BEE 051

ELECTRICAL MACHINE-II

Course Outcomes ;-The student will be able to

CO1- Classify Various AC Machines and understand performance characteristics and equivalent circuit for it.

CO2- Explain construction working principal and power flow in AC machines- Alternator Synchronous Motor, Single phase & Three phase Induction motor, AC series motor

CO3- Analyze various performance parameters of AC machines.

CO4- Apply the know-how of testing work for development of final year project.

CO5- Solve complex problems in machines which is useful for competitive exams.

Unit –I

Single Phase Induction Motor

Single Phase Induction motor; double revolving field theory, equivalent circuit & its determination, performance calculation, starting methods & types of single phase induction motors: their working principle & applications, Comparison with three phase induction motors.1- phase A.C. series motor.

Unit –II

Three Phase Induction Motor

Working principle, construction, comparison of slip ring and squirrel cage motors, steady state analysis, phasor diagram and equivalent circuit, power flow diagram, torque-speed characteristics, Losses and efficiency, No load & block rotor test, circle diagram, Starting of squirrel cage & slip ring motors, power factor control, Cogging & Crawling, Double cage & Deep bar Indication Motor, impact of unbalanced supply & harmonics on performance, speed control, braking, Induction Generator.

Unit III

Polyphase Synchronous Machines-I

Constructional features. Polyphase Distributed AC   Windings: Types, Distribution, coil span and winding factors. Excitation systems, emf equation and harmonic elimination. Generator Mode, Interaction between excitation flux and armature mmf, equivalent circuit model and phasor diagram for cylindrical rotor machine. Salient pole machines: two reaction theory, equivalent circuit model and phasor diagram. Power angle equations and characteristics. Voltage regulation and affect of AVR. Synchronising methods, Parallel operation and load sharing, operation on infinite busbar.

Unit IV

Polyphase Synchronous Machines-II

Motoring mode, Transition from motoring to generating mode, Phasor diagram, steady state operating characteristic, V-curves, starting methods, synchronous condenser, Hunting effect-damper winding effects, speed control including solid state control. Analysis under sudden short circuit. Transient parameters of synchronous machines, various transient and sub-transient reactance, time constant. Expression of transient and sub transient reactance in terms of self and mutual inductances of various windings. Stability considerations. Brushless generators, Single phase generators.

Unit V

Special Electric motors

Reluctance motor, PM BLDC motors (Permanent Magnet brushless DC motor), Hysteresis motor, Servo motor, Stepper motor, Universal motor, Shaded pole motor Linear Induction motors

LIST OF EXPERIMENT

1. To perform No load & blocked rotor test on a 1-phase induction motor & determine its equivalent circuit.
2. To perform Load test on 1-phase induction motor and plot its performance characteristics
3. To perform No load and blocked rotor test on a 3-phase induction motor & determine its equivalent circuit.
4. To perform Brake test on 3-ϕ squirrel cage induction motor& plot its performance characteristics
5. To perform Load test on 3-phase ac slipring induction motor & plot its performance characteristics
6. To study various types of starters used for 3-phase induction motors
7. To perform Regulation of alternator using synchronous impedance method and mmf method
8. To Study 'v' and 'inverted v' curves of synchronous motor
9. To Study Determination of xd and xq of salient pole synchronous motor9. Characteristic of switched reluctance motor.
10. To study speed control of synchronous motor using cycloconverter.

