SAMRAT ASHOK TECHNOLOGICAL INSTITUTE,
(ENGINEERINGCOLLEGE)
VIDISHA (M.P.) – 464001
DEPARTMENT OF ELECTRICAL ENGINEERING

Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	Utilization of Electrical Power	EE-1871 (A)	3	1	0	4

Pre-requisite: Power System and Electrical Machines

Course Objective:

1. Illustrate fundamental concepts of illumination and understands of various types of lamps
2. Explain traction system and various types of controlling of breaking technique.
3. Classify with various type Electric Furnace and welding equipments.
4. Explain the electrolysis process

Topic Covered:

Unit I

ILLUMINATION ENGINEERING: Nature of light, units, sensitivity of the eye, luminous efficiency, glare. Production of Light; Incandescent lamps, arc lamps, gas discharge lamps- fluorescent lamps-polar curves, effect of voltage variation on efficiency and life of lamps, Distribution and control of light, lighting calculations, solid angle, inverse square and cosine laws, methods of calculations, factory lighting, flood lighting and street lighting, Direct diffused and mixed reflection & transmission factor, refractors, light fittings.

Unit II

HEATING, WELDING AND ELECTROLYSIS: Electrical heating-advantages, methods and applications, resistance heating, design of heating elements, efficiency and losses control. Induction heating: core type furnaces, core less furnaces and high frequency eddy current heating, dielectric heating: principle and special applications, arc furnaces: direct arc furnaces, Indirect arc furnaces, electrodes, design of heating elements, power supply and control. Different methods of electrical welding, resistance welding, arc welding, energy storage welding, laser welding, electrobeam welding, and electrical equipment for them. Arc furnaces transformer and welding transformers. Review of electrolytic principles., laws of electrolysis, electroplating, anodizing electro-cleaning, extraction of refinery metals, power supply for electrolytic process, current and energy efficiency.

Unit III

TRACTION: Special features of Traction motors, Different system of electric traction and their Advantages and disadvantages, diesel electric locomotives. Mechanics of train movement: simplified speed time curves for different services, average and schedule speed, tractive effort, specific energy consumption, factors affecting specific energy consumption, acceleration and braking, retardation, adhesive weight and coefficient of adhesion.

Unit IV

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TRACTION MOTORS : DC motors, single phase and three phase motors, starting and control of traction motors, braking of traction motors: plugging, rheostatic and regenerative braking, Modern 25 KV a.c.single phase traction systems: advantages, equipment and layout of 25 KV, line and current selection, single phase power frequency A.C. traction.

Unit V

INDUSTRIAL ELECTRONICS: Solid state controller of heating, welding and traction.

REFERENCES:

1. Tailor, E.O., Utilization of Electrical Energy. Orient Longman Ltd, N.Delhi.
2. R.K. Rajput, Utilization of Lectrical Power Laxmi Publications (P) Ltd.
3. G.C.Garg, Utilization of Electric Power and Electric tradition Khanna Publications.
4. N .V. Suryanarayan, Utilization of Elect. Power including Electric Drives and Electric Traction, New Age International.

TEXT BOOK:

1. J.B.Gupta, Utilization of Electric Power and Electric Traction. S.K.Kataria & Sons.
2. H.Pratab, Art and science of utilization of electrical Energy, Dhanpat Rai & Co.
3. H.Pratab, Modern Electric tradition, Dhanpat Rai & Co.

Course Outcomes - At the end of this course, students will demonstrate the ability to:

1. Simplify the fundamentals of illumination engineering.
2. Advantages of various methods of heating, welding and electrolysis.
3. Fundamental of electric traction and evaluation elaborate suitability of traction motors.
4. Determine starting, speed control and braking of traction motors.
5. Classify the Role and selection of individual and collective drives.

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Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	Process Control Instrumentation	EE-1871 (B)	3	1	0	4

Pre Requisites: Instrumentation
Course Objective:

1. To illustrate the concept of process instruments for various physical variables, system, automation.
2. To classify of the different controllers
3. To acquire the complex control techniques used in process industries

Topic Covered:

Unit-I

TRANSDUCER FUNDAMENTALS.

