

<b>Lesson Plan</b>			
<b>Faculty</b>			
<b>Discipline</b>	<b>Electrical Engineering</b>		
<b>Semester</b>	<b>6th</b>		
<b>Subject</b>	<b>Power System Protection</b>		
<b>Duration</b>	<b>15 Weeks</b>		
<b>Work Load per Week</b>	<b>Lecture – 03 ; Practical - 02</b>		
		<b>Theory</b>	<b>PRACTICALS</b>
<b>Week</b>	<b>Lecture Day</b>	<b>Topic</b>	<b>Name of Practical</b>
<b>I</b>	<b>1</b>	<b>Introduction of the Subject:</b> Power System Protection	<b>Introduction of the power System Lab</b>
	<b>2</b>	<b>Introduction of Faults</b>	
	<b>3</b>	1.1 Common type of faults in both overhead and underground systems.	
<b>II</b>	<b>1</b>	1.2 Types of Symmetrical faults: Three phases to ground and Three Phase fault.	1. Identify various switchgears installed in the laboratory and write their specifications.
	<b>2</b>	1.3 Types of Unsymmetrical faults: Line to line fault, Single line to ground fault,	
	<b>3</b>	double line to ground fault, Line to line and third line to ground fault.	
<b>III</b>	<b>1</b>	<b>Assignment No 01</b>	2. Test HRC fuse by performing the load test.
	<b>2</b>	<b>UNIT II</b>	
	<b>3</b>	<b>Introduction of Switchgears</b> 2.1 Definition of switchgear, Purpose of switchgear.	
<b>IV</b>	<b>1</b>	Function of, switch, fuse, isolator and circuit breaker.	3. Perform the overload and short circuit test of MCB as per IS specifications.
	<b>2</b>	Difference between fuse and circuit breaker.	
	<b>3</b>	2.2 Circuit Breaker: Operating principle of circuit breaker. Arc phenomenon. Methods of Arc extinction.	
<b>V</b>	<b>1</b>	Definition of Arc voltage, Restriking and Recovery voltage,	4. Plot the time-current characteristics of Kit-Kat fuse wire.
	<b>2</b>	Rate of rise of restriking voltage (RRRV). Rating of Circuit breakers: making capacity, breaking capacity, short time capacity.	
	<b>3</b>	2.3 Types of Circuit Breakers: Constructional and working of Oil circuit breakers, Air Blast Circuit Breaker,	
<b>VI</b>	<b>1</b>	SF6 circuit breakers, VCB.	5. Perform Earthing of different equipment installed in the institute viz Motors, Generators, Energy Meter, Main Distribution Board and Energy Meter Box.
	<b>2</b>	Test No 01	
	<b>3</b>	<b>Introduction of Protection Devices</b>	
<b>VII</b>	<b>1</b>	3.1 Fuses: Properties and Characteristics of fuse,	6. Plot the time current characteristics of over current relay.
	<b>2</b>	Types of Fuse: HV and LV fuses, rewire-able, cartridge, HRC.	
	<b>3</b>	3.2 Earthing: Purpose of earthing, method of earthing,	

