6ME09 RESEARCH SKILLS – LAB

Course learning objectives:

1. Apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study.
2. Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.
3. Use effectively oral, written and visual communication.
4. Identify, analyze, and solve problems creatively through sustained critical investigation.
5. Integrate information from multiple sources.
6. Demonstrate an awareness and application of appropriate personal, societal, and professional ethical standards.
7. Practice the skills, diligence, and commitment to excellence needed to engage in lifelong learning.

Course Outcomes:

1. Demonstrate a sound technical knowledge of their selected research topic.
2. Undertake problem identification, formulation and solution.
3. Design engineering solutions to complex problems utilizing a systems approach.
4. Conduct an engineering research.
5. Demonstrate the knowledge, skills and attitudes of a professional engineer.

Students will have to perform any one task and prepare a report on it; from the following list:

1. A mini project involving mechanisms/ electromechanical systems/
2. CAD modeling/ simulation of any thermal, hydraulic or mechanical system.
3. IoT based system for any domestic/ rural/ agricultural/ industrial application
4. A system using non- conventional energy source
5. Market research for launching a new product.
6. Study of any Small Scale Industry.
7. Any other innovative concept for promoting research and innovation among students.

***Practical Examination:-** The practical examination shall consist of oral basedon the task and the report.

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SEMESTER V & VI B.E. ELECTRICAL, ELECTRICAL (ELECTRONICS & POWER) AND ELECTRICAL & ELECTRONICS

B.E. (ELECTRICAL ENGG.) SEMESTER - V

5EE01 CONTROL SYSTEMS

Course Outcomes:

After completing this course, the students will be able to:

1. Demonstrate the fundamental concepts of automatic Control and mathematical modeling of the Systems.
2. Determine the transfer function of control system components.
3. Analyze the time response of various systems and performance of controllers.
4. Evaluate the stability of linear systems using various methods.

Unit I: Introduction to automatic control : Open loop and closed loop system, servo-mechanisms, mathematical modeling of physical systems, transfer functions, block diagrams and signal flow graphs. Effect of feedback on sensitivity to parameter variation and reduction of the noise.

Unit II : Control System Components:

Electrical / Electro-mechanical components such as A.C./D.C. servomotors, stepper motors, synchros, potentiometers, tacho-generators, encoders, their functional analysis and operating characteristics and their application.

Unit III: Time response analysis:

Time response of first and second order systems to standard inputs. Time response specifications, types of system, error analysis, error coefficients, steady state errors, dynamic error series. Approximate methods for higher order system, proportional, derivative and integral control.

Unit IV: Stability:

Stability of control systems, characteristics equation, impulse response, Routh-Hurwitz stability criterion, relative stability. Root Locus: construction of root locus, determination of roots from root locus conditions on variable parameter for stability, effect of addition of poles and zeros.

Unit V: Frequency response methods

Frequency response of linear system, specification, Logarithmic frequency response (Bode) plots from transfer function for various systems. Polar plots for various systems. Estimation of approximate transfer functions from the frequency response.

Unit VI: Stability analysis from frequency response

Gain margin and Phase margin; Stability analysis from Bode plots. Nyquist criterion, Nyquist plots and stability analysis.

Books Recommended:

Text Book: Nagrath I.J., Gopal M.: Control System Engineering, Wiley Eastern.

Reference Books:

1. Control Engineering, D.Ganesh Rao, k. Chennavenkatesh, 2010, PEARSON
2. Ogata K.: Modern Control Systems, Prentice Hall of India.
3. Control Systems by K.R.Varmah TMH edition 2010
4. Linear Control Systems, Ashfaq Hussain, Haroon Ashfaq, Dhanpat Rai &Co.

5EE02 MICROPROCESSOR & MICROCONTROLLER

Course Outcomes:

After completing the course the students will be able to:

1. Recite Fundamentals and Architecture of Microprocessor 8085, Microcontroller 8051
2. Interpret Assembly Language Programming of Microprocessor 8085, Microcontroller 8051
3. Illustrate interfacing with Microprocessor 8085, Microcontroller 8051
4. Develop applications of Microprocessor 8085, Microcontroller 8051.

