DR. A P J ABDUL KALAM UNIVERSITY, INDORE

SYLLABUS

of

MASTER OF TECHNOLOGY (POWER SYSTEM)

Department of Electrical Engineering

(Second Year)

(Session July- December 2017)

College of Engineering

Dr. A P J Abdul Kalam University, Indore

DR. A P J ABDUL KALAM UNIVERSITY, INDORE

Syllabus for Master of Technology (Power System)

Department of Electrical Engineering

List of Subject (Second Year)

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Sub Code: MTPS-301[1] Sub Name: Power System Instrumentation 4 Credits

UNIT-1

Introduction to instrumentation and control of energy systems, display instruments, Recorders.

UNIT-2

Transducers, sensors, actuators such as pressure, temperature, velocity, speed, volume, torque and solar flux measuring devices, current, voltage and power factor.

UNIT-3

Gas analysers, power plants and industrial instrumentation and pollution monitoring devices.

UNIT- 4

Signal conditioning of inputs, single channel and multichannel data acquisition system, D/A and A/D converters, data loggers, supervisory control.

UNIT- 5

Data transmission systems, Advantage and disadvantage of digital transmission over anolog. Time division multiplexing, pulse modulation, digital modulation.

References :

[1] Transducers & Instrumentation by D.V.S. Murty – PHI Prentice Hall.
[2] Electronic Instrumentation by H.S.Kalsi – Tata McGraw Hill.
[3] Electrical and Electronics Measurement and Instr., A.K.Sawhney, Dhanpat Rai.
[4] Instrumentation devices and systems by C.S.Rangan and G.R. Sharma, TMH

Sub Code: MTPS-301[2] Sub Name: Power Controller 4 Credits

UNIT 1

Various power semiconductor devices i.e. SCR, GTO, MOSFET, BJT, IGBT & MCT's & their protection, series-parallel operation, Heat sink calculations, Design of firing circuit for converters, choppers & inverters.

UNIT 2

Analysis & design of 1-φ bridge converter, 3-φ bridge converter with and without freewheeling diode, effect of source impedence, power factor improvement techniques, pulse width modulated converters, Dual converters, converter for HVDC application & DC drives.

UNIT 3

Analysis & design of voltage commutated, current commutated and load commutated choppers, multi quadrant choppers, chopper for traction application. Resonant choppers, SMPS.

UNIT 4

Detailed analysis of 1-φ VSI, 3-φ VSI (180° mode, 150° mode & 120° mode of conduction), various inverter commutation circuits, harmonic reduction techniques, PWM inverters, Inverters for HVDC application & AC drives. Advantages & limitation of current source inverters over VSI, 1-ö and 3-ö CSI. Resonant inverters.

UNIT 5

1-φ to 1-φ, 3-φ to 3-φ cyclo-converter circuits, circulating current scheme, non-circulating current operation, Mean output voltage, harmonics in supply current waveform & input-power factor. Concept of power quality.

References :

[1] Thyristorised Power Controllers - G.K.Dubey, Doradla, Joshi, Sinha
[2] Power Electronics - C.W.Lander
[3] Power Electronics - Rashid
[4] Thyristorised power controlled converters & cycloconverters - B.R.Pelly
[5] Power Electronics - N.Mohan

Sub Code: MTPS-302[1] **Sub Name: Special Machines** **4 Credits**

UNIT 1

Square wave permanent magnet brushless dc motor, magnetic circuit analysis on open circuit torque & emf equations, torque speed characteristics, efficiency, commutation, winding inductances, armature reaction and controllers.

UNIT 2

Sine wave permanent magnet brushless dc motor, torque & emf equation, Inductance of phase winding, synchronous reactance, phasor diagram, torque-speed characteristics.

UNIT 3

Switched reluctance motor, static torque production, partition of energy and the effects of saturation, Dynamic torque production, torque speed characteristics, shaft position sensing, solid rotors.

UNIT 4

Linear Induction Motors, construction, performance, thrust-speed characteristic, application, end effect.

UNIT 5

Stepper motor – variable reluctance stepper motor, single stack stepper motor multistack stepper motor, permanent magnet stepper motor, Important features of stepper motor, torque v/s stepping rate characteristics, Drive circuits, unipolar drive circuits, Bipolar drive circuits.

References:

[1] Brushless Permanent Magnet & Reluctance Motor Drives – T.J.E.Miller
[2] Principles of Electric Machines & Power Electronics – P.C.Sen
[3] Electric Drives – G.K.Dubey

Sub Code : MTPS-302 [2] **Sub Name : Advanced Electrical Drives** **4 Credits**

UNIT 1

Electrical Drives Introduction, Choice of Electrical Drives, Dynamics of Electrical Drives, Concept of Multi-quadrant operation, Components of load torques. Selection of motor power rating.

UNIT 2

D.C. Drive, speed torque, speed control. Starting, Breaking. Controlled rectified fed DC drive, chopper controlled dc drives. Close loop control of d.c. drive. Introduction of transient analysis.

UNIT 3

Induction Motor Drives : Three phase I.M., analysis and performance. Operation with unbalanced source voltages and single phasing, analysis of I.M. fed from Non-sinusoidal voltage supply. Starting, Breaking, Introduction of transient analysis. Speed control methods, single phase I.M. Close loop control of I.M. Drives.

UNIT 4

Synchronous Motor Drives, cylindrical rotor wound field motor, salient pole wound field motor, synchronous reluctance motor, Hysterisis synchronous motor, operation from fixed frequency supply, starting, breaking, synchronous motor variable speed drives, starting large synchronous machines.

UNIT 5

Introduction of Brushless dc motor, stepper motor and switch reluctance motor drives, solar and battery powered drives, Traction Drives, Energy conservation in Electrical Drives.

References:

[1] Power semi conductor controlled drives by G.K. Dubey
[2] Fundamentals of Electrical Drives by G.K. Dubey
[3] Electrical Machine & Power Electronics by P.C. Sen