

GOVT. POLYTECHNIC KANDHAMAL, (PHULBANI)

LESSON PLAN: ENERGY CONSERVATION & AUDIT (TH-2)

5TH – SEMESTER, 2026 (WINTER)

Discipline: Electrical Engineering	Semester: Winter 2026	Name of the teaching faculty: PRIYABRATA PALASINGH NAYAK
Subject: EC& A (TH 2)	No of days/per week class allotted: 03	Semester From Date: 01.07.2026 To Date: 05.11.2026 No of weeks: 15
Week:	Class day:	Theory/practical topics:
1ST	1ST	Unit 1 (Energy Conservation Basics) Energy Scenario: Primary and Secondary Energy
	2ND	Energy demand and supply, National scenario.
	3RD	Energy conservation and Energy audit; concepts and difference
2ND	1ST	Indian Electricity Act 2001; relevant clauses of energy conservation
	2ND	BEE and its Roles
	3RD	MEDA and its Roles
3RD	1ST	Star Labelling: Need and its benefits.
	2ND	Unit 2 (Energy Conservation in Electrical Machines) Need for energy conservation in induction motor and transformer,
	3RD	Energy conservation techniques in induction motor by: Improving Power quality, Motor survey
4TH	1ST	Matching motor with loading, Minimizing the idle and redundant running of motor.
	2ND	Operating in star mode, Rewinding of motor , Replacement by energy efficient motor
	3RD	Periodic maintenance , Energy conservation techniques in Transformer, Loading sharing
5TH	1ST	Parallel operation ,Isolating techniques, Replacement by energy efficient transformers, Periodic maintenance.
	2ND	Energy Conservation Equipment: Soft starters, Automatic star delta convertor, Variable Frequency Drives, Automatic p. f. controller (APFC), Intelligent p. f. controller (IPFC)
	3RD	Energy efficient motor; significant features, advantages, applications and limitations.

6 TH	1 ST	Energy efficient transformers, amorphous transformers; epoxy Resin cast transformer / Dry type of transformer.
	2 ND	Unit 3 (Energy conservation in Electrical Installation systems) Aggregated Technical and commercial losses (ATC);
	3 RD	Power system at state, regional, national and global level.
7 TH	1 ST	Technical losses; causes and measures to reduce by. a) Controlling I ² R losses.
	2 ND	b) Optimizing distribution voltage c) Balancing phase currents
	3 RD	d) Compensating reactive power flow Commercial losses: pilferage, causes and remedies
8 TH	1 ST	Energy conservation equipment: Maximum Demand Controller, kVAR Controller, Automatic Power Factor controller (APFC)
	2 ND	Energy Conservation in Lighting System a) Replacing Lamp sources.
	3 RD	b) Using energy efficient luminaries. c) Using light controlled gears.
9 TH	1 ST	d) Installation of separate transformer / servo stabilizer for lighting.
	2 ND	e) Periodic survey and adequate maintenance programs. Energy Conservation techniques in fans, Electronic regulators.
	3 RD	Unit 4 (Energy conservation through Cogeneration and Tariff) Co-generation and Tariff; concept, significance for energy conservation
10 TH	1 ST	Co-generation
	2 ND	Types of cogeneration on basis of sequence of energy use (Topping cycle, Bottoming cycle)
	3 RD	Types of cogeneration basis of technology (Steam turbine cogeneration)
11 TH	1 ST	Gas turbine cogeneration, Reciprocating engine cogeneration)
	2 ND	Factors governing the selection of cogeneration system.
	3 RD	Advantages of cogeneration.
12 TH	1 ST	Tariff: Types of tariff structure: Special tariffs; Time-off-day tariff, Peak-off-day tariff
	2 ND	Power factor tariff, Maximum Demand tariff, Load factor tariff.

	3 RD	Application of tariff system to reduce energy bill
13 TH	1 ST	Unit 5 (Energy Audit of Electrical System) Energy audit (definition as per Energy Conservation Act)
	2 ND	Energy audit instruments and their use.
	3 RD	Questionnaire for energy audit projects.
14 TH	1 ST	Energy flow diagram (Sankey diagram)
	2 ND	Simple payback period
	3 RD	Energy Audit procedure (walk through audit and detailed audit)
15 TH	1 ST	Energy Audit procedure (walk through audit and detailed audit)
	2 ND	Energy Audit report format.
	3 RD	Energy Audit report format.



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