Unit I : 8085- architecture and Pin Diagram, Microprocessor Operations (Initiated, Internal and External) BUS organization and register structure, instruction set of 8085, addressing modes, Machine Cycles & Bus Timings.

Unit II : Assembly Language Programming of 8085, counters and time delays, stack and subroutines, Memory mapped I/O and I/O mapped I/O, address decoding techniques. Interrupt system of 8085, Data transfer schemes, serial data transfer through SOD and SID line.

Unit III : Programmable Interfacing devices: Internal architecture, programming and interfacing of Programmable Peripheral Interface PPI (8255), Programmable Interrupt Controller PIC (8259),Universal Synchronous Asynchronous Receiver Transmitter USART (8251) and Programmable Interval Timer PIT(8253)

Unit IV: Introduction to microcontroller: 8051 pin configuration and architecture, 8051 Internal resources, pin diagram, I/ O pins, ports and their internal logic circuits, counters, serial ports, interrupt structure, SFRs and their addressing, watch-dog timer, internal code memory, data memory, stack pointer, flags, bit addressable memory.

Unit V: Instruction set of 8051. Addressing modes. Various groups of instructions: data transfer. Arithmetic- logical group. Interrupt, timer counter related instructions. Interfacing of 8051with external memories. Programming 8051 with interfacing examples**.**

Unit VI: 8085 Microprocessors / 8051 Microcontroller Applications: hardware & software developments: signal conditioning & data acquisition system components. Measurement of Pulse width and Magnitude using 8085. Measurement of fundamental quantities -voltage, current, frequency, speed using 8051 Microcontroller.

Text Books:

1. Microprocessor Architecture, Programming, and Applications with the 8085, Ramesh Gaonkar PHI Publication-2006

2. The 8051 Microcontroller and Embedded SystemsMazidi, J.GMazidi, Mckinlay , Pearson Ed.

Reference Books:

1. An Introduction to Microcomputers, Adam Osborne Osborne-Mc-Graw Hill,
2. Advance Microprocessor and Peripherals, K.M.Bhurchandi & A.K.Ray, TMH, 2006.
3. Subrata Ghoshal ñ8051 Microcontrollerò Pearson Education.
4. Richard Barnett , The 8051Family of Microcontrollers Prentice-Hall, Inc-2000

5EE03 ELECTRICAL MACHINES –II

Course Outcomes:

After completing this course students will be able to:

1. Describe the construction, working operation & performance characteristics of the three phase Induction Motor
2. Analyze the starting, braking and speed control of three phase induction motors by various methods.
3. Describe the construction, working operation & performance characteristics of single ï phase Induction Motor
4. Demonstrate the construction, working operation & performance characteristics of synchronous machine.
5. Explain the construction & working of special motors like Universal, Reluctance, PMSM & BLDC Motor.

Unit I: Three phase induction motor-I:

Construction, Types (squirrel cage and slipring), Rotating Magnetic Fields, Principle ofoperation, Torque Slip Characteristics, Starting and Maximum Torque.Effect ofparameter variation on torque slip characteristics. Equivalent circuit, Phasor Diagram, Performance evaluation bydirect& indirect testing,circle diagram.

Unit II : Three phase Induction Motor (IM) –II:

Starters for squirrel cage & slip-ring type IM, Methods of speed control, electric braking,High Torque IM, single phasing, cogging and crawling, Doubly-FedInduction Machines.

Unit III: Single phaseInduction Motor:

Double revolving field theory, Constructional features, equivalent circuit, working, Split-phasestarting methods and applicationsof single-phaseInduction motors.

Unit IV: Synchronous Generator:

Constructional details, working principle, operation, armaturereaction, circuitmodel, determinations of parameters of the circuit model and phasordiagram, methods of determining the regulations and efficiency, Parallel operation of alternators-Synchronization.

UnitV: SynchronousMotor:

Construction, principle of operation, working, starting methods, torque equation - V-curve, Inverted V curve &power angle characteristics, hunting & damping, applications. Transient, subtransient & steady state reactanceofsynchronous machines.

Unit VI: Special Motors:

Construction, working principle, operation, characteristics and applications of Universal motor, Reluctance Motor, Permanent Magnet Synchronous Motor & BLDC Motor.