Review of transducers for non-electrical quantities their characteristics and classification.

Unit-II

TRANSDUCERS FOR INDUSTRIAL MEASUREMENT

Working principle and characteristics of transducers used for measuring weight, density, vibration, distance, thickness, opacity etc. Working principle of pneumatics, electrical optical magnetic and nucleonic transducers used for measuring pressure, level, temperature, flow, moisture, humidity and pH value.

Unit-III

PROCESS CONTROLLERS

Introduction to different control concepts like feedback, feed forward cascade etc. steady state analysis dynamic response of linear and nonlinear elements, transient and frequency response analysis of processes with controllers PID controller design (pneumatic and electrical) comparative study of pneumatic and electric controllers.

Unit -IV

FINAL CONTROL ELEMENTS

Selection of instruments for a given process and their placement in the loop instrumentation diagram with standard symbols.

Unit-V

Case studies of Design of Instrumentation schemes used in Thermal Pulp and paper plants, sugar and cement industries.

TEXT BOOK:

1. Electrical Meaurement& Instrumentation By A.K.Sawney
2. Indusrial Instrumentation By M.S.Berde
3. Control System By Nagrath, Gopal

REFERENCE BOOKS:

1 Control System By B.S.Manake
2. Process control By C.D. Johnson

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3. Instrumentation and process automation By S.K. Singh

Course Outcomes - At the end of this course, students will demonstrate the ability to :

1. Transducer, classification and characteristics.
2. Working principle and characteristics of various tranducers used for measurement and pneumatics.
3. Control concept, analysis of processor with PID controller and their study.
4. Selection of instruments for process and loop instrumentation diagram with standard symbols.
5. Case studies of design used in thermal, paper, cement industries.

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DEPARTMENT OF ELECTRICAL ENGINEERING

Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	Soft Computing Techniques	EE-1871 (C)	3	1	0	4

Pre Requisites: Software Lab, Mathematics

Course Objective –

1. To introduces soft computing techniques that are different from conventional AI techniques.
2. To provide necessary mathematical background for understanding and implementing soft computing Techniques, such as neural networks, fuzzy systems, and genetic algorithms.
3. To introduces case studies where soft computing techniques can be implemented.

Topic Covered:

Unit-I

Evolution of Neural Network, terminologies of AVN, linear separability, supervised learning Network, perceptron Networks, Adaptive linear Neuron, Multiple Adaptive linear Neuron, buck propagation Network, radial basis function Network.

Unit-II

Unsupervised learning Network, fixed weight competitive Net, kohonen self-organizing feature maps, learning vector quantization, counter propagation Networks, adaptive resonance, theory Network.

Unit-III

Genetic Algorithm, Biological background traditional optimization and search techniques, genetic algorithm and search space, terminologies in genetic algorithm operators in GA, encoding, selection crossover, mutation, constraints in GA stopping condition.

Unit-IV

Evolution strategies (ES) partial swarm optimization, artificial Bee colony optimization, application to minimize, maximize constrained/unconstrained mathematical functions and engineering problem optimization.

Unit-V

Differential evolutionary optimization algorithm basic principles, teaching learner based optimization algorithm application to mathematical constrained/unconstrained function and engineering problem optimization.

TEXT BOOK:

1. Principles of Soft computing by S.N. Sivanandam, S.N.Deeple Wile India Publisher.
2. Neural Network, fuzzy logic & Genetic algorithms by Rajasekaran and Pai PHI Learning.
3. PSO Tutorial Kennedy Ebuehart.

REFERENCE BOOKS:

1) An Introduction to Neural Network using Matlab TMH.
2) Hand Book of genetic algorithm by Rajasekaran, Vijay Laxmi Pai.

Course Outcomes - After successful completion of this course student will able to demonstrate:

1) Neural network and terminology of AVN.
2) Learning of vector quantization and counter propagation network.
3) Able to learn genetic algorithm, optimization, search techniques, encoding.
4) Knowledge of artificial bee optimization, application and engineering problem optimization.
5) Evolutionary optimization, basic principle, mathematical function.

