

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Electrical & Electronics Engineering, VIII-Semester

Departmental Elective EX- 802 (A) Power quality Problems and mitigation techniques

UNIT-I Introduction, power quality -voltage quality, power quality evaluations procedures term and definition: general classes of power quality problem, causes & effect of power quality disturbances.

UNIT-II Loads that causes power quality problems, State of art on Passive shunt and series compensation, Classification and working of passive shunt and series compensation, Classification, Principle and control of active shunt compensator: DSTATCOM, Active series compensators, working and its control.

UNIT-III Introduction to unified power quality compensators, classification, working and operation of UPQC.

UNIT-IV Voltage sags and interruption: sources of sags and interruption, estimating voltages sag performance, fundamental principles of protection, monitoring sags. Transients over voltages: sources of transient over voltages, principles of over voltages protection, utility capacitor switching transients, fundamentals of harmonics and harmonics distortion, harmonics sources from commercial load and from industrial loads.

UNIT-V Applied harmonics : harmonics distortion evaluations, principles for controlling harmonics, harmonics studies devices for controlling harmonic distortion, Shunt active and passive filters, their operation and control.

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 quality problems and mitigation techniques: Bhim singh, Amrish Chandra, Kamal Al- Haddad.

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Departmental Elective EX- 802 (B) Special Machine

UNIT- I Stepper Motors: Discretisation of angular position by stepper structures, stepping angle and frequency of excitation. VR and PM rotor structures and their torque production, torque angle characteristics. The hybrid structure and torque production by permanent magnet and excitation fluxes. Power electronic converters for stepper motors, control by load angle.

UNIT - II 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- III BrushLess DC Motor construction and principle, speed control, basic concept of torque, outer and inner rotor, magnetic circuit concept, electrical analogy, winding pattern series and parallel, Thermal consideration.

UNIT- IV Permanent magnet materials and circuits; Characteristics, parameters, properties, classification and calculations, Permanent magnet motors, D.C. brushed motors, design analysis and control and applications.

UNIT- V PM synchronous motors, rotor construction, theory, operation, control and applications. PM step motors, hybrid step motors, sensorless control, reduction of torque pulsations; Case studies such electric vehicles, industrial drives, PV fed water pumping.

Reference Books:

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
4. Permanent magnet synchronous & brushless DC motor drives- R Krishnan, CRC Press, 2004

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Electrical & Electronics Engineering, VIII-Semester

Departmental Elective EX- 802 (C) SCADA Systems & Applications

Unit I Introduction to SCADA and PLC: SCADA: Data acquisition system, evaluation of SCADA, communication technologies, monitoring and supervisory functions. PLC: Block diagram, programming languages, Ladder diagram, Functional Block diagram, Applications, Interfacing of PLC with SCADA. SCADA system components: Schemes, Remote Terminal Unit, Intelligent Electronic Devices, Communication Network, SCADA server.

Unit II SCADA Architecture-Various SCADA Architectures, advantages and disadvantages of each system, single unified standard architecture IEC 61850 SCADA / HMI Systems.

Unit III SCADA Communication-Various industrial communication technologies- wired and wireless methods and fiber optics, open standard communication protocols.

Unit IV Operation and control of interconnected power system-Automatic substation control, SCADA configuration, Energy management system, system operating states, system security, state estimation.

Unit V: SCADA applications Utility applications, transmission and distribution sector operation, monitoring analysis and improvement. Industries oil gas and water. Case studies, implementation, simulation exercises.

Reference Books:

1. Stuart A Boyer: SCADA supervisory control and data acquisition.
2. Gordan Clark, Deem Reynders, Practical Modem SCADA Protocols.
3. Sunil S. Rao, Switchgear and Protections, Khanna Publication.

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Electrical & Electronics Engineering, VIII-Semester

Departmental Elective EX- 802 (D) Application of AI in Electrical/Electronics Engg.

Unit 1:

Introduction-Models of Neural Network – Architectures – Knowledge representation – Artificial Intelligence and Neural networks – Learning process – Error correction learning – Hebbian learning – Competitive learning – Boltzman learning – Supervised learning – Unsupervised learning – Reinforcement learning – learning tasks.

Unit 2:

Multi – layer perceptron using Back propagation Algorithm-Self – organizing Map – Radial Basis Function Network – Functional link, network – Hopfield Network.

Unit 3:

Introduction – Fuzzy versus crisp – Fuzzy sets – Membership function – Basic Fuzzy set operations – Properties of Fuzzy sets – Fuzzy cartesian Product – Operations on Fuzzy relations – Fuzzy logic – Fuzzy Quantifiers – Fuzzy Inference – Fuzzy Rule based system – Defuzzification methods

Unit 4:

Introduction-Encoding – Fitness Function-Reproduction operators – Genetic Modeling – Genetic operators – Crossover – Single-site crossover – Two-point crossover – Multi point crossover-Uniform crossover – Matrix crossover – Crossover Rate – Inversion & Deletion – Mutation operator –Mutation – Mutation Rate-Bit-wise operators – Generational cycle-convergence of Genetic Algorithm.

Unit 5:

Load forecasting – Load flow studies – Economic load dispatch – Load frequency control – Single area system and two area system – Small Signal Stability (Dynamic stability) Reactive power control – speed control of DC and AC Motors.

Reference Book:

S. Rajasekaran and G. A. V. Pai, “Neural Networks, Fuzzy Logic & Genetic Algorithms”- PHI, New Delhi, 2003:
P. D. Wasserman, Van Nostrand Reinhold, ”Neural Computing Theory & Practice” – New York, 1989.

Bart Kosko, "Neural Network & Fuzzy System" Prentice Hall, 1992.
G. J. Klir and T. A. Folger, "Fuzzy sets, Uncertainty and Information"-PHI, Pvt.Ltd,1994.
D. E. Goldberg," Genetic Algorithms"- Addison Wesley 1999