Text Books:

1. D.P.Kothari & I.J.Nagrath,ñElectrical Machinesò-5th Edition, TMH Publication.
2. S.Langsdorf,ñAlternating Current Machinesò, Mc-Graw Hill Publication.

Reference Books:

1. Fitzgerald and Kingsleyôs Electric Machineryò, 7th Edition, McGraw Hill.
2. M.G.Say,ñPerformanceanddesignofACmachinesò,CBSPublishers, 2002.
3. P.S.Bimbhra,ñElectricalMachineryò, KhannaPublishers,2011.
4. C L Dawes, ñA Course in Electrical Engineering (Volume -2)ò, McGraw Hill.

5EE04 Professional Elective-I : POWER SYSTEM OPERATION AND CONTROL

Course Outcomes:

After completing this course student will be able to:

1. To impart knowledge to describe, calculate and analyze energy generation, unit commitment problem in thermal power plant, power system behavior and economics of generating costs.
2. To understand and analyze optimal dispatch with transmission losses, penalty factor and automatic load dispatch.
3. To learn the concept of real and reactive power flow and its control in power system.
4. To learn the automatic voltage regulator and automatic load frequency control.
5. To learn tie line interchange between interconnected utilities.
6. To illustrate various ways of interchange of power between interconnected utilities.
7. To impart knowledge about various advanced controllers such as FACTs controllers with itsevolution, principle of operation, circuit diagram and applications

Unit I : **Economic Operation – Part I:**

Meaning of optimum scheduling, UCP and LSP; Input ï Output characteristics, Heat rate characteristic, Incremental fuel rate, Incremental fuel cost; Methods of obtaining incremental fuel costs; Conditions for incremental loading; Optimum scheduling of generation between different units (Only Two plant system without transmission loss).

Unit II : **Economic Operation – Part II**

Transmission loss as a function of plant generation; Calculation of loss co-efficient (Two plant system); Incremental transmission loss; Optimum scheduling of generation between different plants including transmission loss; Concept and significance of penalty factor; Automatic load dispatch: Operation and Functions.

Unit III : **A. Generator Control Loops**

Concept of real and reactive power; Effect of real and reactive power on system parameters; Basic generator control loops.

B. Automatic Voltage Regulator (AVR)

Functions of AVR; Types of Exciter; Brushless AVR loop: Exciter modeling, Generator modeling, Transfer function block diagram representation, Static performance, dynamic response, Stability compensation, Effect of generator loading.

Unit IV : **Automatic Load Frequency Control**

Automatic generation control (AGC); Speed governing system; Transfer function modeling: Governor, Hydraulic valve actuator, Turbine, Generator, Load; Transfer function representation of an isolated generator; Static performance of speed governor; Closing of ALFC loop.

Unit V : **Control Area:** eaning; Primary ALFC Loop: Static response, Dynamic response, physical interpretation of results; Secondary ALFC loop; Integral Control; Pool operation; Tie-line Modeling; Two area system ï Dynamic response; Tie-line bias control.

Unit VI : **Energy Control of Power System :** Interchange of power between interconnected utilities, economy interchange evaluation, interchange evaluation with unit commitment, types of interchange, capacity and diversity interchange, energy banking, emergency power interchange, inadvertent power exchange, power pools, Circuit diagram and applications of FACTs Technology :- SVC, TCSC, STATCOM and UPFC.

Text Books :-

1. O. L. Elgerd Electric Energy Systems Theory: An Introduction ï 2nd edition, McGraw -Hill Book Comp. N. Y. 1987.
2. Power System Operation & Control, N.V.Ramana, PEARSON education, 2010.

Reference Books :

1. L. K. Kirchamayor ï Economic Operation of Power System- Wiley Estern Pvt. Ltd., New Delhi.
2. Hadi Saadat ï Power System Analysis ï WCB/McGraw-Hill International Edition 1999
3. I.J. Nagrath, D. P. Kothari ï Modern Power System Analysis ï Second edition, Tata Mc-Graw Hill Publishing Company, New Delhi
4. P. S. R. Murty ï Power System Operation and Control ï Tata Mc-Graw Hill Publishing Company, New Delhi.

