Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Electrical and Electronics Engineering)

SEMESTER III

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTEE 301		CIRCUIT THEORY	2	1	2	4	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

To introduce the students with the concept of circuit elements lumped circuits, waveforms, circuit laws and network reduction. To solve the electrical network using mesh and nodal analysis by applying network theorems, analyze the transient response of series and parallel A.C. circuits and to solve problems in time domain using Laplace Transform.

Course Outcomes:

Upon completion of this course students will be able to:

1. Apply the nodal and mesh methods of circuit analysis.
2. Apply linearity and superposition concepts to analyze RL, RC, and RLC circuits in time and frequency domains.
3. Express complex circuits in their simpler Thévenin and Norton equivalent forms.
4. Analyze circuits both in time and frequency domains.
5. Construct and make time and frequency domain measurements on elementary RL, RC, and RLC circuits.

Syllabus:

UNIT I

Practical Voltage & current sources, Source transformations, Network reduction using Star – Delta transformation, Loop and node analysis With linearly dependent and independent sources for DC and AC networks, Concepts of super node and super mesh. Analysis of magnetically coupled circuits, Dot convention, coupling coefficient, tuned circuits, Series and parallel resonance, frequency-response of series and Parallel circuits, Q –factor, Bandwidth.
Network topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks.

UNIT II

Transient analysis- Behavior of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations. Steady state analysis- Concept of phasor & vector, impedance & admittance,

UNIT III

Network Theorems for AC & DC circuits-Thevenins & Norton's, Superpositions, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's

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theorem, problems with dependent & independent sources.

UNIT IV

Frequency domain analysis – Laplace transform solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain

UNIT V

Network function & Two port networks – concept of complex frequency, Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters – Z, Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, terminated two port networks.

Text Books:

1. A K Chakrabarti :Circuit theory: Dhanpat Rai

Reference Books:

1. M.E. Van Valkenburg, Network Analysis, (PHI)
2. F.F.Kuo, Network Analysis.
3. Mittal GK; Network Analysis; Khanna Publisher
4. Mesereau and Jackson; Circuit Analysis- A system Approach; Pearson.
5. Sudhakar & Pillai; Circuit & Networks- Analysis and Synthesis; TMH
6. Hayt W.H. & J.E. Kemmerly; Engineering Circuit Analysis; TMH

List of Practical's: (If Practical Credit Shown in Syllabus)

1. Verification of Thevenin Theorem.
2. Verification of Superposition Theorem.
3. Verification of Reciprocity Theorem.
4. Verification of Maximum Power Transfer Theorem.
5. Verification of Millman's Theorem.
6. Determination of Open Circuit parameters of a Two Port Network.
7. Determination of Short Circuit parameters of a Two Port Network.
8. Determination of A,B, C, D parameters of a Two Port Network
9. Determination of Frequency Response of RLC Series Circuit.
10. Determination of Frequency Response of RLC parallel Circuit.

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTEE 307		ELECTRICAL INSTRUMENTATION	2	1	2	4	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To enable the students to learn in detail about the various instruments available for monitoring/measuring electrical parameters encountered in domestic / industrial applications.
2. To introduce the fundamental concepts of electrical instrumentation.

Course Outcomes:

1. To test and calibrate ammeter, voltmeter, and Wattmeter and energy meter .
2. Learn the measurement of magnetic parameters.
3. Understand the operating principles of Energy and power meters.
4. Measure low, medium & high Resistances using suitable bridges.
5. To select proper instrument for measurement various Electrical elements

Syllabus:

UNIT I

Measurement and error, Accuracy and precision, sensitivity resolution, Error & Error analysis, Effect of temperature, Internal friction, Stray field, Hysteresis and Frequency variation & method of minimizing them, Loading effects, due to shunt connected and series connected instruments, calibration curve, Testing & calibration of instruments. Galvanometers –Theory & operation of ballistic galvanometer, D'arsonal galvanometer, galvanometer motion & damping, Sensitivity, Flux meter, Vibration galvanometer, Spot deflection galvanometer. Definition of analog & digital instruments, Classification of analog instruments, their operating principle, Operating force, Types of supports, Damping, Controlling.