Reference Books:

1. Fitzgerald, C.Kingslay, S.D. Umans, Electric machinery ,5th Ed., McGraw Hills, 1992
2. GMC pherson and R.D. Laramorl, An Introduction to Electric Machine & Transformer,2nd Ed.,John Wiley & Sons, 1990
3. P.S. Bimbhra, Generalised Theory of Electrical Machines.
4. E. Open claw Tayler, The performance & Design of AC Computer Meters, A.H.Wheeler & Co(P) Ltd. Alalhabad, 1971

BEE 052

ELECTRONIC INSTRUMENTATION

Course Outcomes :-The student will be able to
CO1- Recognize the evolution and history of units and standards in Measurements
CO2- Identify the various parameters that are measurable in electronic instrumentation
CO3- Employ appropriate instruments to measure given sets of parameters
CO4- Practice the construction of testing and measuring set up for electronic systems
CO5- To have a understanding of instrumentation concepts that can be applied to Control systems

Unit-I

CRO

Introduction to CRO, Different parts of CRO, Its Block diagram, Electrostatic focusing, Electrostatic deflection, post deflection acceleration, Screen for CRTs, Graticule, Vertical & Horizontal deflection system, Time base circuit, Oscilloscope probes and transducers, Attenuators, Application of CROs, Lissajous patterns, Special purpose CROs- Multi input, Dual trace, Dual beam, Sampling, Storage (Analog & Digital) Oscilloscopes.

Unit-II

A.C. Bridge Measurement

Sources and detectors, Use of Bridges for measurement of inductance, Capacitance & Q factor Maxwells bridge, Maxwells inductance capacitance bridge, Hays bridge, Andersons bridge, Owen's Bridge, De-sauty's Bridge, Schering Bridge, High Voltage Schering bridge, Measurement of relative permittivity, Heaviside cambell's bridge, Weins bridge, Universal bridge, Sources of errors in Bridge circuit, Wagner's Earthing device, Q meter and its applications and measurement methods.

Unit-III

Transducers

Transducers definition and classification, mechanical devices as primary detectors, Characteristic & choice of Transducers, Resistive inductive and capacitive transducers, strain gauge and gauge factor, Thermistor, Thermo couples, LVDT, RVDT, Synchros, Piezo-Electric transducers, Magnet elastic and magnetostrictive Hall effect transducers, Opto-electronic transducers such as photo voltaic, Photo conductive, photo diode and photo conductive cells, Photo transistors, Photo optic transducers. Introduction to analog & Digital data acquisition systems-Instrumentation systems used, Interfacing transducers to electronic control & measuring systems Multiplexing - D/A multiplexing A-D Multiplexing, Special encoders. Digital control description.

Unit-IV

Signal Generators

Fixed & variable frequency AF oscillators, Sine wave generators, Standard signal generator, Sine and Square wave generator Function generator, Square and pulse generator, Random noise generator, Sweep generator, TV Sweep generator, Marker generator, Sweep- Marker generator, Wobblyscope,

Video pattern generator Vectroscope, Beat frequency oscillator Wave analyser Basic wave analyzer, Frequency selective wave analyzer, Heterodyne wave analyzer, Harmonic distortion, analyzer, spectrum analyzer digital Fourier analyzer.

Unit-V

Digital Instruments

Advantages of Digital instruments over analog instruments, resolution and sensitivity of Digital meters., Digital Voltmeter - Ramp type, Dual slope integration type, Integrating type, Successive approximation type, Continuous balance DVM or Servo balancing potentiometer type VM. , compression of Electronic & Digital Volt meter, Digital Multimeter, Digital frequency meter, Time period measurement, High frequency measurement, Electronic counter, Digital tachometer, Digital PH meter, Digital phase meter, Digital capacitance meter. Digital display system and indicators like CRT, LED, LCD, Nixies, Electro luminescent, Incandescent, Electrophoretic image display, Liquid vapour display dot-matrix display, Analog recorders, X-Y recorders. Instruments used in computer-controlled instrumentation RS 232C and IEEE 488, GPIB electric interface.