5EE04 Professional Elective – I
ELECTRICAL ENGINEERING MATERIAL

Course Outcomes:

After completing this course student will be able to :

1. Understand importance of electrical engineering materials
2. Understand how electric conduction takes place in conductors
3. Understand importance of semiconductors and magnetic materials in electrical engineering.
4. Understand importance of dielectric materials in electrical engineering.
5. Identify the need of special materials in electrical engineering.

Unit-I Introduction to Electrical Engineering Materials: Importance of materials, Classification of electrical materials, Scope of electrical materials, Requirement of Engineering materials. Types of engineering materials, Levels of material structure.

Unit-II Conducting Materials: Review of metallic conduction on the basis of free electron theory. variation of conductivity with temperature and composition, materials for electric resistors- General Electric properties; material for brushes of electrical machines, lamp filaments, fuses and solder.

Unit-III Semi conductors: Semiconductors: Mechanism of conduction in semiconductors, types of semiconductors. Hall effect, compound semiconductors, basic ideas of amorphous and organic semiconductors.

Unit-IV Magnetic Materials:
Classification of magnetic materials- origin of permanent magnetic dipoles, magneto materials used in electrical machines, instruments and relays. Magnetic Circuit terminology, Relation between relative permeability and magnetic susceptibility. Classification of magnetic materials, Diamagnetic, Paramagnetic, Ferromagnetic, Anti ferromagnetic. Magnetization curve, Initial and maximum permeability. Hysteresis loop and loss, Eddy current loss.
Unit-V Dielectrics & Insulating Materials: Dielectrics, Factors influencing dielectric strength. Capacito rmaterials. Insulating materials. Insulating Materials: Inorganic materials (mica, glass, porcelain, asbestos), organic materials (paper, rubber, cotton silk fiber, wood, plastics and bakelite), resins and varnishes, liquid insulators (transformer oil) gaseous insulators (air, SF6 and nitrogen) and ageing of insulators.
Unit-VI Materials For Special Applications: Materials for solar cells, fuel cells and battery. Materials for coatings for enhanced solar thermal energy collection and solar selective coatings, Cold mirror coatings, heat mirror coatings, antireflection coatings, sintered alloys for breaker and switch contacts.

Text Book: Electrical Engineering Materials by Dekker A.J (PHI)
Reference Books:

1. S.P.Seth Electrical Engineering Materials (Dhanpat rai and Sons)
2. C. S Indulkar & S. Thiruvelgadam, an Introduction to Electrical Engineering Materials (S Chand Publication)

5EE04 Professional Elective – I
ELECTRONIC COMMUNICATION THEORY

Course Outcomes:
After successfully completing the course, the students will be able to:
1. Explain various types of signal & elements of communication system.
2. Analyze the signal using Fourier Transform
3. Apply Amplitude modulation & Frequency modulation on the communication signal
4. Compare Pulse communication & Digital communication
5. Describe microwave communication system

Unit I: Introduction to Electronics Communication Systems:
Signals: Analog & digital, Deterministic & Non-deterministic, Periodic & nonperiodic, Elements of Communication Systems, Transmitter, Receiver, Need for Modulation, band width requirements, Noise, External, internal noise, noise calculation, noise figure.

Unit II : Signal Analysis:
Fourier Series, Exponential Fourier Series, Fourier Transform, Properties of Fourier Transform, Dirac Delta Function, Fourier Transform of Periodic functions, Fundamental of Power Spectral Density & Energy Spectral Density.

Unit III: Amplitude Modulation
Amplitude Modulation Theory, Generation of Amplitude Modulation, Single Side band Communication, suppression of carrier, suppression of unwanted side band, AM receiver.

Unit IV: Frequency Modulation:
Theory of Frequency Modulation, characteristics of FM, Generation of FM, pre-emphasis, De-emphasis,wide &Narrow band FM Transmission, FM receiver.

Unit V: Pulse Communication :
Information Theory, Classification of pulse modulation, Sampling process, pulse amplitude modulation, PWM and PPM modulation pulse co-demodulation.
A: Digital Communication:
Fundamentals of data communication systems, data sets and inter-connection requirements.

