drives Variable frequency synchronous motor drive, concept of vector control of AC drives.

**UNIT-V**

MATLAB simulation of DC AC machines and drives system.

**BOOKS**


1. Power Electronics & Drives - B.K. Bose
2. Electrical machines and Converters- Modelling and simulation H.Buyse, I.J. Robert
3. Thyristor control of Electrical Drive - V. Subrahmanyam
4. Thyristor DC Drives- P.C. Sen
5. Analysis of Electrical Machine- P.C. Krause

# MEPE 205 – Power Quality and Conditioning

UNIT 1
Understanding Power quality, types of power quality disturbances, power quality indices, Causes and effects of power quality disturbances

UNIT 2
Causes and effects of harmonics, converter configuration and their contribution to supply harmonics, other sources of harmonics

UNIT 3
Radio interference, supply standards, elimination/suppression of harmonics, classical solutions & their drawbacks, passive input filters,design of harmonic filters,Improved power quality converter topologies,(single and three phase), transformer connections, Elimination/suppression of harmonics using active power filters – topologies, and their control methods, PWM converter as a voltage source active filter, current source active filter,

UNIT 4
Active waveshaping of input line current, constant frequency control, constant tolerance band control, variable tolerance band control, discontinuous current control,Electromagnetic interference(EMI), EMI generation ,EMI standards,and elimination.

Reference Books:
1. Power Quality – by R.C. Duggan
2. Power system harmonics – by A.J. Arrillga
3. Power electronic converter harmonics – by Derek A. Paice
4. Power Electronics –Mohan,Undeland,Robbins