SARDAR PATEL UNIVERSITY,BALAGHAT

Academic session 2020-21 & Onwards

Four Year B.Tech in Electrical Engineering (EE)

BEE 501

Electrical Machine-II

Unit –I

Single Phase Induction Motor :- Single Phase Induction motor; double revolving field theory, equivalent circuit and its determination, performance calculation, starting methods and types of single phase induction motors: their working principle and applications, Comparison with three phases induction motors. Single 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 and block rotor test, circle diagram, Starting of squirrel cage and slip ring motors, power factor control, Cogging & Crawling, Double cage & Deep bar Indication Motor, impact of unbalanced supply and 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

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

Text Books:

1. P.S. Bimbhra, Generalised Theory of Electrical Machines.

2. E. Open claw Tayler, The performance & Design of AC Computer Meters, A.H.Wheeler & Co(P) Ltd. Alalhabad, 1971

Experiment List

1. To perform No load and 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.

Four Year B.Tech in Electrical Engineering (EE)

BTEE 502

Electronic Instrumentation

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. Measurement of inductance of a coil using Anderson Bridge.

2. Measurement of capacitance of a capacitor using schering bridge.

3. LVDT and capacitance transducers characteristics and calibration.

4. Resistance strain gauge- Strain Measurement and calibration.

5. Measurement of R,L,C & Q using LCR-Q meter.

6. Study & measurement of frequency using Lissajous patterns.

7. Measurement of pressure using pressure sensor.

8. Study of Piezo-electric Transducer and Measurement of impact using Piezo-electric Transducer

9. Measurement of Displacement using LVDT.

10. Measurement of speed of a Motor using photoelectric transducer.

12. Temperature measurement & Control using thermo couple & using thermistor.

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 and 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

6. 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.

SARDAR PATEL UNIVERSITY,BALAGHAT

Academic session 2020-21 & Onwards

Signals & Systems

Unit I

Dynamic Representation of Systems: Systems Attributes, Causality linearity, Stability, timeinvariance. 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) and 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 and properties, Application of Z-Transform for the analysis of Discrete time LTI Systems, Significance of poles and 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.

Four Year B.Tech in Electrical Engineering (EE)

BTEE 504

Power Sysytem II

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 ЛI, Equivalent T and equivalent ЛI, 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

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

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 insulator 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.

Refrence 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.

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BTEE 505

Principles of Management & Economics

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

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BTEE 506

Electrical Engg. Simulation Lab

LIST OF EXPERIMENT

1. To generate the pulse with the help of comparator.

2. To generate the pulse with the help of PWM techniques

3. To generate the pulse with the help of sine pulse width modulation

4. To find the time response for series RL, RC,RLC circuit.

5. Write a program to calculate the efficiency of the transformer at various laod conditions and plot the graph between efficiency and load for given data.

6. Write a program to determine the equivalent circuit parameter for given problem.

7. Determine the output waveform for the clipper and clamper circuit 8. To observe the output waveform for the MOSFET

9. To observe the waveform of single phase full wave rectifier circuit with R load

10. To observe the waveform of single phase half wave thyristor circuit with R load

11. To observe the waveform of single phase full wave thyristor circuit with RL & RLE load

12. To observe the waveform of single phase semi convertor circuit with RL & RLE load

13. To observe the waveform of single phase semi convertor circuit, when one of the thyristor is replaced by diode