Unit VI: Microwave communication system:
Analog microwave communication: LOS, OTH microwave system Satellite communication: Satellite orbits, frequencies, attitude, transmission path.
Text Book: Electronic Communication System by Kennedy, Davis,TMH.
Reference Books:
1. Electronics Communication by K.Shoenbcle PHI, India.
2. Electronics Communication Techniques, Paul Young,Willey Eastern Pub.
3. Principle of Communication Engineering, Taub Schilling. TMH.
4. Electronics Communication ï Robert Shrader Mc-Graw Hill.

5EE05 Open Elective – I POWER PLANT ENGINEERING

Course Outcomes:-
1) Describe different Sources of Energy Generation.
2) Explain the Working and layout of steam power plant & hydro power plant.
3) Discuss the working principle and basic component of Nuclear, Diesel & gas power plant
4) Illustrate various terms related to power plant economics & tariff.

Unit-I: Introduction:

Energy resources and their availability, types of powe rplants, selection of the plants, Introduction to basic thermodynamic cycles used in power plants, Conventional and non-conventional energy sources, Indian Energy Scenario.

Unit-II: Hydro-Electric Power Plant:
Rainfall and run-off measurements and plotting of various curves for estimating stream flow andsize of reservoir, Layout of Hydro power plant, operation of different components of hydro-electric power plant , classification of hydro Electric power plant, Pump Storage Plant, site selection,advantages & disadvantages

Unit-III: Steam Power Plants:
Flow sheet and working of modern-thermal power plants, super critical pressure steam stations, Layout of Thermal power plant, Site selection, coal storage, coal handling systems, ash Handling systems, working of various parts: Economizer, air pre-heater, condenser, cooling tower, Electrostatic Precipitator, advantages & disadvantages.

Unit-IV: Nuclear Power Plants:
Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working ofNuclear Reactors : Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANadaDeuterium- Uranium reactor (CANDU) fast breeder reactor, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

Unit-V: Diesel & Gas power plant:
Layout of Diesel power plant, functions of different components of diesel plant, advantages &disadvantages, Principle of Operation of Gas Turbine Plants, Open cycle gas turbine plant, closedcycle gas power plant, Combined gas and steam cycle.

Unit-VI: Power Plant Economics:
Load curve, energy load curve, energy duration curve, connected load, maximum demand, demand factor, load factor, diversity factors, plant capacity and utilization factor, types of loads, operating cost, annual plant cost, Generation cost, Depreciation, Objectives/Types of Tariff,

Text Books:

1. Generation of Electrical Energy by B.R.Gupta, Eurasia Publishing House, New Delhi.
2. Power Plant Engineering; R.K.Rajput; Laxmi Publications.

Reference Books:

1. Non-Conventional Energy Resources by G.D.Rai, Khanna Publishers, New Delhi.
2. Principles of PowerSystem byV.K.Mehta, S.Chand Publication.
3. Conventional energy technology by S.B.Pandya,Tata Mc-Graw Hill Publication.
4. Power Plant Engineering, P.K.Nag.

5EE05 Open Elective - ELECTRICAL DRIVES

Course Outcomes:

After completing this course, Students will be able to:

1. Explain the basic Concept of electrical drives
2. Describe Power Electronics devices & their Industrial Applications
3. Demonstrate various starting, braking and speed control methods of DC Motor Drivs
4. Demonstrate various starting, braking and speed control methods of three phase Induction Motor.
5. Describe the construction, working principle and applications of single phase Induction Motor & special motors

Syllabus:

Unit I: Electric Drive: Concept, classification, parts, and advantages of electrical dives. Types of Loads, Components of load toques, Fundamental torque equations, Equivalent value of drive parameters for loads with rotational and translational motion. Multi quadrant operation of drives. Load equalization**.**

Unit II: **Motor power rating:** Thermal model of motor for heating and cooling, classes of motor duty, determination of motor rating for continuous, short time and intermittent duty, equivalent current, torque and power methods of determination of rating for fluctuating and intermittent loads. Effect of load inertia & environmental factors.

