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Energy Conservation and Audit — Complete Syllabus (Open Elective-02, Option B)

BTEUP Diploma in Civil Engineering • 6th Semester • Session 2026-27

Subject 6.3 (Open Elective-02, Option B) • 50 Marks Internal Only • 2 Credits • L 2 • Total NA — not counted in semester total • Choose this OR Renewable Energy Technology (OR Advance Skill Development)

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.3	Open Elective-02: Energy Conservation and Audit	Theory	2 - 0	2	50	—	NA
Open Elective-02 Total				2	50	—	NA

What This Subject Aims To Do

To identify demand supply gaps in the present scenario, understand conservation approaches to an industry, draw the energy flow diagram of an industry, identify energy wastage and suggest alternative methods, and understand the concepts of energy audit.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Basics of Energy	6	20%
2	Electrical Supply System and Motors	7	25%

3	Lighting and DG Systems	6	20%
4	Energy Conservation Building Code (ECBC)	4	15%
5	General Energy Saving Tips	5	20%

Unit 1 — Basics of Energy (6 Periods, 20%)

Topics: Classification of energy — primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy; capacity factor of solar and wind power generators; global fuel reserve; energy scenario in India and state of U.P.; sector-wise energy consumption (domestic, industrial, agricultural and other sectors); impact of energy usage on climate; Energy Conservation and EC Act 2001. Introduction to energy management: energy conservation, energy efficiency and its need; salient features of Energy Conservation Act 2001 and The Energy Conservation (Amendment) Act, 2010 and its importance; prominent organisations at centre and state level responsible for its implementation; standards and labelling: concept of star rating and its importance, types of product available for star rating.

Unit 2 — Electrical Supply System and Motors (7 Periods, 25%)

Topics: Types of electrical supply system, single line diagram, losses in electrical power distribution system, understanding electricity bill: transformers, tariff structure, components of power (kW, kVA and kVAR) and power factor, improvement of power factor, concept of sanctioned load, maximum demand, contract demand and monthly minimum charges (MMC). Transformers: introduction, losses in transformer, transformer loading, tips for energy savings in transformers. Electric motors: types of motors, losses in induction motors, features and characteristics of energy efficient motors, estimation of motor loading, variation in efficiency and power factor with loading, tips for energy savings in motors. Energy efficiency in electrical utilities. Pumps: introduction to pump and its applications, efficient pumping system operation, energy efficiency in agriculture pumps, tips for energy saving in pumps. Compressed air system: types of air compressor and its applications, leakage test, energy saving opportunities in compressors. Energy conservation in HVAC and refrigeration system: introduction, concept of Energy Efficiency Ratio (EER), energy saving opportunities in heating, ventilation and air conditioning (HVAC) and refrigeration systems.

Unit 3 — Lighting and DG Systems (6 Periods, 20%)

Topics: Lighting systems: basic definitions — lux, lumen and efficacy; types of different lamps and their features; energy efficient practices in lighting. DG systems: introduction, energy efficiency opportunities in DG systems, loading estimation. Energy efficiency in thermal utilities. Thermal basics: thermal energy, energy content in fuels, energy units and its conversions in terms of Metric Tonne of Oil Equivalent (MTOE). Energy conservation in boilers and furnaces: introduction and types of boilers, energy performance assessment of boilers, concept of stoichiometric air and excess air for combustion, energy conservation in boilers and furnaces, do's and don'ts for efficient use of boilers and furnaces. Cooling towers: basic concept of cooling towers, tips for energy savings in cooling towers, efficient steam utilisation.

Unit 4 — Energy Conservation Building Code (ECBC) (4 Periods, 15%)

Topics: ECBC and its salient features; tips for energy savings in buildings: new buildings, existing buildings; waste heat recovery and co-generation: concept, classification and benefits of waste heat recovery, concept and types of co-generation system.

Unit 5 — General Energy Saving Tips (5 Periods, 20%)

Topics: Energy saving tips in: lighting, room air conditioner, refrigerator, water heater, computer, fan, heater, blower and washing machine, colour television, water pump, cooking, transport; energy audit, types and methodology, energy audit instruments, energy auditing reporting format.

Instead of This Elective — Advance Skill Development

The 6th-semester scheme allows an **Advance Skill Development** certification course to be taken **instead of** Open Elective-02. No course name is given for the 6th-semester option in the PDF (unlike the 5th semester, which names Advanced Plumbing, TATA TECH.). No detailed contents for this certification course are given in the PDF.

Reference Books (as listed in the syllabus)

- Electric Energy Generation, Utilization and Conservation — Sivaganaraju, S, Pearson, New Delhi, 2012.
- Project Management, Prasanna Chandra, Tata Mcgraw Hill, New Delhi.
- Energy Conservations in Buildings, O.P. Jakhar, Khanna Publishing House, New Delhi.
- Financial Management, Prasanna Chandra, Tata Mcgraw Hill, New Delhi.
- Energy management Handbook, Prasanna Chandra, Tata Mcgraw Hill, New Delhi.
- Energy Technology, O.P. Gupta, Khanna Publishing House, New Delhi (ed. 2018).

- E-books/e-tools to be used as recommended by AICTE/NITTTR, Chandigarh.
- Website for reference: <http://swayam.gov.in>

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Source: BTEUP 3rd Year curriculum (folder2627), approved in C.D.C. meeting held on 16.07.2026. Topic lists follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text.

Please confirm with your own polytechnic for any local changes.