<b>VIII</b>	<b>1</b>	Equipment earthing, Substation earthing, Methods of reducing earth resistance.	7. To write down specifications of Lightning arrestors installed in a substation.
	<b>2</b>	3.3 Basic relay terminology- Protective relay, Relay time, Pick up, Reset current, current setting, Plug setting multiplier, Time setting multiplier.	
	<b>3</b>	3.4 Protective relays: Classification, principle of working, construction and operation of – Electromagnetic (Attracted armature type, Induction) relay,	
<b>IX</b>	<b>1</b>	Thermal relay. Block diagram and working of Static relay.	8. Power measurement by using CTs and PTs.
	<b>2</b>	i. Over-current relay: Principle, operation of instantaneous over current relay, Inverse definite minimum time (IDMT) over current relay.	
	<b>3</b>	ii. Directional over-current: operation of Directional over-current.	
<b>X</b>	<b>1</b>	iii. Differential relay: operation of Differential relay.	9. Measurement of current on any LT line with clip meter.
	<b>2</b>	iv. Distance relays: Impedance relay, mho relay.	
	<b>3</b>	<b>Assignment No 02</b>	
<b>XI</b>	<b>1</b>	<b>UNIT IV</b> <b>Protection scheme</b> 4.1 Protection for Alternator: Differential protection over current,	10. Study of different types of circuit breakers and isolators by visiting power station and to prepare detailed report.
	<b>2</b>	Earth fault protection scheme.	
	<b>3</b>	4.2 Protection for transformer: Buchholz protection scheme,	
<b>XII</b>	<b>1</b>	differential protection scheme.	11. Prepare charts on different Generating stations in our state mentioning their locations.
	<b>2</b>	4.3 Protection for Feeder and transmission line - time graded and over current protection,	
	<b>3</b>	current graded system, differential protection	
<b>XIII</b>	<b>1</b>	<b>UNIT V</b> <b>Over-Voltage Protection</b> 5.1 Causes of over voltages: Internal and external causes,	12. Students may be taken to various Sub-stations/Grid Stations for study the differential protection of transformer.
	<b>2</b>	types of lighting strokes.	
	<b>3</b>	5.2 Protection against Overvoltage and Lightning: ground wire,	
<b>XIV</b>	<b>1</b>	earthing screen, surge diverters or lightning arresters.	<b>File checking and Viva voce</b>
	<b>2</b>	5.3 Types of Lightning arresters: rod gap, horn gap,	
	<b>3</b>	metal oxide type.	
<b>XV</b>	<b>1</b>	Test No 03	<b>File checking and Viva voce</b>
	<b>2</b>	<b>Assignments No 03</b>	
	<b>3</b>	<b>Revision</b>	

Lesson Plan			
Faculty			
Discipline	Electrical Engineering		
Semester	6th		
Subject	Installation and Maintenance of Electrical Equipment		
Duration	15 Weeks		
Work Load per Week	Lecture – 02 ; Practical - 02		
		Theory	PRACTICALS
Week	Lecture Day	Topic	Name of Practical
I	1	<b>Introduction of the Subject:</b> Installation and Maintenance of Electrical Equipment	<b>Introduction of the Lab</b>
	2	<b>Tools and Accessories for Installation and Maintenance</b> 1.1 Tools: Tools, accessories and instruments required for installation, maintenance and repair work.	
II	1	Workmen's safety devices. Underground cable handling equipment. using fire extinguisher for safety against fire.	1. Write IE rules related to safety and demonstrate the steps taken when a person comes in contact with a live wire.
	2	1.2 IER rules: Knowledge of Indian Electricity rules, safety codes, causes and prevention of accidents. Meaning of Authorized persons, anti-climbing devices and danger plates, caution notice.	
III	1	Clearances rules for crossing of transmission and distribution line to roads, streets, power/telecommunication lines, river and railway line.	2. Study of tools, accessories and instruments required during installation, maintenance and repair of electrical equipment.
	2	1.3 Necessity of Maintenance, Types of maintenance.	
IV	1	<b>Installation and maintenance of transmission and Distribution lines</b> 2.1 Installation of Line: Method of erection of steel structures and pole support.	3. Study the steps required for erection of steel structure along with connection of all accessories viz. jumpers, tee points, insulators, joints etc. during installation of a transmission line.
	2	Connection of jumpers, tee-off points, joints and dead ends. Earthing of transmission lines and guarding.	
V	1	Arrangement for different types of insulators. Installation and use of Bird guards, earth wire and guy wires.	4. Measure insulation resistance of Three-phase PVC cable in a distribution board.
	2	Laying of service lines, provision of service fuses, installation of energy meters.	
VI	1	2.2 Maintenance of Line: Patrolling and visual inspection of lines, special inspections and night inspections.	5. Study of steps required for erection of distribution line along with connection of all accessories viz. jumpers, tee points, insulators, joints etc. during installation of a distribution line.
	2	Permit to work, arranging of shut downs personally, temporary earthing, cancellation of permit and restoration of supply.	