UNIT II

Different types of Ammeter & Voltmeter –PMMC, MI, Electrodynamometer, Hotwire, Electrostatic, Induction, Rectifier, Ferro dynamic & Electro-thermic, Expression for control & deflection torque, their advantages, disadvantages & error, Extension of range of instruments using shunt & multiplier.

UNIT III

Instrument transformers: Potential and current transformers, ratio and phase angle errors, testing of instrument transformers, Difference between CT and PT, errors and reduction of errors. Measurement of power: Power in AC and DC Circuit, Electrodynamometer type of wattmeter, Construction, theory, operation & error, Low power factor & UPF wattmeter, Double element and three element dynamometer wattmeter, Measurement of power in three phase circuit, one,

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two & three wattmeter method, Measurement of reactive power by single wattmeter, Measurement of power using CTs & PTs.

UNIT IV

Measurement of Energy: Single phase induction type energy meter –construction & operation – driving and braking torques –errors & compensations –Testing by phantom loading and using R.S.S. meter-Three phase energy meter –Tri-vector meter –Maximum demand meter, Ampere hour meter. Potentiometer –DC potentiometer standardization –Lab type Crompton's potentiometer, application of DC potentiometer, AC polar type and coordinate type potentiometer, their construction and applications.

UNIT V

Miscellaneous Instruments & Measurements: Power factor meter, Single phase and three phase Electro-dynamometer type & moving iron type. Frequency meter –Vibrating reed, Resonance type & Weston type, Synchronoscope, Ohmmeter –series & stunt type, Multi-meter, Megger & Ratio meter. Resistance Measurement –Classification of low, medium & high resistance – Voltmeter, Ammeter, Wheatstone Bridge, Kelvin's double bridge & loss of charge methods for resistance measurement, Earth resistance measurement. Magnetic Measurement –B-H Curve, Hysteresis Loop determination.

Text Books:

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing.
2. Electrical & Electronic Measurement & Instruments by A.K.Sawhney, Dhanpat Rai & Co.

Reference Books:

1. Helfrick and Cooper, "Modern Electronic Instrumentation and Measurement Techniques", Prentice-Hall of India, Reprint 1988.
2. Jones, B.E., "Instrumentation Measurement and Feedback", Tata McGraw-Hill, 1986.
3. Golding, E.W., "Electrical Measurement and Measuring Instruments", 3rd Edition, Sir Issac Pitman and Sons, 1960.

List of Practical's: (If Practical Credit Shown in Syllabus)

1. Measurement of low resistance using Kelvin's Double bridge
2. Measurement of medium resistance using Whetstone's bridge
3. Measurement of high resistance by loss of charge method
4. Measurement of Insulation resistance using Megger
5. Measurement of earth resistance by fall of potential method and verification by using earth tester
6. Measurement of power in a single phase ac circuit by three voltmeter/ three Ammeter method
7. Calibration of a dynamometer type of wattmeter with respect to a standard/Sub Standard wattmeter
8. Calibration of single phase digital/ Electronic type energy meter.
9. Calibration of a dynamometer type of wattmeter by Phantom Loading method.
10. Measurements using Instrument Transformers.
11. Study of various types of Indicating Instruments.
12. Measurement of Power in three phase circuit by one, two & three wattmeters.

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTEE 303		ANALOG ELECTRONICS	2	1	2	4	60	20	20	30	20

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

Any electronic trade has its basis on a certain number of components and some basic standard circuits. These common circuits are applied in all sections of the Electronics technology. To learn the basic methods for the design of digital circuits and provide the fundamental Concepts used in the design of digital systems. To introduce basic postulates of Boolean algebra and shows the correlation between.

