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Electrical Circuits — Complete Syllabus

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

Subject 3.3 (Practicum) • Total 100 Marks • 3 Credits • L 1 - P 4

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
3.3	Electrical Circuits	Practicum	1 - 4	3	60	40 (3 hrs)	100
Electrical Circuits Total				3	60	40	100

What This Subject Aims To Do

To help students maintain electrical systems by applying AC and DC circuit fundamentals — single-phase and three-phase circuits, network analysis and network theorems.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
I	Single Phase A.C Series Circuits	03	23%

II	Single Phase A.C Parallel Circuits	03	20%
III	Three Phase Circuits	03	20%
IV	Network Reduction and Principles of Circuit Analysis	03	17%
V	Network Theorems	02	20%

Unit - I: Single Phase A.C Series Circuits (03 Periods, 23%)

Topics: Sinusoidal quantities: Instantaneous, peak, average and effective values, Form Factor, Peak factor; R, L, C circuit elements its voltage and current response; R-L, R-C, R-L-C combination of A.C series circuit, impedance, reactance, impedance triangle, active power, reactive power, apparent power, power triangle and phasor diagram, Power factor; Resonance, Bandwidth, Quality factor and voltage magnification in series R-L, R-C, R-L-C circuit.

Unit - II: Single Phase A.C Parallel Circuits (03 Periods, 20%)

Topics: R-L, R-C and R-L-C parallel combination of A.C. circuits; Impedance, reactance, phasor diagram, impedance triangle, active power, apparent power, reactive power, power triangle and phasor diagram, power factor; Resonance Bandwidth, Quality factor and voltage magnification in parallel R-L, R-C, R-L-C circuit.

Unit - III: Three Phase Circuits (03 Periods, 20%)

Topics: Concept of generation of 3-phase alternating voltage, Advantage of 3-phase system over single-phase system, Phasor representation of three phase supply, Phase sequence and polarity; Types of three-phase connections, Relation between phase and line quantities in three phase star and delta system; Balanced and unbalanced load, three phase power, active, reactive and apparent power in star and delta system.

Unit - IV: Network Reduction and Principles of Circuit Analysis (03 Periods, 17%)

Topics: Concept of voltage and current sources; symbol and graphical representation, characteristics of practical and ideal sources, Source transformation; Star/delta and delta/star transformation; Mesh Analysis; Nodal Analysis.

Unit - V: Network Theorems (02 Periods, 20%)

Topics: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem.

Practical Work

- Unit I — Use dual trace oscilloscope to determine A.C voltage and current response in given R, L, C circuit.
- Unit I — Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L series circuit. Draw phasor diagram.
- Unit I — Use voltmeter, ammeter to determine active, reactive and apparent power consumed in given R-C series circuit. Draw phasor diagram.
- Unit I — Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L-C series circuit. Draw phasor diagram.
- Unit I — Use variable frequency supply to create resonance in given series R-L-C circuit or by using variable inductor or variable capacitor.
- Unit II — Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L Parallel circuit. Draw phasor diagram.
- Unit II — Use voltmeter, ammeter to determine active, reactive and apparent power consumed in given R-C Parallel circuit. Draw phasor diagram.
- Unit II — Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L-C Parallel circuit. Draw phasor diagram.
- Unit II — Use variable frequency supply to create resonance in given series R-L-C Parallel or by using variable inductor or variable capacitor.
- Unit III — Use voltmeter, ammeter, wattmeter, p.f meter to determine line and phase quantities of voltage and current for balanced three phase star connected load and calculate active, reactive, and apparent power. Draw phasor diagram.
- Unit III — Use voltmeter, ammeter, wattmeter, p.f meter to determine line and phase quantities of voltage and current for balanced three phase delta connected load and calculate active, reactive, and apparent power. Draw phasor diagram.
- Unit IV — Use voltmeter, ammeter to determine current through the given branch of an electric network by applying nodal analysis.
- Unit IV — Use voltmeter, ammeter to determine current through the given branch of an electric network by applying mesh analysis.
- Unit V — Use voltmeter, ammeter to determine current through the given branch and voltage across the given element of circuit by applying superposition theorem.
- Unit V — Use voltmeter, ammeter to determine equivalent circuit parameter in a given circuit by applying Thevenin's theorem.
- Unit V — Use voltmeter, ammeter to determine equivalent circuit parameter in a given circuit by applying Norton's theorem.
- Unit V — Use voltmeter, ammeter to determine load resistance for maximum power transfer for a given circuit by applying maximum power transfer theorem.

Reference Books (as listed in the syllabus)

- Ashfaq Husain, Networks & Systems, Khanna Book Publishing, New Delhi
- Gupta, B. R; Singhal, Vandana; Fundamentals of Electrical Network, S. Chand and Co., New Delhi, ISBN: 978-81-219-2318-7
- Saxena, S.B Lal; Dasgupta, K; Fundamentals of Electrical Engineering, Cambridge University Press Pvt. Ltd., New Delhi, ISBN: 978-11-0746-435-3
- Theraja, B. L.: Theraja, A. K, A Text Book of Electrical Technology Vol-I, S. Chand & Co. Ramnagar, New Delhi, ISBN: 9788121924405
- Sudhakar, A.; Shyammohan, S. Palli; Circuit and network, McGraw Hill Education, New Delhi, ISBN: 978-93-3921-960-4
- Bell, David A., Electric Circuits, Oxford University Press New Delhi, ISBN: 978-01-954-25246
- Boylested, R.L., Introductory circuit Analysis, Wheeler, New Delhi, ISBN: 978-00-231-3161-5
- Mittle, V.N.; Mittle, Arvind; Basic Electrical Engineering, McGraw Hill Education, Noida, ISBN: 978-00-705-9357-2
- Sivanandam, S.N, Electric Circuit Analysis, Vikas Publishing House Pvt. Ltd, Noida, ISBN: 978-81259-1364-1
- Salivahanan, S.; Pravinkumar, S; Circuit theory, Vikas Publishing House Pvt. Ltd, Noida; ISBN: 978-93259-7418-0
- Rahul Wadhwa Basic of Electrical Engineering, Asian Publishers, Muzaffarnagar ISBN no. 978-93-5502-068-0

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