Unit III: Starting & Braking of Electric Drives: Effect of starting on Power supply, motor and load. Methods of starting of electric motors. Acceleration time Energy relation during starting, methods to reduce the Energy loss during starting. Types of braking, braking of DC motor, Induction motor and Synchronous motor, Energy loss during braking**.**

Unit IV: **DC motor drives:** Modeling of DC motors, block diagram & Transfer function, Single phase, three phases fully controlled and half controlled DC drives. Dual converter control of DC drives. Power factor, supply harmonics and ripple in motor current, Chopper controlled DC motor drives**.**

Unit V: Induction motor drives: Stator voltage variation by three phase controllers, Speed control using chopper resistance in the rotor circuit, slip power recovery scheme. Pulse width modulated inverter fed induction motor drive. Volts / Hertz Control**.**

Unit VI: Industrial applications of Electric Drives: Introduction to Solar and Battery Powered Drive, Stepper motor, Switched Reluctance motor drive Industrial application: Drive consideration for Textile mills, Steel rolling mills, Cement mills, Paper mills, Machine tools. Cranes & hoist drives.

Text Books:
1. Fundamental of Electrical Drives, G.K. Dubey, New Age International Publication.
2. A first course on Electrical Drives, S.K. Pillai, , New Age International Publication.

Reference Books:
1. Electric Drives, Vedam Subrahmanyam, TMH
2. Bose, B.K., Modern Power Electronics and AC Drives, PHI
3. Electric Motor Drives, R. Krishnan, PHI
4. Sen, P.C., Thyristor DC Drives, John Wiley and Sons (1981).

5EE06 CONTROL SYSTEM - LAB

Student should perform minimum eight practicals based on the followings.

List of Experiments :
1. Study of Potentiometer
2. Study of A.C. Synchro and its characteristics
3. Determination of Transfer Function of D.C. Generator
4. Determination of Transfer Function of D.C.Servomotor and Its Characteristics
5. Performance Characteristics of a D.C. Motor Angular Position Control System
6. Determination of Frequency Response of Given R-C Network
7. Determination of Transfer Function of A.C. Tacho-Generator
8. Experimental Study of The Operating Characteristics of a Small Stepper Motor and Its Controller
9. Study Closed Loop PI Controller System and Its Time Response to Different Input.
10. Experimental Study of Position Control of DC Motor using Ardiuno
11. Experimental Study of Time Domain Analysis of Second Order Control System
12. Study AC Position Control System

Note : Above experiments may be conducted by using models, simulation, numerical, drawing sheets or experimentation.

5EE07 MICROPROCESSOR &MICROCONTROLLER- LAB

List of Experiments:
1. Write an Assembly Language Program for the Addition of two8-bit/16-bit numbers
2. Write an Assembly Language Program for the Subtraction of two 8-bit numbers
3. Write a Program for Finding the larger and smaller one among the two 8-bit numbers
4. Write a Program for Finding the largest/smallest number in array of 8-bit numbers
5. Write a Program for Masking and setting of nibbles
6. Write a Program for Block data transfer in same and reverse order
7. Write a Program for Sorting of even and odd numbers from an array of 8-bit numbers
8. Write a Program for Multiplication of two 8-bit numbers
9. Write a Program for Square wave generation using 8255 PPI
10. Write a Program for Stepper motor control using 8255 PPI
11. Write a Program for Interfacing ADC with 8085/8051 using 8255 PPI
12. Write a Program for Interfacing DAC with 8085/8051 using 8255 PPI
13. Write a Program for Lamp load control using 8255 PPI
14. Write a Program for measurement of DC Voltage /Current using ADC, 8255 PPI
15. Study of Architectural Differences: Microprocessor 8085, and Mcrocontroller 8051

5EE08 ELECTRICAL MACHINES - II LAB.

