RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Electrical & Electronics Engineering, VIII Semester

EX-8001Computer-Aided Design of Electrical Machines

Unit-I

Introduction: Design problem-Mathematical programming methods, computer aided design- Mathematical formulation of the problem. Programming techniques (LP & NLP only), Methods of solution, Unconstrained optimization problems, constrained optimization problems.

Unit-II

Optimal design of DC machine:-Design of armature, Windings and field systems, Selection of variables for optimal design, Formulation of design equations, Objective function, Constraint functions, Algorithms for optimal design.

Unit-III

Optimal design of power transformer:-Design of magnetic circuit, Design of windings, Selection of variables for optimal design, Formulation of design equations, Objective function, Constraint functions, Algorithms for optimal design.

Unit-IV

Optimal design for 3-phase alternator:-Design of stator, windings, Design of Field systems for salient pole and non-salient pole machines, Selection of variables for optimal design, Formulation of design equations, Objective function, Constraint functions, Algorithms for optimal design.

Unit-V

Optimal design of 3-phase induction motor:-Design of stator, Windings Design of squirrel cage rotor, Design of slip ring rotor, Selection of variables for optimal design, Formulation of design equations, Objective functions Constraint functions, Algorithms for optimal design.

References:

1. Computer- Aided Design of Electrical Equipment- by Dr. M. Ramamoorthy-Affiliated East-West press Pvt. Ltd. New Delhi.
2. Electrical Machine Design- by A.K. Sawhney, Dhanpat Rai & Sons.
3. Principles of Electrical Machine Design with Computer Programmes by- S.K. Sen, Oxford & IBH Publishing Co.
4. Performance and Design of A.C. Machines-M.G. Say, Affiliated East West Press Pvt. Ltd., New Delhi.
5. Performance and Design of D.C. Machines- Clayton & Hancock.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Electrical & Electronics Engineering, VIII Semester

EX- 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.

List of experiments:

1. Simulation showing the effect of power quality problems.
2. Simulation of reactive power compensation of linear load.
3. Simulation of harmonic analysis of balanced non-linear loads.
4. Simulation of harmonic analysis of un-balanced non-linear loads.
5. Simulation of active shunt filters for harmonics compensation.
6. Simulation of compensation device showing power factor correction.
7. Simulation of compensation device showing voltage regulation.

8. Simulation of hybrid filter as a combination of active series and passive shunt filters.
9. Simulate the effect of neutral current.
10. Simulate the effect of dynamic load connected to 3-phase system.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Electrical & Electronics Engineering, VIII Semester

EX-8003 Elective – V (1) Objected Oriented Methodologies C & C++

UNIT-I

Fundamentals of C Programming: History of C; Structure of a C Program; Data types; Constant & Variable, naming variables; Operators & expressions; Control Constructs – if-else, for, while, do-while; Case switch statement; Arrays; Formatted & unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.

UNIT-II

Modular Programming: Functions; Arguments; Return value; Parameter passing – call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion – basics, comparison with iteration, types of recursion- direct, indirect, tree and tail recursion, when to avoid recursion, examples.

UNIT – III

Advanced Programming Techniques: Special constructs – Break, continue, exit(), goto & labels; Pointers - & and * operators, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free(); String; Pointer v/s array; Pointer to pointer; Array of pointer & its limitation; Function returning pointers; Pointer to function, Function as parameter; Structure – basic, declaration, membership operator, pointer to structure, referential operator, self referential structures, structure within structure, array in structure, array of structures; Union – basic, declaration; Enumerated data type; Typedef; command line arguments. Miscellaneous Features: File handling and related functions; printf & scanf family;C preprocessor – basics, #Include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef; Variable argument list functions.

UNIT-IV

C++ basics, loops and decisions, structures and functions, object and classes, object arrays, constructor and destructor functions. Operator and function overloading, pointers, pointers to base and derived classes inheritance, public and private inheritance, multiple inheritance.

UNIT-V

Polymorphism, virtual functions, abstract base classes and pure virtual function, friend function, early and late binding. C++ I/O system, formatted I/O, creating insertors and extractors, file I/O basis, creating disk files and file manipulations using seekg(), seekp(), tellg() and tellp() functions, exception handling: try, catch and throw.