Course Outcomes:

After the successful completion of this course students will be able to

1. Understand the basic physics of carrier transport in bulk semiconductors and real device structures.
2. Understand the fundamentals of operation of the main semiconductor electronic devices.
3. Understand the basic parameters of electronic devices, their performance, and limiting factors.
4. Understand the basic principles of electronic device operation with emphasis on bipolar transistors, and unipolar microwave devices.
5. To introduce the concepts and techniques associated with the number systems and codes. To minimize the logical expressions using Boolean postulates.
6. To design various combinational and sequential circuits

Syllabus:

UNIT I

Semiconductor Diode

PN junction diode theory, forward and reverse-biased junctions, reverse-bias breakdown, Zener and avalanche breakdown, load line analysis, behavior of PN junction characteristics, temperature dependence, concept of junction capacitance in forward and reverse bias conditions, diode characteristics, diode applications: rectifier, Clipper and clamper circuit, different types of diodes: zener diodes, varactor diodes, Tunnel diode, photo-diodes, LED, Schottky diode, Laser diodes.

UNIT II

Transistors: BJT, FET, MOSFET, Types, working principle, characteristics, and region of operation, load line, biasing methods (fixes biasing, self biasing), early effect.

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SEMESTER III

UNIT III

Transistors Amplifier: Small Signal BJT amplifiers: AC equivalent circuit, hybrid, re model and their use in amplifier design. Multistage amplifiers, frequency response of basic & compound configuration, Power amplifiers: Class A, B, AB, C and D stages, push-pull amplifier (their efficiency and power Dissipation).

UNIT IV

Feedback & Oscillator Circuits: Effect of positive and negative feedbacks, basic feedback topologies & their properties, Analysis of practical feedback amplifiers, Sinusoidal Oscillators, Operation of oscillators, types of transistor oscillators (RC, LC and Crystal), Multivibrators: Monostable and Astable Multivibrator, basic operation of the 555 timer.

UNIT V

Operational Amplifiers: Op-Amp Basics, ideal and practical Op-Amp circuits, differential and common mode operation, Inverting & Non Inverting Amplifier, OpAmp applications: Summing amplifier, Integrators and differentiators, Instrumentation amplifier.

List of Practical's: (If Practical Credit Shown in Syllabus)

1. V-I Characteristics of different types of Diodes.
2. Design of various clipping and clamping circuits.
3. Design half & full wave rectifier
4. Design & Analysis of transistor amplifier in CE, CB & CC configuration.
5. Design & Analysis of JFET Amplifier.
6. Design & Analysis of MOSFET Amplifier.
7. Study of power amplifiers of various classes.
8. Study of various oscillators.
9. Char. of Op-Amp (input offset voltage, slew rate CMRR, BW, Input bias current)
10. Study of Op-Amp as a comparator.

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTEE 305		ELECTRICAL ENGINEERING MATERIALS	3	0	0	3	60	20	20	0	0

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

To introduce the concepts of different electrical engineering materials. To gain the concepts of conducting, semiconducting, dielectric and insulating materials with their properties and application. It will also provide the various phenomena such as Magnetostriction, Hall Effect, Super conductivity etc.

Course Outcomes:

Upon completion of this course the students will be able to:

1. Apply core concepts in materials science to solve engineering problems.
2. Select the material for design and construction
3. Understand the importance of life -long learning
4. Evaluate the insulating, conducting and magnetic materials used in electrical machines.
5. Understand the properties of liquid, gaseous and solid insulating materials.

Syllabus:

UNIT I

Insulating Materials and their Applications:

Plastics- Definition and classification, thermosetting materials, Thermo-plastic materials; Natural insulating materials, properties and their applications; Gaseous materials – Ceramics-properties and applications.

UNIT II

Semi-Conducting Materials:

Introduction - Semi-conductors and their properties, Different semiconducting materials (silicon and germanium) used in manufacture of various semiconductor devices (i.e. p-type and n-type semiconductors), Materials used for electronic components like resistors, capacitors, diodes, transistors and inductors etc.

UNIT III

Materials For Electrical Applications

Materials used for Resistors, rheostats, heaters, transmission line structures, stranded conductors, bimetals fuses, soft and hard solders, electric contact materials, electric carbon materials, thermocouple materials. Solid Liquid and Gaseous insulating, materials. Effect of moisture on insulation.

