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DEPARTMENT OF ELECTRICAL ENGINEERING

Govt. Polytechnic, Balasore

LESSON PLAN FOR ACADEMIC SESSION - 2026-27

ENERGY CONSERVATION AND AUDIT

Course Code : EEPC303	Semester : 5th
Total Periods : 45 Hours	Examination : 3 Hours
Theory Periods : 3 P/Week	Progressive Assessment: 30 Marks
Maximum Marks : 100	End Semester Examination : 70 Marks
Semester From Date : 01/07/2026	To Date : 05/11/2026
Name of the Teaching Faculty: Er. Nilakantha Naik, Lect Stage-II (ELECT)	

WEEK	PERIOD	TOPIC
1st	1st	Energy Conservation Basics: Energy Scenario: Primary and Secondary Energy, Energy demand and supply, National scenario.
	2nd	Energy conservation and Energy audit: Concepts and differences.
	3rd	Energy Conservation Act / Indian Electricity Act: Relevant clauses of energy conservation.
2nd	1st	BEE and its Roles; MEDA/State Designated Agencies and their Roles.
	2nd	Star Labelling: Need, classification, and benefits.
	3rd	Energy Conservation in Electrical Machines: Need for energy conservation in induction motors and transformers.
3rd	1st	Energy conservation techniques in induction motor: Improving power quality and Motor survey.
	2nd	Matching motor with loading; Minimizing idle and redundant running.
	3rd	Operating in star mode; Motor rewinding considerations.
4th	1st	Replacement by energy efficient motor; Periodic maintenance of motors.
	2nd	Energy conservation techniques in Transformers: Load

		sharing, Parallel operation, and Isolating techniques.
	3rd	Replacement by energy efficient transformers; Periodic maintenance of transformers.
5th	1st	Energy Conservation Equipment: Soft starters and Automatic star-delta converters.
	2nd	Variable Frequency Drives (VFD): Working and energy saving potential.
	3rd	Automatic Power Factor Controller (APFC) and Intelligent Power Factor Controller (IPFC).
6th	1st	Energy Efficient Motor: Significant features, advantages, applications, and limitations.
	2nd	Energy Efficient Transformers: Amorphous transformers, Epoxy Resin Cast / Dry type transformers.
	3rd	Energy Conservation in Electrical Installation Systems: Aggregated Technical and Commercial (AT&C) losses; Power system scenario at state, regional, national, and global levels.
7th	1st	Technical Losses: Causes and reduction measures by controlling I^2R losses and optimizing distribution voltage.
	2nd	Technical Losses: Balancing phase currents and compensating reactive power flow.
	3rd	Commercial Losses: Pilferage, theft, causes, and remedial measures.
8th	1st	Installation Energy Conservation Equipment: Maximum Demand Controller and kVAR Controller.
	2nd	APFC implementation in electrical installations.
	3rd	Energy Conservation in Lighting System: Replacing lamp sources and using energy efficient luminaries.
9th	1st	Lighting System: Light controlled gears and installation of separate transformers/servo stabilizers for lighting.
	2nd	Periodic survey and adequate maintenance programs for lighting systems.
	3rd	Energy conservation techniques in fans and Electronic regulators.
10th	1st	Energy Conservation through Cogeneration and Tariff: Co-generation and Tariff concept, significance for energy conservation.
	2nd	Types of cogeneration based on sequence of energy use: Topping cycle and Bottoming cycle.
	3rd	Types of cogeneration based on technology: Steam turbine and Gas turbine cogeneration systems.
11th	1st	Reciprocating engine cogeneration systems.
	2nd	Factors governing the selection of cogeneration systems

		and advantages of cogeneration.
	3rd	Tariff: Concept, types of tariff structures, and Special tariffs.
12th	1st	Time-of-Day (TOD) tariff, Peak-off-day tariff, Power Factor tariff.
	2nd	Maximum Demand tariff and Load Factor tariff.
	3rd	Practical application of tariff systems to reduce industrial and commercial energy bills.
13th	1st	Energy Audit of Electrical System: Energy audit definition as per Energy Conservation Act.
	2nd	Types of energy audits: Walk-through audit vs. Detailed audit.
	3rd	Energy audit instruments and their specific uses (Power quality analyzer, Lux meter, Thermal imager, etc.).
14th	1st	Questionnaire preparation for energy audit projects.
	2nd	Energy Flow Diagram: Sankey diagram construction and analysis.
	3rd	Economic analysis: Simple Payback Period calculations and financial feasibility.
15th	1st	Energy audit procedure and step-by-step methodology.
	2nd	Energy Audit Report Format and standard presentation techniques.
	3rd	Case study review and final course revision.

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