

MTPS – 201 Power Electronics Applications 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

Thyristor 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 control, A.J. Wood, B.F Woolenberg, John W
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, Wiley inter science, 2002

MTPS – 202 Advance Course In Electrical Machines

UNIT 1

Review: Primitive machine, voltage and torque equation. Concept of transformation, change of variables, m/c variables and transform variables. Application to D.C. machine for steady state and transient analysis, equation of cross field commutator machine.

UNIT 2

Induction Machine: Voltage, torque equation for steady state operation, Equivalent circuit, Dynamic performance during sudden changes in load torque and three phase fault at the machine terminals. Voltage & torque equation for steady state operation of 1- ϕ induction motor & scharge motor.

UNIT 3

Synchronous Machine: Transformation equations for rotating three phase windings, Voltage and power equation for salient and non salient alternator, their phasor diagrams, Simplified equations of a synchronous machine with two damper coils.

UNIT 4

Operational Impedances and Time Constants of Synchronous Machines : Park's equations in operational form, operational impedances and $G(P)$ for a synchronous machine with four Rotor Windings, Standard synchronous machine Reactances, time constants, Derived synchronous machine time constants, parameters from short circuit characteristics.

UNIT 5

Approximate Methods for Generator & System Analysis: The problem of power system analysis, Equivalent circuit & vector diagrams for approximate calculations, Analysis of line to line short circuit, Application of approximate method to power system analysis.

Reference Books:

1. Analysis of Electric Machinery - P.C.Krause
2. The General theory of Electrical Machines - B.Adkins
3. The General theory of AC Machines - B.Adkins & R.G.Harley
4. Generalised theory of Electrical m/c - P.S.Bhimbra
5. Electro Mechanical Energy Conversion - White & Woodson

w.e.f. 2014-15

MTPS 203- POWER SYSTEM LABORATORY

Suggestive list of experiments

1. Study of Bucholz relay.
2. To determine the characteristics of inverse time current relay.
3. To determine the dielectric strength of transformer oil.
4. Separation of eddy current & iron losses of single phase transformer.
5. To perform slip test on synchronous machine and to determine d-axis & q-axis reactances.
6. To measure the direct axis subtransient reactance of synchronous machine.
7. To measure the quadrature axis subtransient reactance of synchronous