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DEPARTMENT OF ELECTRICAL ENGINEERING

Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	Calibration and Testing of Electrical Equipments	EE-1872 (A)	3	1	0	4

Pre Requisites: Electrical Instrumentation
Course Objective -

1. Familiar with calibrating measurement instruments.
2. To Explaincalibration coordinatorsfor those responsible for maintaining quality.
3. Impart knowledge of measurement science to maintaining quality standards.
4. Describe different levels of standards and the requirements of traceability.

Topic Covered:
Unit - I
Electricity Rules: Indian Electricity Rules, Indian Electricity Act, Electricity Supply Act.

Unit - II
Standards IEEE/IEA/UL and Indian: Study of Various Indian Standards codes for various important electrical equipments.

Unit - III
Installation & Commissioning : Installation & Commissioning of out door Indoor electrical equipments like transformer, Motors, Switchgears, Panels, Relays, CT, PT, Earthing etc.

Unit - IV
Testing: Testing of new & Old electrical installation as per IS of the following. Transformer, Cables, Insulating Oil, Protective relays, Circuit Breakers, CT, PT, Meters, Energy Meters, PVC insulated cables, High voltage Testing & Routing Test, Type test on above.

Unit - V
Calibration: Calibration of meters, Energy meters, Relays, Circuit breakers, & other equipments as per IS specification.

TEXT BOOK:

1. M. Subbarao, Installation Commissioning & testing of Electrical Engineering Equipments, Khanna Pub.
2. Jagdishlal, Hanbook of Electricity Laws, Delhi Law House

REFERENCE BOOKS:

1. I.S. Codes, Indian Standard codes, Indian Standard Institution, Nanak Bhavan, New Delhi.
2. IS 9283 - Submersible Motor
3. IS 325 - Induction Motor
4. IS 2071 - High Voltage Testing
5. IS 3156 - Potential Transformer
6. IS 2705 - Current Transformer
7. IS 1255 - Cables
8. IS 2026 - Power Transformer
9. IS 1866 - Transformer Oil

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10. IS 694 - PVC insulated Cables

Course Outcomes - At the end of this course, students will demonstrate the ability to :

1. To adopt rules & Electrical rules according to IER.
2. To apply the various Indian standards. For use in different equipments.
3. To distinguish the installation & commissioning of different types of electrical equipments.
4. To illustrate the different testing process use in different equipments.
5. To choose the calibration process for energy meter relay, C.B. etc.

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DEPARTMENT OF ELECTRICAL ENGINEERING

Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	Computer Architecture	EE-1872 (B)	3	1	0	4

Pre Requisites: Microprocessor and Digital Electronics

Course Objective –

1. To conceptualize the basics of organizational and architectural issues of a digital computer.
2. To analyze performance issues in processor and memory design of a digital computer.
3. To understand various data transfer techniques in digital computer.
4. To analyze processor performance improvement using instruction level parallelism

Unit-I

Register transfer and Micro-operations Instruction codes, computer instructions, timing and control, execution of instructions, input output and interrupt.

Unit-II

Central processor organization : Power bus Organization, arithmetic logic unit, stock organization instruction format addressing modes, data transfer and manipulation, parallel processing. Micro program control organization : Control memory address sequencing, micro program sequencer microinstruction formats.

Unit-III

Arithmetic Processor Design: Addition and subtraction algorithm multiplication algorithm, division algorithm processor configuration, arithmetic with signed 2'scomplement numbers, booth's multiplication algorithm, division in signed 2's complement representation, floating point arithmetic operations.

Unit-IV

Input-output organization :Peripheral devices, I/O interface asynchronous data transfer, direct memory access, priority interrupt input-output processor, multiprocessor organization.

Unit-V

Memory Organization : Aauxiliary memory microcomputer memory , memory Hie rarchy, associative memory , virtual memory , cache memory , memory management Hardware.

Text Books :

1. Computer system architecture by M.Morris Mano, PHI Publication.
2. Structured Computer organization by Andrew S.Tenenbaum, PHI Publication.