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UNIT IV

Magnetic Materials

Introduction and classification of magnetic materials, spontaneous magnetization in ferromagnetic materials, magnetic Anisotropy,Magnetostriction,Diamagnetism,magnetically soft and hard materials, Ferrites, cast and cermet permanent magnets, ageing of magnets. Factors effecting permeability and hysteresis. B-H curve, magnetic saturation, hysteresis loop (including) coercive force and residual magnetism, concept of eddy current and hysteresis loss, Curie temperature,

UNIT V

Special Purpose Materials

Refractory Materials, Structural Materials, Radioactive Materials, Galvanization and Impregnation of materials, Processing of electronic materials, Insulating varnishes and coolants, Properties and applications of mineral oils, Testing of Transformer oil as per ISI.

Text Books:

1. SK Bhattacharya: "Electrical and Electronic Engineering Materials" 1st edition Khanna Publishers, New Delhi, 2006.
2. A.J. Dekker "Electrical Engineering Materials", PHI, 2006.

Reference Books:

1. TTTI Madras: "Electrical Engineering Materials" TMH.
2. R K Rajput: "A course in Electrical Engineering Materials", Laxmi Publications. 2009.
3. T K Basak: "A course in Electrical Engineering Materials"New Age Science Publications 2009.
4. C. S. Indulkar and S. Thruvengadem: "Electrical Engineering Materials" S. Chand.
5. John Allison "Electrical Engineering Material s & Devices" TMH.
6. V. Raghvan: "Material Science & Engineering" PHI.
7. S.P. Seth & P.V. Gupta: "A course Electrical Engineering Materials" Dhanpat Rai & Sons.

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
ML301		ENVIRONMENT AND ENERGY STUDIES	3	0	0	3	60	20	20	0	0

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The students will be able to:

1. To understand sources of information required for addressing environmental challenges
2. To identify a suite of contemporary tools and techniques in environmental informatics
3. To apply literacy, numeracy and critical thinking skills to environmental problem-solving

Course Outcomes:

The students should be able to:

1. Apply the principles of ecology and environmental issues that apply to air, land and water issues on a global scale.
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
3. Demonstrate ecology knowledge of a complex relationship between predators, prey, and the plant community.

Syllabus:

Unit I

Environmental Pollution and Control Technologies: Environmental Pollution & Control: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air quality standards. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary and Tertiary.

Unit II

Natural Resources: Classification of Resources: Living and Non - Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resouces, Land resources: Forest resources, Energy resources: growing energy needs, renewable energy source, case studies..

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Unit III

Ecosystems: Definition, Scope and Importance ecosystem. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, ecosystem value, devices and carrying capacity, Field visits.

Unit IV

Biodiversity and its Conservation: Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a megadiversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, manwildlife conflicts; Conservation of biodiversity: In-situ and Exsitu conservation. National biodiversity act.

Unit V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan(EMP).

Reference Books:

1. Agarwal, K.C.,(latest edition).**Environmental Biology**, Bikaner :Nidi Pub. Ltd.,
2. Brunner R.C.(latest edition) **Hazardous Waste Incineration**, McGraw Hill Inc.
3. Clank R.S. .,(latest edition. **Marine Pollution**, Clanderson Press Oxford (TB).
4. **Environmental Encyclopedia**, Jaico Pub. Mumbai,
5. De A.K(latest edition) **Environmental Chemistry**, Wiley Wastern Ltd.
6. ErachBharucha(2005).**Environmental Studies for Undergraduate Courses** by for University Grants Commission.
7. R. Rajagopalan(2006).**Environmental Studies**. Oxford University Press.
8. M. AnjiReddy(2006).**Textbook of Environmental Sciences and Technology**. BS Publication.
9. Richard T. Wright(2008).**Enviromental Science: towards a sustainable future** PHL Learning Private Ltd. New Delhi.
10. Gilbert M. Masters and Wendell P. Ela .(2008).**Environmental Engineering and science**. PHI Learning Pvt Ltd.
11. Daniel B. Botkin& Edwards A. Keller(2008).**Environmental Science** Wiley INDIA edition.
12. AnubhaKaushik(2009).**Enviromental Studies**. New age international publishers.