LIST OF EXPERIMENTS

1. To measure the unknown capacitance of given capacitor by Desauty method.
2. To measure the unknown capacitance of given capacitor by Schering method.
3. To measure the unknown Inductance of given coil by Maxwell's Bridge method .
4. To measure low resistance using Kelvin double bridge .
5. To study operation and technical specification of multimeter .
6. To study operation and technical specification of thermocouple.
7. To study operation and technical specification of CRO.
8. To measure the displacement using LVDT.
9. To measure temperature using RTD.
10. To study operation and technical specification of Spectrum analyzer

References Books:

1. Albert. D. Helfrick, W.D. Cooper, Modern Electronic Instrumentation and measurement techniques, PHI.
2. Kalsi H.S., Electronic Instrumentation, TMH.
3. A.K. Sawhney, Electrical and Electronic measurements and Instrumentation, Dhanpat Rai & Co.
4. E.W. Golding, Electrical Measurement and Measuring Instruments Sir Isaac Pitman and Sons, Ltd. London 1940
5. C.S. Rangan, G.R. Sarma, V.S.V. Mani, Instrumentation Devices and Systems Tata McGraw-Hill Publishing Company Ltd.
7. B.C. Nakra, K.K. Choudhry, Instrumentation, Measurement and Analysis Tata McGraw-Hill Publishing CompanyLtd.
8. Morris A.S., Principles of Measurement & Instrumentation, PHI 9. Murthy BVS, "Transducers and Instrumentation", PHI.
10. Doeblin D.O., Measurement Systems- Applications and Desig Albert D. Helfrick, William D.Cooper, Modern Electronic Instrumentation and Measurement Techniques Pearson Education.

BEE 053

SIGNALS & SYSTEMS

Course Outcomes ;-The student will be able to

CO1- Classify the signals as Continuous time and Discrete time, response of LTI system using convolution

CO2- understand Fourier series, Fourier transform & properties of LTI system, Sampling theorem used in signal transformation in frequency domain.

CO3- Analyze Fourier analysis of discrete time signal & system, DTFT & its properties used in signal transformation of discrete time LTI system.

CO4- Understanding of Laplace transform, Z transform, ROC & its properties used in signal transformation in s domain and z domain.

CO5- Analyze Sampling theorem used in sampling in frequency domain and discrete time signal.

Unit I

Dynamic Representation of Systems

Systems Attributes, Causality linearity, Stability, time invariance. Special Signals, Complex exponentials, Singularity functions (impulse and step functions).. Linear Time-Invariant Systems: Differential equation representation convolution Integral. Discrete form of special functions. Discrete convolution and its properties. Realization of LTI system (differential and difference equations).

Unit II

Fourier Analysis of Continuous Time Signals and Systems

Fourier Series, Fourier Transform and properties, Parseval's theorem, Frequency response of LTI systems. Sampling Theorem.

Unit III

Fourier Analysis of Discrete Time Signals & Systems

Discrete-Time Fourier series, Discrete-Time Fourier Transform (including DFT) & properties. Frequency response of discrete time LTI systems.

Unit IV

Laplace Transform
Laplace Transform and its inverse: Definition, existence conditions, Region of Convergence and properties, Application of Laplace transform for the analysis of continuous time LTI system (stability etc.) Significance of poles & zeros.

Z-Transform
Z-Transform and its inverse: Definition, existence, Region of convergence & properties, Application of Z-Transform for the analysis of Discrete time LTI Systems, Significance of poles & zeros.

Unit V

Sampling
The sampling theorem, reconstruction of signal from its samples, sampling in the frequency domain, sampling of discrete-time signals.

Reference Books:-
1. Alan V. Oppenheim, Alan S. Willsky and H. Nawab, Signals and Systems, Prentice Hall, 1997

2. Simon Haykin, Communication Systems, 3rd Edition, John Wiley, 1995.

BEE 054

POWER SYSYTEM II

Course Outcomes ;-The student will be able to

CO-1- To identify and analyze the performance of transmission lines.
CO-2 Analyze power flow in transmission line its performance and its compensation technique.
CO-3 To analyze and apply the knowledge of mechanical design of transmission lines.
CO-4 To aware of features, ratings, application of different electrical equipment in power station and selection of overhead line insulators.
CO-5   Classify different power distribution systems. Evaluate most economical size of conductors and have knowledge of substation layout.