<b>VII</b>	<b>1</b>	Maintenance schedule of busbars, isolating switches, Relays, circuit breakers, LT switches.	6. Study of tests done at the time of commissioning of transmission and distribution line as per IS standards.
	<b>2</b>	<b>Installation and Maintenance of Underground Cables</b> 3.1 Installation of Cable: Inspection, storage, transportation and handling of cables.	
<b>VIII</b>	<b>1</b>	Clearances from other department such as Municipal, Highway authorities, railway, etc.	7. Prepare list of all electrical accessories required for installation of Pole mounted substation, Plinth mounted substation.
	<b>2</b>	Different methods of laying cable. Introduction to Cable filling compounds, Epoxy resin and hardeners.	
<b>IX</b>	<b>1</b>	3.2 Maintenance of Cable: Cable jointing and termination.	8. Study of various pre-installation tests as per IS standard done on following electrical equipment viz Electrical motors, Electrical Generators, Transformers and Underground cables.
	<b>2</b>	Assignment	
<b>X</b>	<b>1</b>	Test	9. Study of various pre-commissioning tests as per IS standard done on following electrical equipment viz Electrical motors, Electrical Generators, Transformers and Underground cables.
	<b>2</b>	<b>Installation and Maintenance of Electrical Machine</b> 4.1 Installation of Machine: Inspection and handling of transformers and motors.	
<b>XI</b>	<b>1</b>	Installation of power and distribution transformers. Installation of CT and PT. Dehydration of Transformer.	10. Prepare maintenance schedule of Power transformer.
	<b>2</b>	4.2 Maintenance of Machine: Preventive Maintenance schedule of transformer below and above 1000KVA.	
<b>XII</b>	<b>1</b>	Maintenance schedule of CT and PT. Preventive Maintenance schedule of motors, over hauling of motors, trouble shooting of electric motors.	11. Prepare maintenance schedule of Distribution Transformer.
	<b>2</b>	<b>Testing and Commissioning of Electrical Equipment</b> 5.1 Testing of insulator.	
<b>XIII</b>	<b>1</b>	5.2 Testing of transmission and distribution line before commissioning.	12. Prepare maintenance schedule of Motors.
	<b>2</b>	5.3 Testing of electrical motor.	
<b>XIV</b>	<b>1</b>	5.4 Testing of transformers.	<b>File checking and Viva voce</b>
	<b>2</b>	Test	
<b>XV</b>	<b>1</b>	<b>Assignments</b>	<b>File checking and Viva voce</b>
	<b>2</b>	<b>Revision</b>	

**Name of the Faculty:**

**Discipline : Electrical Engineering**

**Semester : 6th**

**Subject : HVDC & FLEXIBLE AC TRANSMISSION SYSTEMS**

**Duration : 15 weeks**

**Work load (Lecture/Practical) per week (in Hours):Lecture-03,Practical -00**

<b>Week</b>	<b>Lecture Day</b>	
<b>I</b>	<b>1</b>	<b>Introduction of the Subject: HVDC &amp; FLEXIBLE AC TRANSMISSION SYSTEMS</b>
	<b>2</b>	<b>HVDC Transmission</b>
	<b>3</b>	1.1 Introduction to HVDC transmission
<b>II</b>	<b>1</b>	1.2 Comparison of AC and DC transmission.
	<b>2</b>	1.3 Application of DC transmission system,
	<b>3</b>	1.4 Equipment of HVDC transmission systems
<b>III</b>	<b>1</b>	1.5 Modern trends in D. C. transmission
	<b>2</b>	<b>Assignment No.01</b>
	<b>3</b>	Test No.01
<b>IV</b>	<b>1</b>	<b>HVDC System Control</b>
	<b>2</b>	2.1 Principles of dc link control
	<b>3</b>	2.2 Types of dc Link
<b>V</b>	<b>1</b>	2.3 Starting and Stopping of dc link,
	<b>2</b>	2.4 Power control
	<b>3</b>	2.5 Harmonics and Filters:, Effects of Harmonics
<b>VI</b>	<b>1</b>	Sources of harmonic generation,
	<b>2</b>	Types of filters
	<b>3</b>	<b>Flexible AC Transmission Systems (FACTS)</b>
<b>VII</b>	<b>1</b>	3.1 Objective of FACTS
	<b>2</b>	Concept of FACTS
	<b>3</b>	3.2 Control of power flow in transmission lines,

