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Electric Machine- 1 — Complete Syllabus

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

Subject 3.2 (Theory) • Total 100 Marks • 4 Credits • L 4 – 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.

About this document: This is the theory paper 3.2. Its practical work is the separate lab subject 3.5 (Electric Machine- 1 (Lab)).

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.2	Electric Machine- 1	Theory	4 - 0	4	40	60 (3 hrs)	100
Electric Machine- 1 (Theory) Total				4	40	60	100

What This Subject Aims To Do

To help students maintain electric motors and transformers — DC generators and motors, single-phase and three-phase transformers, and special-purpose transformers.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
I	DC Generators	10	20%
II	D.C. Motors	10	20%
III	Single Phase Transformers	12	23%
IV	Three Phase Transformers & Special Purpose transformers	12	20%
V	Maintenance of DC Machines and Transformers	12	17%

Unit - I: DC Generators (10 Periods, 20%)

Topics: Classification of insulating materials according to temperature, Insulating materials used in DC machines and transformers (Emery paper, mica, varnish, sleeves, cotton tape, paper and oil); DC generator: construction, parts, materials and their functions; Principle of operation of DC generator: Fleming's right-hand rule, schematic diagrams, e.m.f. equation of generator, armature reaction, commutation; Applications of DC generators; Importance of DC generators in various industries.

Unit - II: D.C. Motors (10 Periods, 20%)

Topics: DC motor: Types of DC motors; Fleming's left-hand rule, Principle of operation of Back e.m.f. and its significance, Voltage equation of DC motor; Torque and Speed; Armature torque, Shaft torque, BHP, Brake test, losses, efficiency; DC motor starters: Two Point, Three-point and Four Point starters; Speed control of DC shunt and series motor: Flux and Armature control; Brushless DC Motor: Construction and working.

Unit - III: Single Phase Transformers (12 Periods, 23%)

Topics: Types of transformers: Shell type and core type; Construction: Parts and functions; Transformer: Principle of operation, EMF equation of transformer: Derivation, Voltage transformation ratio, Significance of transformer ratings; Transformer No-load and on-load phasor diagram, Leakage reactance; Equivalent circuit of transformer: Equivalent resistance and reactance; Voltage regulation and Efficiency: Direct loading, OC/SC method, All day efficiency; Polarity tests on single phase transformers.

Unit - IV: Three Phase Transformers & Special Purpose transformers (12 Periods, 20%)

Topics: Three Phase Transformers: Construction, cooling, three-phase transformers connections, three-phase to two phase conversion (Scott Connection), parallel operation of three phase transformer; Comparison between Bank of three single phase transformers & Single unit of three phase transformer; Transformer accessories: Conservator, Breather, Explosion vent, Buchholz relay – ON load and OFF load tap changer; Distribution and Power transformers; Auto Transformer and its applications.

Unit - V: Maintenance of DC Machines and Transformers (12 Periods, 17%)

Topics: Importance of Maintenance: Preventive and Breakdown Maintenance; Causes of Sparking in Commutator, Defects in Commutator and Remedies, Resurfacing of Commutator and Brushes, Defects in DC Armature winding; Maintenance of Transformer Oil, Transformer oil tester, Acidity test, BDV test; Earthing: Measurement of earth resistance.

Reference Books (as listed in the syllabus)

- G.C. Garg & P.S. Bimbhra, Electrical Machines, Vol-I, II, Khanna Book Publishing House (ISBN: 978-9386173-447, 978-93-86173-607), New Delhi
- Dr. T.D.Bisht, Pooja Yadav, Ashish Sahoo Electrical Machine-I, Asian Publishers, Muzaffarnagar ISBN no. 978-93-91541-30-9
- Mittle, V.N. and Mittle, Arvind., Basic Electrical Engineering, McGraw Hill Education, New Delhi, ISBN: 9780070593572
- Kothari, D. P. and Nagrath, I. J., Electrical Machines, McGraw Hill Education. New Delhi, ISBN: 9780070699670
- Bhattacharya, S. K., Electrical Machines, McGraw Hill Education, New Delhi, ISBN: 9789332902855
- Mehta, V. K. and Mehta, Rohit, Principles of Electrical Machines, S. Chand and Co. Ltd., New Delhi, ISBN: 9788121930888
- Theraja, B.L., Electrical Technology Vol-II (AC and DC machines), S. Chand and Co. Ltd., New Delhi, ISBN: 9788121924375
- Bandyopadhyay, M. N., Electrical Machines Theory and Practice, PHI Learning Pvt. Ltd., New Delhi, ISBN: 9788120329973
- Murugesh Kumar, K., DC Machines and Transformers, ISBN: 9788125916055

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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.

