EE- 601 – Microprocessor & Microcontrollers

UNIT 1: Microprocessor 8086

Introduction to 16-bit 8086 microprocessors, architecture of 8086, Pin Configuration, interrupts, minimum mode and maximum mode, timing diagram, Memory interfacing, Comparative study of Salient features of 8086, 80286 and 80386.

UNIT 2: Microprocessor 8086 programming

Instruction set of 8086, Addressing mode, Assembler directives & operations, assembly and machine language programming, subroutine call and returns, Concept of stack, Stack structure of 8086, timings and delays,

UNIT 3:Input-Output interfacing: Memory Mapped I/O and Peripherals I/O. PPI 8255 Architecture and modes of operation, Interfacing to 16-bit microprocessor and programming, DMA controller (8257) Architecture, Programmable interval timer 8254, USART 8251, 8 bit ADC/DAC interfacing and programming.

UNIT 4:Microcontroller 8051

Intel family of 8 bit microcontrollers, Architecture of 8051, Pin description, I/O configuration, interrupts; Interrupt structure and interrupt priorities, Port structure and operation, Accessing internal & external memories and different mode of operations, Memory organization, Addressing mode, instruction set of 8051 and programming.

UNIT 5: 8051 Interfacing, Applications and serial communication

8051 interfacing to ADC and DAC, Stepper motor interfacing, Timer/ counter functions, 8051 based thyristor firing circuit, 8051 connections to RS-232, 8051 Serial communication , Serial communication modes, Serial communication programming, Serial port programming in C.

BOOKS:

1. Hall Douglas V. “Microprocessor and interfacing, Programming and Hardware”, second edition, Macmillan, McGraw Hill,.
2. Ray A.K., Bhurchandi K.M. "Advance Microprocessor and peripheral", first edition, TMH
3. Muhammad Ali Mazidi and Janice Gillespie Mazidi “The 8051 Microcontroller and Embedded Systems” Pearson education, 2005.
4. V.Udayashankara and M.S.Mallikarjunaswamy “8051 Microcontroller” McGraw Hill.
5. Mc Kinlay“The 8051 Microcontroller and Embedded Systems – using assembly and C”- PHI, 2006 / Pearson, 2006.
6. Krishna Kant “microprocessors & Microcontrollers Architecture, Programming & System Design.” PHI.

EE- 602 – Electrical Power Generation

Unit I

General consideration on various sources of energy, energy conversion employing steam, energy conversion using water gas turbine

a) MHD generation
b) Solar generation
c) Wind power station
d) Geothermal power generation.

Unit II

Thermal, nuclear and gas power station:

Block diagram of thermal power station, selection of site. Different types of auxilaries used in thermal power station. Nuclear Power Station: Different types of reactors and fuels, safety methods, waste disposal..

Unit III

Gas Power Station:

Block diagram, gas cycles, combined cycle power plants. Comparison between these power stations

Hydro Power Station:

Choice of site, block diagram including surge tank and penstock, Hydrographs, flow duration curve. Types of turbines, base load and peak load power station.

Unit IV

Economic aspects of power plant operations:

Definitions load factor, demand factor and Diversity factor. Calculation of cost of generation, fixed charges, interest and depreciations, Methods of Depreciation. Tariffs: Different types of tariffs, power factor improvement.

Unit V

Economic Scheduling of Power Stations:

Economic operation of power system, criteria of loading of power plants with and without transmission loss, load dispatching in power system, co-generation and coordination of power plants.

Reference:

1.G.R.Nagpal,"Power Plant Engineering", Khanna Publisher
2.. S.N. Singh Electric Power Generation. PHI.
3. M.V.Deshpandey,"Modern Design of Power Station"

EE- 603 – Electrical Machine Design

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.

6. Design & Testing of Electrical Machines-Deshpande, PHI.

EE- 604 – Power Electronics

Unit-I

Advantages and application of power electronic devices characteristics, Symbol & application of power diodes, power transistors, GTO, Triac, Diac, Power MOSFET, IGBT, LASCR, Fast recovery diode, schottey diode MCTs. Principle of operation of SCR, Two transistor analogy, brief idea of construction of SCR, Static characteristics of SCR, Condition of turn on & off of SCR Gate characteristics, Method for turning on of SCR, Turnoff methods, different commutation techniques (Class A,B,C,D,E, & F Commutation) firing of SCR, Use of pubic transformer and opto isolator in firing, Resistance firing Ckt, Resistance capacitance firing circuit, UJT firing cut, and ramp triggering, firing for 3-Φ circuit. SCR rating & protection of SCR over voltage, Over current, Suprior firing, Design of snubber circuit and protection of gate of SCR, heating, cooling & mounting of SCR series and parallel operation of SCR, String efficiency & problem associated with series and parallel operation of SCR

Unit-II

Operation and analysis of single phase (Half wave & Full Wave) and multiphase (Three Phase) uncontrolled and controlled rectifier circuit with resistive, resistive & inductive load (continuous & non continuous conduction, Fw small & very large inductive loads) and RLE loads. Estimation of average load voltage and load current for above rectifier cirucits active and reactive power input. Effect of free wheeling diode and source inductance on performance of these rectifier circuits . Comparison of mid point & Bridge rectifier circuits.