Course Outcomes - After successful completion of this course student will have:

1. Ability to understand basic structure of computer.
2. Ability to understand instruction format, data transfer, parallel processing and control memory organization.
3. Ability to understand control unit operations, arithmetic and floating point operation.
4. Ability to design memory organization direct memory access, interrupt and multiprocessor organization.
5. Ability to understand the concept of memory organization.

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Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	Industrial Electrical Systems	EE-1872 (C)	3	1	0	4

Pre Requisites: Basic Electrical,

Course Objective–

1. Interpret technical aspects of industrial Systems
2. To Extend the Illumination system used in industry

Topic Covered:

Unit-I

Electrical System Components

LT system wiring components, selection of cables, wires, switches, distribution box, meteringsystem, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse currentcharacteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator,Relays, MPCB, Electric shock and Electrical safety practices.

Unit-II

Residential and Commercial Electrical Systems

Types of residential and commercial wiring systems, general rules and guidelines forinstallation, load calculation and sizing of wire, rating of main switch, distribution board andprotection devices, earthing system calculations, requirements of commercial installation,deciding lighting scheme and number of lamps, earthing of commercial installation, selectionand sizing of components.

Unit-III

Illumination Systems

Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency,specific consumption, glare, space to height ratio, waste light factor, depreciation factor,various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED andtheir operation, energy saving in illumination systems, design of a lighting scheme for aresidential and commercial premises, flood lighting.

Unit-IV

SLD, Cable and Switchgear selection, Lightning Protection, Earthing design,Power factor correction – kVAR calculations, type of compensation, Introduction to PCC,MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

Unit-V

Industrial Electrical System Automation

Study of basic PLC, Role of in automation, advantages of process automation, PLC basedcontrol system design, Panel Metering and Introduction to SCADA system for distributionautomation.

DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing theDG, UPS and Battery Banks, Selection of UPS and Battery Banks.

Reference Books

1. S. L. Uppal and G. C. Garg, "Electrical Wiring, Estimating & Costing", Khanna publishers, 2008.
2. K. B. Raina, "Electrical Design, Estimating & Costing", New age International, 2007.
3. Web site for IS Standards.
4. H. Joshi, "Residential Commercial and Industrial Systems", McGraw Hill Education, 2008.

Text Books

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5. S. Singh and R. D. Singh, "Electrical estimating and costing", DhanpatRai and Co.,1997.

Course Outcomes - At the end of this course, students will demonstrate the ability to:

1. Discuss the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
2. Classify various components of industrial electrical systems.
3. Analyze and select the proper size of various electrical system components.
4. Understand the illumination system.
5. Elaborate automation system for industrial purpose.

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DEPARTMENT OF ELECTRICAL ENGINEERING

Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	Power System Protection	EE-1873 (A)	3	0	0	3

Pre-requisite: Power System and Electrical Machines

Course Objectives:

1. To Illustrate the basic concepts and new developments in power system protection.
2. To Illustrate the causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system.
3. To analyze the system under faulted conditions.
4. To indentify the characteristics and functions of relays and protection schemes.
5. To impart knowledge on functioning of circuit breakers.
6. To explain static and numerical relays.

Topic Covered:

Unit-I

Principle of Power system Protection and Fault Analysis:

Faults in power systems, single line diagram, equivalent impedance diagram, per unit reactance's. Analysis (using matrices) of power systems by symmetrical components under:Three phase short circuit, Line to line fault, Line to ground fault, Double line to ground fault.
Sequence networks and their inter connections for different types of faults, effects of fault impedance. Current Limiting Reactors: Applications, types, construction and location of current limiting reactors, short circuit calculation using reactors.

Unit-II

Relays :

General considerations, sensing of faults, construction of electro-magnetic attraction and induction types relays, Buchholz and negative sequence relay, concept of reset, pick up, inverse time and definite time characteristics, over current , over voltage, directional, differential and distance relays on R-X diagram. Static Relays: Introduction, advantage and limitation of static relays, static over current, directional, distance and differential relays. Concept of Numeric relays.

