

POWER SYSTEM ANALYSIS AND PROTECTION (EE-302-E)

L T P
3 1 -

Sessional: 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration : 3 Hrs.

Unit – I

Introduction:-

Per unit quantities characteristics & representation of components of a power system, synchronous machines, transformers, lines cables and loads. Single line diagram, impedance diagram, line reactance diagrams.

Protective Relaying:

Scheme of protection of generators, transformers, transmission lines & bus-bars, carrier current protection, functional characteristics of relays, operating principle of electromagnetic and static relays, over current, directional over current, differential relay, impedance relay.

Unit-II

Neutral grounding: Need for neutral grounding, various types of neutral grounding.

Circuit Interruption: Circuit interruption, theory of arc formation and its extinction in d.c., a.c. circuits, restriking and recovery voltage, interruption of capacitive and inductive currents. Rupturing capacity and rating of circuit breakers.

Circuit Breakers:- Classification of circuit breakers, circuit breakers of low medium, high & extra high voltages. Multibreak and resistance switching. Autoreclosing of high capacity & H.V. circuit breakers.

Unit-III

Fault Analysis:- Symmetrical faults, calculation of faults currents, use of current limiting reactors. Unsymmetrical faults: types of transformation in power system analysis, symmetrical components transformation, sequence impedance of power system elements.

Sequence network of power system analysis of unsymmetrical short faults sequence components filters, network analysis & its application to interconnected system.

Unit –IV

Transients in Power Systems: Transient electric phenomenon, lightning & switching surges, traveling waves, reflection & refraction of waves with different line termination, protection against dangerous pressure rises.

Stability of Power System: Concepts of stability, power angle characteristics of synchronous, steady state and transient stability swing waves.

Text Books:-

1. Elements of power system analysis by W.D. Stevenson.
2. Electric Power System by B.M. Weddy.
3. The transmission & Distribution of electric energy by H. Cotton.
4. Modern Power System Analysis by I.J. Nagrath & D.P. Kothari.
5. A Course in Electrical Power by Soni, Gupta & Bhatnagar
6. Power System Analysis & Stability by S.S. Vadhwa
7. Electrical Power System by C.L. Wadhwa
8. Electrical Power System by Ashfaq Hussain.

Note: The question paper shall have *eight questions in all organized into four sections having two questions from each of the four units. Students will be required to attempt five questions in all, selecting at least one question from each unit*

MICROCONTROLLERS & APPLICATIONS (EE-304-E)

L T P
3 1 -

Sessional: 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration : 3 Hrs.

Unit – I

Introduction:-

Comparing Microprocessors and Microcontrollers. Technological trends in Microcontrollers development. Survey of Microcontrollers – 4 bit, 8-bit, 16-bit, 32-bit Microcontrollers. Applications of Microcontrollers.

Unit-II

8051 Architecture:

block diagram, pin. Diagram of 8051. Functional descriptions of internal units, registers, PSW, internal RAM, ROM, stack, Oscillator and Clock. I/O pins, ports and circuits connecting external memory. Counters and timers. Serial data interrupt. Serial data transmission/reception and transmission modes. Timer flag interrupt. External interrupt, software generated interrupts. External memory and memory space decoding, expanding I/Os, memory mapped I/O reset & CLK circuits.

Unit-III

8051 Instruction Set and Programming:

8051 instruction syntax, addressing modes, data transfer instructions, logical instructions, arithmetic instructions, jump and call instructions. Interrupts and interrupt handler subroutines. Writing assembly language programs. Time delays. Pure S/W polled timer. Pure H/W delay. Lookup tables. Serial data transmission using time delays and polling. Interrupt driven serial transmission and reception.

Unit-IV

8051 Applications:

interfacing keyboards programs for small keyboards and matrix keyboards. Interfacing multiplexed displays, numeric displays and LCD displays. Measuring frequency and pulse width. Interfacing ADCs & DACs. Hardware circuits for handling multiple interrupts. 8051 serial data communication modes- modes 0, modes 1, mode 2, mode 3.

Text Books:-

1. K.J. Ayala, The 8051 microcontroller 2nd edition Penram international
2. intel's manual on "Embedded Microcontrollers"

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DIGITAL SIGNAL PROCESSING (EE-306-E)

L T P
4 1 -

Sessional: 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration : 3 Hrs.

Unit – I

The Z Transform Analysis of LTI System, DFT, FET: Transform and its properties, Inversion of Z-transform, one sided Z-transform and solution of differential equations. Analysis of LTI system in Z-domain, causality, stability, schur-cohn stability test, relationship between Z-transform and Fourier transform. Frequency selective filters, all pass filters, minimum phase, maximum phase and mixed phase systems.

Frequency domain sampling and DFT, properties of DFT, Linear filtering using DFT, frequency analysis of signals using DFT, radix 2, radix 4, goertzel algorithm.

Unit-II

Implementation of Discrete Time System:

Direct form, cascade form, frequency sampling and lattice structures for FIR systems, direct forms, transposed form, cascade form parallel form. Lattice and lattice ladder structures for IIR systems. State space structures quantization of filter co-efficient structures for all pass filters.

Unit –III

Design of FIR Filters:- Characteristics of practical frequency selective filters, filters design specification peak pass band ripple, minimum stop band attenuation. Four types of FIR filters Design of FIR filters using windows. Kaiser window method comparison of design methods for FIR filters Gibbs phenomenon.

Unit-IV

Design of IIR Filters:

Design o IIR filters from analog filters, design by approximation of derivatives, impulse invariance method bilinear transformation method characteristics of Butterworth, Chebyshev, and Elliptical analog filters and design of IIR filters.