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTEE 308		**ELECTRICAL INSTALLATION TESTING AND MAINTENANCE**	2	1	2	4	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The course covers topics on general principles of electrical installations, testing of transformers, induction motor & various electrical equipments. It also covers topics on earthing system for safety and practical aspects of condition monitoring and maintenance of various electrical equipments.

Course Outcomes:

At the end of the course, the students will be able to:

1. Apply Indian Electricity safety Rules and Regulations for design of electrical systems.
2. Understand the maintenance of various electrical equipments.
3. Test and install electrical apparatus and HVAC systems for commercial and industrial applications.
4. List the conditions for Install of electrical equipments.
5. Analyze the different earthing systems and design electrical systems as per the requirements for residential and commercial purposes.

Syllabus:

UNIT I

Electrical Safety Management: Safety Management during Operation and Maintenance, India Electricity rules, workmen's safety devices: Electric Shock, treatment for electric shock, Clearance and Creepages.

Need of Earthing, different methods of Earthing, Equipment for Earthing and System Grounding, Earthing Procedure - Building installation, Domestic appliances, Industrial premises.

UNIT II

Electrical Maintenance: Importance and necessity of maintenance, Requirement of electrical maintenance department, Maintenance: Types of maintenance, maintenance schedules, procedures, Maintenance of Transmission lines. Maintenance of Distribution Transformers: Checking of insulation Resistance, Checking and maintenance of busbars, isolating switches, lightning arrestors, and relay panels, Power Transformers. Maintenance of Motors: Over hauling of motors. Preventive Maintenance of circuit breakers, underground cables. Trouble Shooting: Causes for failure of electrical equipments.

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UNIT III

Electrical Installation System: Tools/Instruments necessary for installation, Technical report, Inspection, site testing and checking, Installation of electrical equipments like induction motors, DC machines, transformers, switch gears, transmission and distribution lines. Precautions while installation is in progress. Testing of installation before declaring it to be fit for energizing.

Domestic installation: Introduction, testing of electrical installation of a building, IE rules for domestic installation

UNIT IV

Testing of transformers: Type tests, Routine tests and Special tests. Determination of mechanical stress under normal & abnormal conditions. Trouble shooting, faults, causes and remedies.

UNIT V

Testing of various electrical equipments: Testing of Power cables – Causes of cable failure, fault location methods and Remedial actions. Testing of CT, PT, generator, testing of switchgear & other protective devices like circuit breaker, relay and lighting arrester. Testing of Capacitor banks.

Text books:

1. Paul Gill,"Electrical Power Equipment Maintenance And Testing",CRCPress,2008.
2. Rao, S., "Testing, Commissioning, Operation and Maintenance of Electrical Equipment", 6/E., Khanna Publishers, New Delhi.

Reference books:

1. M.Subbarao,Installation Commissioning & Testing Of Electrical Engineering Equipments, Khanna Publishers.
2. Singh Tarlok, "Installation, Commissioning And Maintenance Of Electrical Equipment", S.K. Kataria And Sons, New Delhi.
3. Philip Kiameh, "Electrical Equipment Handbook: Troubleshooting And Maintenance", Mcgraw-Hill, 2003.
4. Preventive Maintenance Of Electrical Apparatus: SK Sharotri, Katson Publishing House Ludhiana.

List of Practical's: (If Practical Credit Shown in Syllabus)

1. Introduction of tools, electrical materials, symbols and abbreviations.
2. To study earthing of electrical installation.
3. To study types of insulators.
4. To study maintenance schedule for distribution transformer, testing, maintenance and protection of distribution transformer.
5. To study of measurement of insulation resistance and capacitance.
6. To study of maintenance schedule for storage battery switchgear and control equipment.
7. To study types of neutral earthing and substation earthing.
8. To study construction and types of plate earthing.
9. To study construction and types of pipe earthing.
10. Testing of CT and PT.

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