BOOKS:

1. Kerninghan & Ritchie “The C programming language”, PHI
2. Schildt “C:The Complete reference” 4th ed TMH.

3. Cooper Mullish “The Spirit of C”, Jaico Publishing House, Delhi
4. Kanetkar Y. “Let us C”, BPB.
5. Kanetkar Y.: “Pointers in C” , BPB
6. Gottfried : “Problem Solving in C”, Schaum Series
7. Jones, Harrow Brooklish “C Programming with Problem Solving”, Wiley Dreamtech India. Note : Paper is to be set unit wise with internal choice.
8. Lafore R. “Object Oriented Programming in C++”, Galgotia Pub.
9. Lee “UML & C++ a practical guide to Object Oriented Development 2 ed, Pearson.
10. Schildt “C++ the complete reference 4ed, 2003.
11. Hans Erit Eriksson “UML 2 toolkit” Wiley.
12. Balagurusawmy “Object Orienter Programming with C++”.
13. B.G., Boach “Object Oriented Analysis & Design with Applications”, Addision Wesly.
14. S. Parate “C++ Programming”, BPB. 8. Boggs “Mastering UML” BPB Publications.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Electrical & Electronics Engineering, VIII Semester

EX-8003 Elective – V (2) Soft computing techniques and applications

UNIT-1

Review of probability theory: Random variable, distribution functions , function of random variable. generation of random digit, and random variants from various distribution function, Monte Carlo simulation, sampling distributions station evolution using MCS, confidence interval, coefficient of variation.

UNIT-2

Evolution ANN, artificial neurons, activation functions, ge - rule, and back propagation rule of training, RBF and FLN network.

UNIT-3

Draw back of classical optimization techniques, genetic algorithm; binary and real parameter GA, constraints handling in GA.

UNIT-4

Evolution strategies(ES), two members non-recombinative ES, multi member ES, recombinative ES. Optimization based on swarm intelligence particle, swarm optimization and its variants .

UNIT-5

Application of soft computing techniques to problem of electrical engg. E.g. economic dispatch, reliable optimization, ANN traing using evolutionary algorithms.

References :

1. R.Y. Rubinstein Simulation and the Monte Carlo method, John Wiley & sons 1st Edition.
2. Paul. L. Mayer-Introducing probability and statical application, Addition Weslay.
3. Rajasekaran and pai- Neural Network, Fuzzy logic & Genetic Algorithms. PHI Learing
4. Multi objective optimization using evolutionary algorithm- Kalyanmoy Deb John Wiley & Sons Ltd.
5. Probability and Random processes for Electrical Engineering , Alberto Leon Garcia IInd Pearson.
6. Principles of soft computing- S N Shivanandan, S N Deepa Wiley India (P) Ltd, I edition 2007.
7. Hand book of genetic algorithm- Rajaserkharans, vijaya laxmi pai.
8. Sivanandam & Deepa- An Introduction to Neural Networks using Matlab 6.0 1st ed., TMH
9. M.Amirthavalli, Fuzzy logic and neural networks, Scitech publications.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Electrical & Electronics Engineering, VIII Semester

EX-8003 Elective – V (3) 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. 3. Electric Drives – G.K.Dubey
4. Permanent magnet synchronous & brushless DC motor drives- R Krishnan, CRCPress, 2004

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Electrical & Electronics Engineering, VIII Semester

EX-8004 Elective – VI (1) VLSI circuits and systems

Unit I

Introduction to CMOS VLSI circuit, VLSI design flow, Design strategies ,Hierarachy, regularity, modularity, locality, MOS Transistor as a Switches, CMOS Logic, Combinational circuit, latches and register, Introduction of CAD Tool , Design entry, synthesis, functional simulation.

Unit II

Specification of sequential systems Characterizing equation & definition of synchronous sequential machines. Realization of state diagram and state table from verbal description, Mealy and Moore model machines state table and transition diagram. Minimization of the state table of completely and incompletely specified sequential machines.

Unit III

Asynchronous Sequential Machine Introduction to asynchronous sequential machine, Fundamental mode and Pulse mode asynchronous sequential machine, Secondary state assignments in asynchronous sequential machine, races and hazards.

Unit IV

State Machine Algorithmic state machine and fundamental concept of hardware/ firmware algorithms. Controllers and data system designing.

Unit V

Fault Detection in combinational circuit Types of faults, Fault detection using Boolean Difference and path sensitization method. Concept of PROM, PLA, PAL, CPLD and FPGA, PALASM software applications.

Refrences:

1. Neil Weste: Principle of CMOS VLSI Design, TMH.
2. Kohavi: Switching & Finite Automata Theory, TMH.
3. Lee: Digital Circuits and Logic Design, PHI Learning..
4. Roth Jr.: Fundamentals of Logic Design, Jaico Publishing House.
5. Parag K. Lala: Fault Tolerant and Fault Testable Hardware Design, BS Publication.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Electrical & Electronics Engineering, VIII Semester

EX-8004 Elective – VI (2) Power Electronics Converters for Renewable Energy

UNIT- I

Introduction to renewable sources: world energy scenario, Wind, solar, hydro, geothermal, availability and power extraction. Introduction to solar energy: Photovoltaic effect, basics of power generation, P-V & I-V characteristics, effect of insolation, temperature, shading; Modules, connections, ratings; Power extraction (MPP), tracking and MPPT schemes; standalone systems, grid interface, storage, AC-DC loads.

