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Electric Circuits and Network — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 3rd Semester • Session 2026-27
Subject 3.4 (Practicum) • Total 100 Marks • 3 Credits • L 2 - P 2

Note: The scheme table and contents list call this subject “Electric Circuit and Network” (singular); the subject heading in the PDF calls it “Electric Circuits and Network”. No marks-distribution table is given for this subject in the PDF, so unit weightages are not shown.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.4	Electric Circuit and Network	Practicum	2 - 2	3	Practical 60	Practical 40 (3 hrs)	100
Electric Circuit and Network Total				3	60	40	100

What This Subject Aims To Do

To build on A.C. theory with networks, filters and transmission lines — the foundation for line communication, audio and video communication and microwave communication systems.

Unit-Wise Complete Topic List

Note: no marks-distribution table is given for this subject in the official syllabus, so unit weightages are not shown.

Unit 1 — Basic Electrical Circuits & Theorem (6 Periods)

Topics: Node and Mesh analysis, Superposition Theorem, Thevenin Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem.

In simple words: The standard theorems for analysing circuits: nodal and mesh analysis, and the theorems of Thevenin, Norton, superposition, maximum power transfer and reciprocity.

Unit 2 — Two Port Network (5 Periods)

Topics: Two Port Network: Open Circuit Impedance Parameters, Short Circuit Admittance Parameters, Transmission Parameters Hybrid Parameters. Overview of T network, π network, Ladder network; Lattice network

In simple words: Describing a network by its two-port parameters (Z, Y, transmission and hybrid) and the standard T, π , ladder and lattice shapes.

Unit 3 — Attenuator (6 Periods)

Topics: Units of attenuation (Decibels and Nepers): General characteristics of attenuators - Analysis and design of simple attenuator of following types; Symmetrical T and π type, L type.

In simple words: Circuits that deliberately reduce signal strength by a known amount, measured in decibels and nepers.

Unit 4 — Filter (6 Periods)

Topics: Brief idea of the use of filter networks in different communication systems, concept of low pass, high pass, band pass and band stop filters. Active Filters Basic concept of active filters and their comparison with passive filters.

In simple words: Filters that let some frequencies through and block others — low-pass, high-pass, band-pass and band-stop, passive and active.

Unit 5 — Transmission Line (5 Periods)

Topics: Transmission Lines, their types and applications, Distributed constants, T and π representation of transmission line section, Concept of reflection and standing waves, definition of reflection coefficient, SWR & VSWR and their relation (no derivation), Concept of transmission lines at high frequencies.

In simple words: What happens when a signal travels along a long line: reflections, standing waves and SWR, and why lines behave differently at high frequencies.

Practical Work

- Verify voltage and current using Node analysis in a DC resistive circuit.
- Verify voltage and current using Mesh analysis in a DC resistive circuit.
- Verification of electrical circuit using Thevenin's theorem.
- Verification of electrical circuit using Norton's theorem.
- Verification of electrical circuit using Maximum Power Transfer theorem.
- Use Superposition theorem to determine current/voltage in a linear circuit with multiple sources.
- Determine Z-parameters of a two-port network.
- To determine the Y parameters of a Two-port network.
- Determine transmission line parameters A, B, C, and D of a two-port network.
- To determine Hybrid parameters of a two-port network.
- To design and verify a symmetrical T-type attenuator for a given attenuation and characteristic impedance.
- To design and verify a symmetrical π -type attenuator for a specified dB loss and characteristic impedance.
- To study the frequency response of a Low Pass Filter and observe the cut-off frequency.
- To study the frequency response of a High Pass filter and observe the cut-off frequency.
- To study the frequency response of a Band Pass filter and observe the cut-off frequency.
- To study the frequency response of a Band Stop filter and observe the cut-off frequency.
- To construct and test a Band Pass Filter and study its center frequency and bandwidth.
- To observe reflections due to impedance mismatch in transmission lines.

Reference Books (as listed in the syllabus)

- Network Filters and Transmission Lines by AK Chakarvorty; Dhanpat Rai and Co. Publication, New Delhi
- Rahul Wadhwa, Network, Filters & Transmission Lines, Asian Publishers, Muzaffarnagar. ISBN: 978-93-5502-112-0
- Networks and Systems by Ashfaq Husain, Khanna Publishing House
- Network Analysis by Soni and Gupta; Dhanpat Rai and Co. Publication, New Delhi
- Network Filters and Transmission Line by Yash Pal; Ishan Publications, Ambala City
- Electrical and Electronics Measuring instrumentation, A.K Sawhney; Dhanpat Rai and Co. Publication, New Delhi

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Please confirm with your own polytechnic for any local changes.