Unit-III

Protection :

Types & detection of faults and their effects, alternator protection scheme (stator, rotor, reverse power protection etc.). Power transformer protection (external and internal faults protection), generator-transformer unit protection scheme, bus bar protection. Transmission line protection (current/time grading, distance), Pilot relaying schemes, power line carrier protection.

Unit-IV

Switchgear: Theory of current interruption- energy balance and recovery rate theory, arc quenching, recovery and restriking voltages. Types of circuit breakers. bulk oil and minimum oil, air break and air blast, sulphur hexa fluride (SF6) and vacuum circuit breakers. Rating selection and testing of circuit breakers/operating mechanisms. LT switchgear, HRC fuses, types construction and applications.

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Unit-V

Modern Trends In Protection: Electronic relays, static relays functional circuits: comparators, level detectors, logic and training circuits, microprocessor and computer based protection schemes, software development for protection, security & reliability.

TEXT BOOK:

1. Van A. R & Warrington C., "Protective Relays: Their Theory and Practice", Vol 1 & 2, Chapman and Hall.
2. Paithankar Y.O.,"Transmission Network Protection:Theory and Practice", Marcel Deicker, Inc.
3. GEC Measurements," Protective Relays : Application Guide", GEC Measurements.
4. Masson R.J., Art & Science of Protective Relaying.
5. J & P Switchgear handbook Ravindra Nath B., and Chandar M., Power systems protection and switchgear
6. Rao Sunil S, Switchgear and protection.

Reference Books:

1. Crane P.H.C. Switchgear Principle
2. The Elementantary council Power protection Vol.1,2&3, peter peregrinus Ltd.
3. Badriram & Vishwakarma power system protection
4. Ravindranath & Chander system protection & switchgear.

Course out comes–At the end of this course, students will demonstrate the ability to

1. The different components of a protection system
2. Evaluate Fault Current due to different types of faults in a network.
3. The protection schemes for different power system components
4. The basic principle of digital protection.
5. System protection schemes, and the use of wide area measurements

EE-1876:Power System Protection Laboratory (0:0:2 – 1 credit)
Hands-on related to the course contents of **EE-1873 (A)**.

List of Experiments:

1. To determine the characteristics of IDMT relay.
2. To determine the characteristics of percentage biased differential relay.
3. To determine the pickup value, drop off value & reset ratio of instantaneous relay.
4. To determine the Dielectric strength of transformer oil.
5. To study of Buchhloz relay.
6. Study of SF6 circuit breaker.
7. Study of over voltage relay.
8. Study of over current relay.

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Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	Power System Reliability	EE-1873 (B)	3	0	0	3

Pre Requisites: Power System

Course Objective:

1. Be acquainted with the main concept of short term and long term planning.
2. Classify the load forecasting methodology.
3. Be acquainted with the categories of electric energy consumers.
4. To evaluate power system generation, transmission, distribution reliability.
5. Explain the assessment methods of power costs.
6. Explain the methodology of reactive power planning.
7. Explain perform generation and transmission planning.

Topic Covered:

Unit-I

Review of Probability Theory Element of probability theory Probability Distribution, Random variable, Density and distribution functions. Mathematical expectation. Binominal distribution, Poisson distributions, Normal distribution, Exponential distribution, Weibull distribution.

Unit-II

Reliability of Engineering Systems

Component reliability, Hazard models, Reliability of systems with non-repairable components, series, Parallel, Series-Parallel, Parallel-series configurations. Non-series-parallel configurations, minimal tie-set, minimal cut-set and decomposition methods. Repairable systems, MARKOV process, Long term reliability, Power System reliability.

Unit-III

Reliability of Engineering Systems

Reliability model of a generating unit, State space methods, Combing states, sequential addition method, Load modeling, Cumulative load model, merging of generation and load models, Loss of load probability, Percentage energy loss, Probability and frequency of failure, Operating reserve calculations.

Unit-IV

Power Network Reliability

Weather effect on transmission lines, Common mode failures, Switching after faults, three state components, Normally open paths, Distribution system reliability.

Unit-V

Composite System Reliability

Bulk Power supply systems, Effect of varying load, Inter connected systems, correlated and uncorrelated load models, Cost and worth of reliability.