<b>VIII</b>	1	3.3 Application.
	2	<b>FACTS Controller</b>
	3	4.1 Need for compensation
<b>IX</b>	1	4.2 Classification of FACTS controllers
	2	4.3 Shunt Compensation:
	3	Objectives of shunt compensation,
<b>X</b>	1	Methods of controllable VAR generation,
	2	Static VAR Compensator (SVC), STATCOM.
	3	4.4 Series Compensation:
<b>XI</b>	1	Objectives of series compensation,
	2	GCSC, TSSC, TCSC and SSSC.
	3	<b>Combined Controllers Compensation</b>
<b>XII</b>	1	5.1 Unified Power Flow Controller:
	2	Principles of operation,
	3	comparison with other FACTS controller
<b>XIII</b>	1	5.2 Interline Power Flow Controller
	2	Principles of operation,
	3	comparison with other FACTS controller
<b>XIV</b>	1	<b>Assignment No. 03</b>
	2	Test No.03
	3	Revision of 1 <sup>st</sup> Unit
<b>XV</b>	1	Revision of 2 <sup>nd</sup> and 3 <sup>rd</sup> Unit
	2	Revision of 4 <sup>th</sup> and 5 <sup>th</sup> Unit
	3	<b>Previous year Question Papers</b>

**Name of the Faculty:**

**Discipline : Electrical Engineering**

**Semester : 6th**

**Subject : Entrepreneurship Development and Management**

**Duration : 15 weeks**

**Work load (Lecture/Practical) per week (in Hours):Lecture-03,Practical -00**

<b>Week</b>	<b>Lecture Day</b>	
<b>I</b>	<b>1</b>	<b>Introduction of the Subject:</b> Entrepreneurship Development and Management
	<b>2</b>	Entrepreneurship: Concept and definitions, classification and types of entrepreneurs,
	<b>3</b>	entrepreneurial competencies, Traits / Qualities of entrepreneurs, manager v/s entrepreneur,
<b>II</b>	<b>1</b>	role of Entrepreneur, barriers in entrepreneurship, Sole proprietorship and partnership forms of business organisations,
	<b>2</b>	small business vs startup, critical components for establishing a start up,
	<b>3</b>	Leadership: Definition and Need, Manager Vs leader, Types of leadership
<b>III</b>	<b>1</b>	Definition of MSME (micro, small and medium enterprises), significant provisions of MSME Act,
	<b>2</b>	importance of feasibility studies, technical, marketing and finance related problems faced by new enterprises,
	<b>3</b>	major labor issues in MSMEs and its related laws, Obtaining financial assistance through various government schemes like Prime Minister Employment Generation. Program (PMEGP) Pradhan Mantri Mudra Yagna (PMMY)
<b>IV</b>	<b>1</b>	, Make in India, Start up India, Stand up India National Urban Livelihood Mission (NULM); Schemes of assistance by entrepreneurial support agencies at National, State, District level:
	<b>2</b>	NSIC, NRDC, DC:MSME, SIDBI, NABARD, Commercial Banks, SFC's TCO, KVIB, DIC,
	<b>3</b>	Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP).
<b>V</b>	<b>1</b>	<b>NATURE AND FUNCTIONS OF MANAGEMENT:</b> Definition, Nature of Management,
	<b>2</b>	Management as a Process, Management as Science and Art,
	<b>3</b>	Management Functions, Management and Administration, Managerial Skills
<b>VI</b>	<b>1</b>	, Levels of Management; Leadership.
	<b>2</b>	<b>PLANNING AND DECISION MAKING:</b>

	3	Planning and Forecasting - Meaning and definition, Features, Steps in Planning Process,
VII	1	Approaches, Principles, Importance,
	2	Advantages and Disadvantages of Planning,
	3	Types of Plans, Types of Planning,
VIII	1	Management by Objective.
	2	Decision Making-Meaning, Characteristics.
	3	ORGANISING AND ORGANISATION STRUCTURE:
IX	1	Organising Process - Meaning and Definition, Characteristics Process,
	2	Need and Importance Principles, Span of Management
	3	Organisational Chart - Types,
X	1	Contents, Uses, Limitations,
	2	, Factors Affecting Organisational Chart.
	3	, STAFFING: Meaning, Nature, Importance, Staffing process.
XI	1	Manpower Planning, Recruitment, Selection,
	2	Orientation and Placement, Training, Remuneration.
	3	CONTROLLING AND CO-ORDINATION
XII	1	Controlling - Meaning, Features, Importance, Control Process,
	2	Characteristics of an effective control system,
	3	Types of Control. Coordination -characteristics, essentials.
XIII	1	Market Survey and Opportunity Identification,
	2	Scanning of business environment, Assessment of demand and supply in potential areas of growth,
	3	Project report Preparation, Detailed project report including technical,
XIV	1	economic and market feasibility, Common errors in project report preparations,
	2	Exercises on preparation of project report.
	3	Assignments
XV	1	Revision of 1 <sup>st</sup> Unit
	2	Revision of 2 <sup>nd</sup> and 3 <sup>rd</sup> Unit
	3	Revision of 4 <sup>th</sup> and 5 <sup>th</sup> Unit



