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Electronic Devices and Circuits — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 3rd Semester • Session 2026-27
Subject 3.1 (Theory) + 3.5 (Lab) • Total 200 Marks • 5 Credits

About this document: Electronic Devices and Circuits appears twice in the 3rd semester — as a theory paper (3.1) and as a lab (3.5). Both are covered here, completely, in the official order.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.1	Electronic Devices and Circuits	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
3.5	Electronic Devices and Circuits (Lab)	Practical	0 - 4	2	Practical 60	Practical 40 (3 hrs)	100
Electronic Devices and Circuits Total				5	100	100	200

What This Subject Aims To Do

To develop the skills required to use basic electronic devices in various electronic circuits, and to understand the construction, working, characteristics and applications of semiconductor devices such as diodes and transistors — the basic building blocks of amplifiers, oscillators, switching circuits, wave shaping circuits and power supplies.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Semiconductor Diodes Circuit and Applications	6	14%
2	Bipolar Junction Transistor	11	25%
3	Unipolar Junction and Field Effect Transistor	9	21%
4	Amplifiers and Oscillators	11	25%
5	SCR, DIAC, TRIAC and IGBT	5	14%

Note: the weightages in the official marks-distribution table add to 99% (14+25+21+25+14), although the table's Total row prints 100%. Reproduced as printed in the official syllabus.

Unit 1 — Semiconductor Diodes Circuit and Applications (6 Periods, 14%)

Topics: Definition, Extrinsic/Intrinsic, N-type & p-type, P-N junction diode forward & reverse bias characteristics. Different types of diodes, Diode (P-N Junction) as rectifier, Half wave rectifier, full wave rectifier. Construction & Working Principle of Positive, Negative, and Biased Clippers - Construction & Working Principle of Positive and Negative Clampers

In simple words: How a semiconductor diode works, how it turns AC into DC (rectifiers), and how clippers and clampers shape waveforms.

Unit 2 — Bipolar Junction Transistor (11 Periods, 25%)

Topics: PNP and NPN transistor- Operation and characteristics. CB, CE and CC configurations: working, characteristics and their comparison. Concept of leakage current, effect of temperature on leakage current, standard notation for current and voltage polarity. Transistor Biasing, Transistor as an amplifier in CE configuration, DC load line.

In simple words: The transistor: how it works in its three configurations, how to bias it correctly, and how it amplifies a signal.

Unit 3 — Unipolar Junction and Field Effect Transistor (9 Periods, 21%)

Topics: Junction Field Effect Transistor: Construction, operation, characteristics and Biasing. MOSFET: Construction, operation, Characteristics. CMOS: Construction, operation and Characteristics. Comparison of JEET, MOSFET and Bipolar Transistor. Introduction to advance non-planer devices like FinFET, GAA.

In simple words: Field-effect transistors (JFET and MOSFET), the CMOS pair that runs modern chips, and a first look at newer devices like FinFET and GAA.

Unit 4 — Amplifiers and Oscillators (11 Periods, 25%)

Topics: Single Stage Transistor Amplifier: Analysis of Single Stage CE, CB and CC amplifier. Multistage Amplifiers: Need of multistage amplifier, gain of multistage amplifier, RC coupled, and transformer coupled, direct coupled Amplifier, their frequency response and bandwidth. Large Signal Amplifier: Difference between voltage and power amplifiers - Importance of impedance matching in amplifiers - Class A, Class B, Class AB, and Class C amplifiers, Push-pull amplifier. Feedback Amplifiers: Properties of negative Feedback, impact of feedback on different parameters, Basic Feedback Amplifier Topologies. Basic Principles, different types of Oscillator-LC, RC and crystal oscillator.

In simple words: Making signals bigger (amplifiers of several kinds) and making signals from nothing (oscillators) — including feedback, which trades gain for stability.

Unit 5 — SCR, DIAC, TRIAC and IGBT (5 Periods, 14%)

Topics: Construction, working and characteristics, SCR as a Switch, DIAC as bidirectional switch, Comparison of SCR, DIAC, TRIAC, MOSFET and IGBT.

In simple words: Power switching devices: how SCRs, DIACs, TRIACs and IGBTs turn heavy loads on and off, and how they compare.

Practical Work

- Construct the circuit and plot the VI characteristics of the PN Junction Diode, find the cut in voltage.
- Plot the V-I Characteristic of Zener Diode.
- Plot the V-I Characteristic of Photo Diode.
- Plot the V-I Characteristic of Light emitting Diode.
- Simulate half wave, full wave and bridge rectifier using simulation tool like P Spice/ Orcad/ Multisim.
- Construct a Half Wave Rectifier and obtain regulation characteristics – Without Filters and with Filters Compare the results.

- Construct a Full Wave Rectifier and obtain regulation characteristics – Without Filters and with Filters Compare the results.
- Plot input and output characteristics of transistor in CB /CE/CC configuration.
- Build and test voltage divider biased type amplifier & measure voltage at different points on the circuit and observe waveforms.
- Obtain the characteristics of DIAC and TRIAC.
- Obtain frequency response of Single stage RC/RL -coupled amplifier.
- Develop a simulation model for Voltage Series and Voltage Shunt Feedback Amplifiers.
- Develop circuits for Voltage Series and Voltage Shunt Feedback Amplifiers and obtain output plots. Compare the results with the simulation model.
- Develop a simulation model for Current Series and Current Shunt Feedback Amplifiers.
- Develop circuits for Current Series and Current Shunt Feedback Amplifiers and obtain output plots. Compare the results with the simulation model.

Reference Books (as listed in the syllabus)

- Analog Circuits A.K. Maini Khanna Publishing House Ed. 2018 (ISBN: 978-93-86173-584)
- Electronic Devices and Circuits. Salivahanan and N. Suresh Kumar McGraw Hill Education; Fourth edition (1 July 2017) ISBN: 978-9339219505
- Electronics Devices and circuit theory Boyestad & Nashelsky Pearson Education India; 11 edition (2015) ISBN: 978-9332542600
- Electronic Principles Albert Malvino & David Bates Tata McGraw Hill Publication 2010 ISBN: 978-0070634244
- Rahul Wadhwa, Electronics Devices & Circuits, Asian Publishers, Muzaffarnagar. ISBN: 978-93-91541-74-3
- Electronics Devices & Circuits Jacob Millman McGraw Hill Education; 4 editions (2015) ISBN: 978-9339219543

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 Source: BTEUP 2nd 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.