Text Books:-

1. John G. Proakis, Digital Signal Processing, PHI
2. S.K. Mitra, Digital Signal processing, TMH
3. rabiner and Gold, Digital Signal processing, PHI
4. salivahan, Digital Signal processing, TMH
5. Digital Signal processing, Alon V. Oppenheim, PHI

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ADVANCED PROGRAMMING (EE-312-E)

L T P
3 1 -

Sessional: 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration : 3 Hrs.

Unit – I

Review: Review of C language, standard library, basics of C environment, pre-processors directives, illustrative simple C programs, header files.

Review of elementary data structures arrays, stacks, queues, link list with respect to storage representation and access methods.

Unit-II

Searching Method: Sequential, binary, indexes searches.

Sorting: Internal and external sorting, methods, bubble, insertion, selection, merge, heap, radix and quick sort. Comparison with respect to their efficiency.

Unit-III

Introduction to C++, C++ environment: objects, classes & their associations, object modeling techniques, namespaces, basics of OOP concepts: data encapsulation, abstraction, inheritance, reusability, polymorphism (compile time & run time). Illustrative C++ programs on the above topics.

Unit-IV

Topic in C++: Access specifiers: public, private & protected, Constructor: constructor with default arguments, parameterized constructors, copy constructors, destructors, function overloading, operator overloading, friend function & classes, types of inheritance, virtual functions. Illustrative C++ programs on the above topics.

Text Books:-

1. Trembley and Sorenson, "An Introduction of data structures with application" MGH
2. Goodman, S.E. and Hetedniemi, S.T. "Introduction to the design and Analysis" MGH
3. Herbert Schildt, "C++ complete reference" TMH

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POWER ELECTRONICS-II (EE-308-E)

L T P
3 1 -

Sessional: 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration : 3 Hrs.

Unit – I

D.C. to D.C. Converter:

Classification of choppers, principle of operation, steady state analysis of class A choppers, step up chopper, steady state, switching mode regulator: bluk, boost, buck-boost, cuk regulators, current commutated and voltage commutated chopper, basic scheme, output voltage control techniques, one, two and four quadrant choppers, step up chopper, voltage commutated chopper, current commutated chopper, MOSFET and transistor based choppers.

Unit-II

D.C. to A.C. Converter:

Classification, basic series and improved series inverter, parallel inverter, single phase voltage source inverter, steady state analysis, half bridge and full bridge inverter: modified Mc murray and modified Mc murray Bedford inverter, voltage control in single phase inverters, PWM inverters reduction of harmonics, current source, three phase bridge inverter.

Unit-III

Inverters:

Basic circuit, 120 degree mode and 180 degree mode conduction schemes, modified McMurray-Bedford half bridge and bridge inverters, brief description of parallel and series inverter (CSI), transistor and MOSFET based inverters.

Unit-IV

Power supplies:

Switched mode DC and AC power supplies

Application: Dielectric and induction heating. Block diagram of DC motor speed control.

Drives:

Introduction to electric drives: DC drives-converter and chopper fed DC drives, AC drives-stator voltage control, V/F control, rotor resistance control, static Scherbius system and static Kramer systems.

Text Books:

1. M.H. Rashid, Power Electronics: Circuits Devices and Application, PHI
2. Ned Mohan, Tore m. undeland, William P. Robbins, Powre Electronics: Converters, Application and Design, John Wiley & Sons.
3. P.S. Bhimra, Power Electronics.
4. M.Ramamoorthy an introduction to thyristors & their applications east west press.
5. A.K. Gupta & L.P. Singh, Power electronics and introduction to Drives Dhanpat Rai pub. Co.

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ELECTRIC DRIVE AND TRACTION (EE-310-E)

L T P
4 1 -

Sessional: 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration : 3 Hrs.

Unit – I

Introduction:

Definition & Classification of different type of drives, review of characteristics and components of electric drives, speed control methods of various a.c. and d.c. drives, its advantages and applications, acceleration and retardation time, energy consideration.

Braking of drives: Various methods of braking of a.c. and d.c. drives, automatic control arrangement, characteristics and application, acceleration and retardation time, energy consideration.

Induction motor (A.C) drives: Basic principle of induction motor drives, 3-phase a.c. voltage controller fed I.M. drive, variable frequency control, voltage source inverter (VSI) and current source inverter (CSI), cycloconverter fed IM drive, slip power control, static rotor resistance control, chopper control of 3-phase slip ring induction motor.

Unit-II

D.C. drives: Rectifier controlled circuits, single phase fully controlled and half controlled rectifier fed separately excited d.c. motor, 3-phase fully and half controlled fed separately excited d.c. motor, performance and characteristics of single phase and 3-phase rectifier controlled d.c. drives. Control techniques of d.c. drives using chopper, multi quadrant control of chopper fed motors.

Unit-III

Dynamics of electric drives: Components & classification of load torque, fundamental load torque equation, permissible frequency of starting and stopping, definite time, speed torque conventions. Speed and current limit control, automatic starting and pulling operation of synchronous motors. Digitally controlled (Microprocessor control of electric drives): Application areas and functions of HP in drive technology, block diagram of arrangement and comparison with other method, components for digital control, vector control of IM drive using HP.

Unit-IV

Traction Drives: Nature of traction load, motors, conventional d.c. and a.c. traction drives, their characteristics, d.c. traction using chopper controlled d.c. motors, poly phase a.c. motors for traction drives, speed time relationship, tractive effort for propelling a train, power of a traction motor.

Rating of motors: Determination of motor rating, nature of loads and classes of motor duty, frequency of operation of motor subjected to intermittent loads, pulse loads etc. thermal model of motor for heating and cooling.

Text Books:-

1. Electric drives by S.K. Pillai, Wiley.
2. Thyristor D.C. Drives by S.K. Sen
3. Control system in industry by Siskind, MGH
4. Electric Machines & Drives by Fransver.

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