Improvement & Testing

Proper Design simplicity, Component improvement Testing Plans, time censored & sequential reliability tests, accelerated life test, Environ mental test, Reliability estimations.

Text book:

1. J. Endreny, Reliability Modeling in Electric Power Systems, John Wiley & Sons.
2. Roy Billinton & Ronald, N allan, Reliability Evaluation of Power Systems, Plenum Press, New York.

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Course Outcomes - At the end of this course, students will demonstrate the ability to:

1. Element of probability theory, distribution, mathematical expectation.
2. Reliability of engineering system, series-parallel configuration, Markov process.
3. Effect of weather on transmission lines, switching after faults, common mode failures.
4. Reliability of generating unit, state space method, probability and frequency failure.
5. Composite system reliability, improvement and testing, reliability estimation.

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Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	High Voltage Engineering	EE-1873 (C)	3	0	0	3

Pre Requisites: Power System

Course Objective:
1. To classify the High Voltage Technology and Applications
2. Illustrate the Break Down in Gaseous and Liquid Dielectrics& Solid Dielectrics
3. Generation of High Voltages and Currents
4. To explain the Over Voltage Phenomenon and Insulation Co-Ordination

Unit-1. Conduction and Breakdown in gases
Gases as insulating media, collision processes, ignition process, Townsend's criterion for breakdown, experimental determination of coefficients α and γ, streamer theory of breakdown in gases, paschen's law, corona discharges.

Unit-2. Conduction and Breakdown in liquid and solid die-electrics
Conduction and Breakdown in pure and commercial liquids, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Breakdown of Solid dielectrics in practice, breakdown in composite dielectrics, Solid dielectrics use in practice

Unit 3: Generation&Measurements of High Voltages and currents
Generation of high voltages, generation of high D. C. and A.C. voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.
Measurements of high direct current voltages, measurements of high voltages alternation and impulse, measurements of high currents-Direct, alternating and impulse, cathode ray oscilloscograph for impulse voltage and current measurements.

Unit4: Lightning and Switching Over-voltages
Natural causes for over voltages-Lightning Phenomenon,over voltage due to switching surges, System faults and other abnormal condition, principle of insulation coordination on high voltage and extra high voltage power systems

Unit5: High Voltage Testing of Electrical Apparatus and High Voltage Laboratories
Various standards for HV Testing of electrical apparatus, IS, IEC standards, Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, power transformers and some high voltage equipment, High voltage laboratory layout, indoor and outdoor laboratories, testing facility requirements, safety precautions in H. V. Labs.

Text/Reference Books
1. M. S. Naidu and V. Kamaraju, "High Voltage Engineering", McGraw Hill Education, 2013.
2. L. Wadhwa, "High Voltage Engineering", New Age International Publishers, 2007.
3. Razevig (Translated by Dr. M. P. Chourasia), "High Voltage Engineering Fundamentals", Khanna Publishers, 1993.

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4. Kuffel, W. S. Zaengl and J. Kuffel, "High Voltage Engineering Fundamentals", Newnes Publication, 2000.
5. R. Arora and W. Mosch "High Voltage and Electrical Insulation Engineering", John Wiley & Sons, 2011.
6. Various IS standards for HV Laboratory Techniques and Testing

Course outcomes:

After successful completion of this course student will able to learn:

1. Mechanism of breakdown in gases, paschen's law, streamers theory.
2. Mechanism of breakdown in liquid, Mechanism of breakdown in solid.
3. Impulse generator, working, earthing, tripping, and technique to observe waveform on CRO.
4. Electrostatic voltmeter, potential dividers for high voltage, sphere gap and construction.
5. Wet and dry flash over test on insulator, testing of transformer and rotating machine, method of insulation coordination.

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DEPARTMENT OF ELECTRICAL ENGINEERING

Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	Energy Conservation & Management	EE-1874 (OC-3)	3	0	0	3

Pre-requisites: Non conventional energy source, thermodynamics and laws, energy utilization, Electric Machines.

