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Basics of Power Generation Systems — Complete Syllabus

BTEUP Diploma in Electrical Engineering • 3rd Semester • Session 2026-27

Subject 3.1 (Theory) • Total 100 Marks • 3 Credits • L 3 - P 0

Please note — cover year vs approval: BTEUP's own file for this curriculum prints “YEAR 2025-2026” on its cover, while carrying the approval line “UPDATED AND APPROVED BY BOARD OF TECHNICAL EDUCATION U.P. LUCKNOW IN C.D.C MEETING HELD ON 16.07.2026” on every page. It is filed in BTEUP's 2026-27 folder (folder2627), so it is treated here as the 2026-27 syllabus on the strength of that approval. The scheme it carries is identical, subject for subject and mark for mark, to the 2025-26 scheme.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.1	Basics of Power Generation Systems	Theory	3 - 0	3	40	60 (3 hrs)	100
Basics of Power Generation Systems Total				3	40	60	100

What This Subject Aims To Do

To help students maintain the efficient operation of various electric power generating plants — thermal, hydro, solar, wind, biomass and others — and to select the adequate mix of power generation based on economic operation.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
I	Power Plants: Coal, Gas, Diesel and Nuclear-based	08	24%
II	Large Hydro Power Plants and MHD	08	19%
III	Solar and Wind Power Plants	08	19%
IV	Other Generating Stations	08	19%
V	Economics of Power Generation and Interconnected Power System	10	19%

Unit - I: Power Plants: Coal, Gas, Diesel and Nuclear-based (08 Periods, 24%)

Topics: Schematic arrangement of power plant (coal-based, gas-based, diesel-based, nuclear-based); Functions of the various types of power plants and their major auxiliaries; Safe working Practices of various power plants: coal-based, gas-based, diesel-based, nuclear-based.

Unit - II: Large Hydro Power Plants and MHD (08 Periods, 19%)

Topics: Hydrology, stream flow, hydrograph, flow duration curves; Types of hydroelectric plants and their fields of use, capacity calculations for hydropower, Dams, head water control, penstocks, water turbines, specific speeds, turbine governors; Hydro plant auxiliaries, plant layout; Concepts and principles of Magneto Hydro Dynamic (MHD) generation.

Unit - III: Solar and Wind Power Plants (08 Periods, 19%)

Topics: Solar Power Technology: (a) Concentrated Solar Power (CSP) plants, construction and working of: Power Tower, Parabolic Trough, Parabolic Dish, Fresnel Reflectors; (b) Solar Photovoltaic (PV) power plant: layout, construction, working; Wind power density in watts per square meter, Horizontal and vertical axis large wind power plant, Geared wind power plant, Direct-drive wind power plant.

Unit - IV: Other Generating Stations (08 Periods, 19%)

Topics: Biomass: Biomass conversion technologies, methods for obtaining energy from biomass; Geothermal and Tidal Energy: Geothermal sources and its significance, geothermal power plant – dry steam, flash steam, and binary cycle, Tidal energy and its significance, Different types of tidal power plants: single basin, double basin; Fuel Cells: Concept, types and principles of fuel cells.

Unit - V: Economics of Power Generation and Interconnected Power System (10 Periods, 19%)

Topics: Related terms: connected load, firm power, cold reserve, hot reserve, spinning reserve; Base load and peak load plants; Load curve, load duration curve, integrated duration curve; Cost of generation: Average demand, maximum demand, demand factor, plant capacity factor, plant use factor, diversity factor, load factor and plant load factor; Choice of size and number of generator units, combined operation of power station; Smart Grid.

Reference Books (as listed in the syllabus)

- Nag. P. K. Power Plant Engineering, McGraw Hill, New Delhi, ISBN: 978-9339204044
- Tanmoy Deb, Electrical Power Generation, Khanna Publishing House, Delhi (Ed. 2018)
- Gupta, B.R., Generation of Electrical Energy, S. Chand & Co. New Delhi
- Ashish Sahu, Pooja Yadav Power Plant Engineering, Asian Publishers, Muzaffarnagar ISBN no. 978-93-5502-025-3
- Rachel, Sthuthi; Earnest, Joshua – Wind Power Technologies, PHI Learning, New Delhi, ISBN: 978-93-88028-49-3; E-book 978-93-88028-50-9
- Solanki, Chetan Singh, – Solar Photovoltaics: Fundamentals, Technologies and Applications, PHI Learning, New Delhi, ISBN: 9788120351110
- Hau, Erich, Wind Turbines, Springer-Verlag, Berlin Heidelberg, Germany, ISBN: 978-3-642-27150-2
- Gipe, Paul, Wind Energy Basics, Chelsea Green Publishing Co; ISBN: 978-1603580304
- Wizelius, Tore; Earnest, Joshua – Wind Power Plants and Project Development, PHI
- Gupta, J.B. A Course in Electrical Power – S. K Kataria and Sons, New Delhi. 2014
- Soni, Gupta, Bhatnagar, A Course in Electrical Power. – Dhanpat rai and Sons
- System, S.Chand & Co. New Delhi, 2005, ISBN: 9788121924962

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Source: BTEUP 2nd Year curriculum (folder2627) — cover prints YEAR 2025-2026, but the approval line 'UPDATED AND APPROVED BY BOARD OF TECHNICAL EDUCATION U.P. LUCKNOW IN C.D.C MEETING HELD ON 16.07.2026' appears on every page (95 times); treated as the 2026-27 curriculum. 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.