Unit-III

Series and parallel inverter, Voltage source & current source inverter, Single phase and three phase bridge inverter, Self cumulated inverters,, Mc- murray & MC murray bed ford inverters, Voltage control of single phase and three phase bridge inverter, Harmonics & their reduction techniques.

Unit-IV

Principle of chopper operation, Various control strategies in chopper, Step up & step-up/step down choppers, chopper configuration (Type A,B, C,D, & E), Steady state analysis of chopper circuits, Current & voltage commutation of chopper circuits Jones & Morgens chopper

Unit-V

Single phase (mid point & bridge configuration) and three phase cyclo convertor configuration and operating principles. AC voltage controllers (using SCRs & Traics) single phase full wave controller with R and RL load, Estimation of RMS load voltage, RMS load current and input power factor, three phase AC voltage controller (Without analysis) Dual converter Switched mode voltage regulator buck, Boost, Buch & Boost, Ck regulators.

References:

1 M.H. Rashid, Power Electronics Circuits, Devices and Applications, Pearson
2 Education, Singapore, 1993.
3 M Ramsmoorthy, An Introduction to transistor and their application, Affiliated East-West Press.
4 P.C. Sen, Power Electonics, TMH.
5 M.D. Singh, K.B. Khanchandani, Power Electronics, TMH, Delhi, 2001.
6 Chakravarti A., Fundamental of Power Electronics and Drives, Dhanpat Ray & Co.,
7 Dr. P.S. Bhimbhra, Power Electonics, Khanna Pub.
8 Vedam Subramanyam, Power Electronics New Age International Revised II ed. 2006.
9 Randall Shaffer, Fundaments of Power Electronics With MATLAB Cengage Leaening 2008.
10 Sivanagaraju, Power Electronics, PHI.

EE- 605 – Energy Conservation & Management

UNIT-I

General energy problem: Energy use patterns and scope for conservation.
Energy audit: Energy monitoring, Energy accounting and analysis, Auditing and targeting. Energy conservation policy, Energy management & audit, Energy audit, Types of energy audit, energy management (audit), qualities and function of energy managers, language of an energy manager, Questionnaire, Check list for top management, Loss of energy in material flow, energy performance, Maximizing system efficiency, Optimizing, input energy requirements, Energy auditing instruments, Material load energy balance diagram.

Unit-II

Thermodynamics of Energy Conservation. Basic principle. Irreversibility and second law efficiency analysis of systems. Primary energy sources, optimum use of prime-movers, energy efficient house keeping, energy recovery in thermal systems, waste heat recovery techniques, thermal insulation. Thermal energy audit in heating, ventilation and air conditioning. Maintenance and Energy audit – friction, lubrication and tribo-logical innovations. Predictive and preventive maintenance.

Unit-III

Load curve analysis & load management DSM, Energy storage for power systems (Mechanical, Thermal, Electrical & Magnetic) Restructuring of electric tariff from energy conservation consideration, Economic analysis depreciation method, time value of money, Evaluation method of projects, replacement analysis, special problems inflation risk analysis. Pay back period, Energy economics, Cost Benefit Risk analysis, Pay back period.

UNIT-IV

Energy efficient electric drives, Energy efficient motors V.S.D. power factor improvement in power system. Energy Conservation in transportation system especially in electric vehicle. Energy flow networks, Simulation & modeling, formulation & Objective & constraints, alternative option, Matrix chart.

Unit-V

Energy conservation task before industry, Energy conservation equipments, Co-Generation, Energy conservation process, Industry Sugar, Textiles, Cement Industry etc Electrical Energy Conservation in building, heating and lighting. domestic gadgets

References:

- Energy Management – W.R. Murphy & G. Mckey Butler worths.
- Energy Management Head Book- W.C. Turner, John Wiley
- Energy Management Principles- Craig B. Smith, Pergamon Press
- Energy Conservation- Paul O Callagan- Pergamon Press
- Design & Management of energy conservation. Callaghan,
- Elect, Energy Utilization & Conservation. Dr. Tripathi S.C.,