List of Experiments :
1. Perform the load test on three phase IM & plot its performance characteristics.
2. Perform the No load test on three phase IM to separate out its no load losses.
3. Estimate the performance parameters of three phase IM from its circle diagram.
4. Plot the equivalent circuit of three phase Induction motor.
5. Study of different types of starters used for three phase IM
6. Speed control of three phase squirrel cage Induction motor by various methods like stator voltage control method, frequency control method, changing number of poles.
7. Speed control of three phase Induction motor.
8. Perform the electric braking of three phase Induction motor.
9. Perform the load test on single phase IM & plot its performance characteristics.
10. Load test on three phase alternator to determine its performance parameters.
11. Synchronize the three ï phase alternator within finite bus-bar
12. Perform the OC & SC test on synchronous generator to estimate its regulation by EMF & MF methods
13. Estimate the regulation of three phase alternator using ZPF method.
14. Perform the load test on three phase Synchronous motor.
15. Plot the V& inverted V curves of synchronous motor.

5EE09 INFORMATION &COMMUNICATION TECHNOLOGY - LAB

Word Processing with MS-Word:
- Basic operations- Editing and Formatting text, paragraphs and pages, printing.
- Working with tables, figures, images.
- Mailmerge.Working with Charts, Equations, Symbols.

MS Excel: Working with work books / work sheets.

- Data Entry techniques & defining datas etasa Table.
- Setting, Previewing, and Printing under MS-Excel.
- Performing Calculations, using Excel Formulas, Functions and Charts.
- Sorting / Filtering data in excel sheet.

Working with MS Power Point.

- Presentation Basics. Adding more components to the slides, printing the slides.
- Formatting Presentations, backgrounds and layout. Applying Themes. Using SlideMaster.
- Working with Graphics, Images and Clips. Multimedia. Inserting Sound and Narration
- Delivering Presentations. Animating Objects. Adding Action effects.
- Live Presentation. Using Custom Shows.
- Saving / Protecting the Presentation.

Web Page Development:

- Introduction to HTML, CSS, JAVA Scripting
- Development of Webpage.

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SEMESTER : VI [ELECTRICAL ENGINEERING]

6EE01 POWER ELECTRONICS

Course Outcomes

After completing this course student will be able to

1. Explain the concepts and techniques used in power electronics
2. Apply the knowledge of series and parallel connection of SCRs in power control applications
3. Analyze various power converter circuits
4. Analyze the single phase and three phase Inverter circuits
5. Explain the operation of DC/DC converter circuits
6. Demonstrate the applications of power electronic circuits.

Syllabus

Unit I:SCR, Triac, Diac ï Construction and Applications, two Transistor Analogy of SCR, SCR turnON mechanism, different methods for turning ON SCR, turn OFF mechanism, Thyristor firing circuits, introduction to Power MOSFET and IGBT their construction and characteristics.

Unit II: Series-Parallel operation of SCRs, firing circuits for series and parallel operations, static and dynamic equalizing circuit, equalization of current in parallel connected SCRs,string efficiency, de-rating factors, protections of SCRs against di/dt, dv/dt, over-voltage/ over-current protection.

Unit III: Principle of phase control, half-wave-controlled rectifier, half controlled bridge and fully controlled bridge rectifier for R, RL and RLE load, derivation for output voltage and current, effect of freewheeling diode, effect of source inductance.

Unit IV: Classification of circuit for forced commutation, series inverter, improved series inverter, parallel inverter, single phase PWM inverters, principle of operation of three phase bridge inverter in 120^0 and 180^0mode.

Unit V: Basic principle of Chopper, Time ratio control and current limit controlled technique, Voltage commutated Chopper circuit, Jones Chopper, Step up Chopper, Step down Chopper and AC Chopper.

Unit VI: Speed control of DC series motor using chopper, Speed control of DC shunt motor using phase controlled rectifier. Speed control of three phase Induction motor by stator voltage control method, V/f control.

Text Book: Rashid Muhammad, H., ñPower Electronics: Circuits, Devices and Applicationsò, 4^{th} Edn., Pearson Education.

Reference Books:

1. Mohan Ned, Undeland Tore, M. and Robbins William, P., ñPower Electronics: Converter, Applications and Designò, John Wiley & Sons, 1994.
2. LandevCyrill, W., ñPower Electronicsò, McGraw Hills, London, 1981.
3. Dewan, S.B. and Satrughan A., ñPower Semiconductor Circuitsò, John Wiley & Sons,
4. M.D. Singh & K.B. Khanchandani, ñPower Electronics ñTata Mc-Graw Hill, New Delhi