Course Objective -

1. To discussenergy problem and scope for conservation, energy audit and its types.
2. To motivate the students of energy auditing instruments.
3. To realize the importance of thermal insulation, waste heat, recovery techniques and co-generation.
4. DSM and its program, payback period and cost benefit analysis.
5. To explain the of energy efficient motors.

Topic Covered:

UNIT-I

General energy problem: Energy use patterns and scope for conservation.Energy audit: Energy monitoring, Energy accounting and analysis, Auditing and targeting. Energy conservation policy, Energy management & audit, Energy audit, Types of energy audit, energy management (audit), qualities and function of energy managers, language of an energy manager, Questionnaire, Check list for top management, Loss of energy in material flow, energy performance, Maximizing system efficiency, Optimizing, input energy requirements, Energy auditing instruments, Material load energy balance diagram.

Unit-II

Thermodynamics of Energy Conservation. Basic principle. Irreversibility and second law efficiency analysis of systems. Primary energy sources, optimum use of primemovers, energy efficient house keeping, energy recovery in thermal systems, waste heat recovery techniques, thermal insulation. Thermal energy audit in heating, ventilation and air conditioning. Maintenance and Predictive and preventive maintenance, lubrication and tribo-logical innovations.

Unit-III

Load curve analysis & load management DSM, Energy storage for power systems (Mechanical, Thermal, Electrical & Magnetic) Restructuring of electric tariff from energy conservation consideration, Economic analysis depreciation method, time value of money, Evaluation method of projects, replacement analysis, special problems inflation risk analysis. Pay back period, Energy economics, Cost Benefit Risk analysis, Pay back period.

UNIT-IV

Energy efficient electric drives, Energy efficient motors V.S.D. power factor improvement in power system. Energy Conservation in transportation system especially in electric vehicle. Energy flow networks, Simulation & modeling, formulation & Objective & constraints, alternative option, Matrix chart.

Unit-V

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Energy conservation task before industry, Energy conservation equipments, Co-Generation, Energy conservation process, Industry Sugar, Textiles, Cement Industry etc Electrical Energy Conservation in building, heating and lighting. domestic gadgets

TEXT BOOK:

1. Energy Management – W.R. Murphy & G. Mckey Butler worths.
2. Energy Management Head Book- W.C. Turner, John Wiley
3. Energy conservation and management-Surah Kumar Soni, Manoj Nair, Edition 4, Satya Prakash
4. Energy Management-Umesh Rathore, Edition-2, S.K. Katari & Sons.

REFERENCE BOOKS:

1. Energy Management Principles- Craig B. Smith, Pergamon Press
2. Energy Conservation- Paul O Callagan- Pergamon Press
3. Design & Management of energy conservation. Callaghan
4. Elect, Energy Utilization & Conservation. Dr. Tripathi S.C

Course Outcomes:

After successful completion of this course students will able to:

1. Able to calculate energy loss and understand energy patterns.
2. Able to examine energy audit technique and instruments.
3. Will be aware of thermodynamics laws, types of maintenance and energy conservation economic evaluations.
4. Can understand energy efficient motors and drives
5. Will understand cogeneration and energy conservation aspects in industries.

03/06/2019

BOS Date: 03.06.2019

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE,
(ENGINEERINGCOLLEGE)
VIDISHA (M.P.) - 464001
DEPARTMENT OF ELECTRICAL ENGINEERING

Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	Non Conventional Sources of Energy	EE-1875 (OC-4)	3	0	0	3

Pre-requisite: Power System and Generation

Course Objective:

1. Analyze solar energy technologies.
2. Classify the wind energy and hybrid energy systems.
3. Analyze concepts of hydro, ocean and geothermal energy systems.
4. Familiarize the operations of direct energy conversion systems.

Topic Covered:

Unit-I

NEW & RENEWABLE ENERGY SOURCES

Solar, biomass, wind, tidal, geothermal, microhydel, etc. – their availability & potential. Conversion of solar energy into various forms of energy (heat, electricity, mechanical etc.)

Unit-II

GEOTHERMAL & TIDAL ENERGY

Basic principles, systems used in practice and applications, resource assessment criteria, status in India.