Lesson Plan			
Faculty			
Discipline	Electrical Engineering		
Semester	6th		
Subject	Energy Conservation and Audit		
Duration	15 Weeks		
Work Load per Week	Lecture – 02 ; Practical - 02		
		<b>Theory</b>	<b>PRACTICALS</b>
<b>Week</b>	<b>Lecture Day</b>	<b>Topic</b>	<b>Name of Practical</b>
<b>I</b>	1	<b>Introduction of the Subject:</b> Energy Conservation and Audit	<b>Introduction of the Lab</b>
	2	Fundamentals of Energy Conservation	
<b>II</b>	1	1.1 Energy Scenario: Primary and Secondary Energy, Energy demand and supply.	1. Identify star labelled electrical apparatus and compare the data for various star ratings.
	2	1.2 Introduction to Energy conservation, energy management , energy efficiency and its need	
<b>III</b>	1	1.3 Bureau of Energy efficiency ( BEE) and its Roles	2. Study of various instrument used for energy audit
	2	1.4 Star Labelling: Need and its benefits.	
<b>IV</b>	1	Energy Conservation in Electrical Installation Systems	3. Use APFC unit for improvement of p. f. of electrical load.
	2	2.1 General energy saving tips in Lighting system	
<b>V</b>	1	2.2 Energy efficiency measures in fans , water pumps, Room Air Conditioners, Refrigerators, Heaters, Blowers , Washing Machines etc	File checking and Viva voce
	2	Assignment No 01	
<b>VI</b>	1	Test No.01	4. Determine the reduction in power consumption by replacement of lighting system in a class room / laboratory.
	2	2.3 Energy conservation in Electricity Bill: concept of Electricity billing, Maximum Demand Controller kVAR Controller , Maximum demand controllers; Automatic power factor controllers (APFC)	
<b>VII</b>	1	Energy Conservation in Electrical Machines	5. Collect electricity bill of a residential consumer and suggest suitable means for conservation and reduction of the energy bill.
	2	3.1 General energy saving tips for transformer and AC/DC motor.	
<b>VIII</b>	1	3.2 Energy efficient motor; significant features, advantages, applications and limitations	6. Prepare an energy audit report for your Institute.
	2	3.3 Energy efficient transformers, amorphous transformers; epoxy Resin cast transformer / Dry type of transformer.	

<b>IX</b>	<b>1</b>	3.4 Energy saving factors for the selection of DG system.	File checking and Viva voce
	<b>2</b>	Assignment No 02	
<b>X</b>	<b>1</b>	Test No.03	7. Prepare a technical report on energy conservation act 2003.
	<b>2</b>	Energy Audit of Electrical System	
<b>XI</b>	<b>1</b>	4.1 Energy audit : Definition, and Need of energy audit	8. Prepare a technical report on Energy Conservation Building Code (ECBC).
	<b>2</b>	4.2 Types of Energy audit and Instruments used for energy audit	
<b>XII</b>	<b>1</b>	4.3 Roles and responsibilities of energy Manager and Accountability	9. Studying the various energy conservation methods useful in power generation, transmission and distribution.
	<b>2</b>	4.4 Energy Audit procedure: Techniques involved in conducting energy audits, including data collection, analysis, and evaluation of energy consumption patterns.	
<b>XIII</b>	<b>1</b>	Energy Conservation Act	10. Visit an industry and studying various energy management systems in an industry. Further identify the various energy conservation methods useful in a particular industry
	<b>2</b>	5.1 Energy conservation Act 2001: Objectives, features and its amendments.	
<b>XIV</b>	<b>1</b>	5.2 Salient features of Energy Conservation Building Code (ECBC): Building Envelope, Comfort System and Controls, Lighting & Controls and Electrical & Renewable Energy Systems.	<b>File checking and Viva voce</b>
	<b>2</b>	5.3 Salient features of Eco Niwas Samhita Code (ENS)	
<b>XV</b>	<b>1</b>	Assignment No 03	<b>File checking and Viva voce</b>
	<b>2</b>	Test No.03	