Unit-II

Power converters for solar: Micro converter, DC-DC buck/boost/buck-boost /flyback /forward/cuk, bidirectional converters; Inverters: 1ph, 3ph inverters Multilevel Neutral point clamp, Modular multilevel, CSI; Control schemes: unipolar, bipolar.

Unit- III

Single phase and three-phase back Controllers. Triggering techniques for power factor and harmonic controls. Design and analysis of phase control circuits. Solid state transfer switches.
Concept of three-phase to single phase and single phase to three-phase cyclo-converter. Effect of source inductance. Concept of PWM techniques single and multiple pulse form. Working of STATCON, SVC, UPS, SMPS.

Unit- IV

Intro to wind energy: P-V, I-V characteristic, wind power system: turbine-generator-inverter, mechanical control, ratings; Power extraction (MPP) and MPPT schemes. PLL and synchronization, power balancing / bypass, Parallel power processing; Grid connection issues: leakage current, Islanding mode, harmonics, Mitigation of harmonics, filters, passive filters, Active filters, active/reactive power feeding, unbalance.

Unit-V

Generators for wind: DC generator with DC to AC converters; Induction generator with & w/o converter; Synchronous generator with back to back controlled/ uncontrolled converter; Doubly fed induction generator with rotor side converter topologies; permanent magnet based generators. Battery: Types, charging discharging.

References:

1. Sudipta Chakraborty, Marcelo G. Sim303265es, and William E. Kramer. Power Electronics for Renewable and Distributed Energy Systems: A Sourcebook of Chetan Singh Solanki, Solar Photovoltaics: fundamentals, Technologies and Applications, Prentice Hall of India, 2011.

2. N. Mohan, T.M. Undeland & W.P. Robbins, Power Electronics: Converter, Applications & Design, John Wiley & Sons, 1989
3. Muhammad H. Rashid, Power Electronics: Circuits, Devices, and Applications, Pearson Education India, 2004.
4. Topologies, Control and Integration. Springer Science & Business, 2013.
5. Remus Teodorescu, Marco Liserre, Pedro Rodriguez, Grid Converters for Photovoltaic and Wind Power Systems, John Wiley and Sons, Ltd., 2011.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Electrical & Electronics Engineering, VIII Semester

EX-8004 Elective – VI (3) Environmental Issues, Policy, Standards & Regulations

UNIT 1

Global environmental concerns: The Scenario, The Changing Global atmosphere &common concerns. United Nations Framework Convention on Climate Change (UNFCC), Kyoto Protocol, Conference of Parties (COP), Various Clean Development Mechanism (CDM), Prototype Carbon fund (PCF), Earth Summit, Sustainable development. Green Certificate

UNIT-2

The Global Program for protected area management, Strategies for environmental improvement plan. Organizations working in the field of energy and environment - UNEP, IPCCC, CPCB etc. Basic features of ISO 14000.

UNIT-3

Water Quality: Parameters: Physical, Chemical and Bacteriological .Potable Water Standards,Waste Waster Effluent Standards. Minimal National Standards (MINAS).

UNIT -4

Environment Policies: Water Act 1974, The Air Act, 1981, Environmental (Protection) Act.-1986, M. P. State Environment Policy, Municipal Solid Waste (Management & Handling) Rules, 1998, Biomedical Waste (Management & Handling) Rules 1998.

UNIT-5

Review of various energy sources. Importance of unconventional sources such as solar, biogas, wind, tidal etc. Study of typical energy converters such as high performance motors, special generators driven by biogas engines, wind turbines etc. Mini-hydro generators. Modern state-of-the art and futuristic systems in this area.

References:

1. Environmental Issues and Polices, Prentice Hall—Stephon Ison, Stephen Peake, Stuart Wall
2. ISO 14000 Environmental Management by Goetsch, Davis. Prentice Hall
3. Standard methods for the Examination of Water and Wastewater. (1989).17thEd. APHA, Washigton. D.C., 2-12
4. Energy Management by Paul O'Callaghan –McGraw Hill
5. Cleaner Production – Energy Efficiency Manual for GERIAP, UNEP, Bangkok prepared by National Productivity Council
6. Training material on 'Environmental concerns' prepared by National Productivity Council
7. Parivesh, October 2002 – Central Pollution Control Board.