Unit I

Transmission systems & performance of transmission line
Various systems of transmission, effect of system voltage, comparison of conductor materials required for various overhead systems. Short, Medium & long transmission line and their representation, Nominal T, Nominal Л, Equivalent T and equivalent Л, network models, ABCD

Unit II

constants for symmetrical & asymmetrical network

Mathematical solution to estimate regulation & efficiency of all types of lines. Surge Impedance, loading, Interpretation of long line equation and its equivalent equation. Tuned power lines. Power flow through transmission line, Circle diagram, Method of voltage control, Static & rotating VAR generator, transformer control.

Unit III

Overhead transmission line- I

Insulator & Mechanical design types of conductors used in overhead transmission line, Types of line supports and towers, Distribution of conductors over transmission towers, Spacing between conductors, Length of span and sag tension calculation for transmission line.

Unit IV

Overhead transmission line- II

Wind & ice loading, support of line at two different levels, string chart, Sag template, Stringing of conductor, Vibration and Vibration dampers. Insulator Materials used for transmission line insulations, Types of insulators for overhead transmission line failure of insulator, Voltage distribution of suspension insulator, String efficiency, Shielding and grading.

Unit V

Voltage control & Distribution system:

AC single phase, 3 phase, 3wire & 4 wire distribution, Kelvin's law for most economical size of conductor Substation layout showing substation equipment, bus bar single bus bar and sectionalized bus bar, main and transfer for bus bar system, sectionalized double bus bar system, ring mains.

LIST OF EXPERIMENTS

1.   To study ABCD constants of a transmission line.
2.   To determine efficiency and regulation of long transmission line.
3.   To study various types of conductors used in transmission line.
4.   To study various types of insulators used in transmission line.
5.   To determine voltage distribution and string efficiency of suspension insulators..
6.   To study different types of DC distribution system.
7.   To study radial feeder performance
        i.   when feed at one end
        ii.   when feed at both end
8.   To study performance of typical DC Distribution system in radial configuration.
9.   To study performance of typical DC Distribution system in ring main configuration.
10.   To study pf improvement with static VAR compensation.

Reference Books:-
1. C.L. Wadhwa, Electrical Power System Analysis, New Age International.
2. D.P. Kothari, I.J. Nagrath, Power System Engineering TMH II Ed. Reprint 2009.

BEE 055

PRINCIPAL OF MANAGEMENT & MANAGERIAL ECONOMICS

Course Outcomes ;-The student will be able to

CO1- Identify and apply appropriate management techniques for managing business.
CO2- Have a conceptual knowledge about the planning and decision making.
CO3- Apply the concept of organizing for the effective functioning of a management.
CO4- Understand the various macro-economic concepts of budgetary deficits, public debt, and balance of payment.
CO5- Managerial uses of Production Function, Short Run and Long Run Production Analysis.

Unit I

Management Concept: Management, Administration and Organization Difference and Relationship between Organization Management and Administration. Importance of Management, Characteristics of Management

Unit II

Management: Scientific Management, Principles of Management, Process of Management, Functions of Management, Levels of Management, Project Management

Unit III

Decision Making: Introduction and Definition, Types of Decisions, Techniques of Decision Making, Decision

making under certainity Decision making under uncertainty, Decision Making under risk

Unit IV

Managerial Economics: Introduction, Factors Influencing Manager, Micro and Macro-economics, Theory of the Cost, Theory of the Firm, Theory of Production Function.

Unit V

Productivity: Input-Output Analysis, Micro-economics Applied to Plants and Industrial Undertakings, Production and Production system, Productivity, Factors affecting Productivity, Increasing Productivity of Resources

Reference Books
1. The Practice of Management Peter Drucker Harper and Row
2. Essentials of Management: Koontz, Prentice Hall of India
3. Management Staner, Prentice Hall of India
4. Principle and Practice of Management T.N. Chhabra, Dhanpat Rai New Delhi