SOLAR THERMAL ENERGY

Solar thermal devices: Radiation geometry, various types of solar collectors, flat plate & concentrating collectors, their construction working & application, hot water & hot air systems, industrial hot water systems, low pressure steam generation, solar dryers, solar pond, space heating & space conditioning, design criteria and methodologies for solar thermal applications. Solar concentrator and their applications, solar thermal power generation. use of solar thermal systems with existing systems, economic analysis of solar thermal systems, example of hybrid systems.

Unit-III

SOLAR PHOTOVOLTAIC

Solar photovoltaic conversion: Basic principle of SPV conversion, types of solar cells, fabrication of SPV cells, Units.SPV systems: Different configurations, SPV system components and their characteristics, applications, hybrid SPV system. Block diagram of general SPV system, Balance of system(BOS) components, MPP Tracker, Inverter, Battery, Cables, Wiring.

Unit-IV

WIND ENERGY

Wind energy conversion technologies, aerodynamics of wind turbine rotor, site selection. Wind resource assessment, various models to predict wind pattern and their analysis, concept of wind farms, various aspects of wind turbine design, hybrid wind energy systems (Wind + diesel power, wind + conventional grid, wind + photovoltaic system etc.).

Unit-V

HYDROGEN & FUEL CELL

Hydrogen as a renewable energy source, source of hydrogen, fuel for vehicles. Hydrogen production: Direct electrolysis of water, direct thermal decomposition of water, biological and biochemical methods of hydrogen production. Storage of hydrogen: Gaseous, cryogenic and metal hydride. Utilization of hydrogen fuel cell – Principle of working, construction and applications.

03/06/2019

Reference Books:

1. Chetan Singh Solanki, "Solar Photovoltaics: Fundamentals, Technologies And Applications" PHI Learning; 3 edition (9 May 2015)
2. Joshua Earnest, "Wind Power Technology", Prentice-Hall of India Pvt.Ltd; 1 edition 2014
3. S. P. Sukhatme, "Solar Energy – Principals of thermal collection and storage".
4. J. Twidell and T. Weir, "Renewable Energy recources", E & F N spon Ltd., London
5. N.S. Rathore and N. L. Panwar, "Renewable Energy Sources for Sustainable Development", New India Publishing Agency, New Delhi, 2007.
6. G.N. Tiwari, M. K. Ghosal, "Fundamentals of Renewable Energy Sources", Narosa Publication 2007.
7. Godfrey Boyle (editor), "Renewable Energy".

Course Outcomes - At the end of this course, students will demonstrate the ability to:

1. To identify and solve operational issues in solar energy technologies and systems.
2. To Compute the amount of wind power available, power density and power coefficient.
3. To identify and solve operational issues in wind and hybrid energy systems.
4. To recognize and solve operational issues in wave, tidal, OTEC, hydro and geothermal systems.
5. To understand hydrogen as a renewable energy used as fuel for vehicle application.

03/06/2019

BOS Date: 03.06.2019

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE,
(ENGINEERINGCOLLEGE)
VIDISHA (M.P.) – 464001
DEPARTMENT OF ELECTRICAL ENGINEERING

Branch	Subject Title	Subject Code	Hours per week			Total Credits
			L	T	P	
B.E. Electrical VII sem.	Major Project-1	EE-1878 (DLC)	0	0	4	2

Course Outcomes - At the end of this course, students will demonstrate the ability to :

1. To provides students an opportunity to do something on their own and under the supervision of a guide.
2. Students get acquainted with different aspects of manufacture, design or analysis.

Topic Covered:

The Major Project Work provides students an opportunity to do something on their own and under the supervision of a guide. Each student shall work on an approved project, which may involve fabrication, combine element of these areas. The project work involves sufficient work so that students get acquainted with different aspects of manufacture, design or analysis. The students also have to keep in mind that in final semester they would be required to implement whatever has been planned in the Major Project in this semester. It is possible that a work, which involves greater efforts and time may be taken up at this stage and finally completed in final semester, but partial completion report should be submitted in this semester and also evaluated by an external examiner. At the end of semester, all students are required to submit a synopsis. Design or investigation of a technical problem that may take design, experimental or analytical character.

03/06/2019