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Digital Electronics — Complete Syllabus

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

Subject 3.2 (Theory) + 3.6 (Lab) • Total 200 Marks • 5 Credits

About this document: Digital Electronics appears twice in the 3rd semester — as a theory paper (3.2) and as a lab (3.6). Both are covered here, completely, in the official order.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.2	Digital Electronics	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
3.6	Digital Electronics (Lab)	Practical	0 - 4	2	Practical 60	Practical 40 (3 hrs)	100
Digital Electronics Total				5	100	100	200

What This Subject Aims To Do

To expose students to the design process of combinational and sequential logic circuits, giving a strong foundation for all modern electronic devices and digital systems, and a profile for work in hardware and process industries.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
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1	Number Systems & Boolean Algebra	8	19%
2	Logic Gates	8	19%
3	Combinational Logic Circuits	8	19%
4	Sequential Logic Circuits	10	24%
5	Memory Devices	8	19%

Unit 1 — Number Systems & Boolean Algebra (8 Periods, 19%)

Topics: Introduction to different number systems – Binary, Octal, Decimal, Hexadecimal. Conversion between the number system, 1's complement and 2's complement, Binary Addition and Subtraction. Special Codes: BCD, Gray Codes, ASCII codes. Boolean Algebra: Basic Boolean laws, De-Morgan's Theorem, SOP and POS representation

In simple words: How computers count (binary, octal, hexadecimal), how negative numbers are stored, and the algebra that describes logic.

Unit 2 — Logic Gates (8 Periods, 19%)

Topics: Logic Gates – NOT, AND, OR, NAND, NOR, XOR, XNOR: Symbol, Logical expression and truth table. Implementation of Boolean expressions and Logic Functions using gates; Simplification of Boolean expressions using Karnaugh Maps (up to 4 variables).

In simple words: The seven basic gates, their symbols and truth tables, and K-maps — a visual shortcut for simplifying logic.

Unit 3 — Combinational Logic Circuits (8 Periods, 19%)

Topics: Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexer – 2 to 1 MUX, 4 to 1 MUX, 8 to 1 MUX., Demultiplexer – 1 to 2 DEMUX, 1 to 4 DEMUX, Decoder, Encoder. Parity generator and checker.

In simple words: Circuits whose output depends only on the present inputs: adders, subtractors, multiplexers, decoders, and error-checking parity circuits.

Unit 4 — Sequential Logic Circuits (10 Periods, 24%)

Topics: Basic Latches using NAND and NOR gates, Triggering and types of triggering. Flip Flops – SR, JK, T, D Flip Flops, JK-MS Flip Flops. Counters – Definition and types of counters, difference between asynchronous and synchronous counters, logic diagram, truth table and operation of Decade Counter, Johnson Counter and Ring Counter, applications of counters. Registers –: Types of register, Serial in Serial Out, Serial in Parallel Out, Parallel in Serial Out, Parallel in Parallel Out, applications of registers

In simple words: Circuits with memory: flip-flops that store one bit, counters that count pulses, and registers that hold and shift data.

Unit 5 — Memory Devices (8 Periods, 19%)

Topics: Classification of Memories – RAM Organization, Address Lines and Memory Size, SRAM, DRAM, Read Only memory – ROM organization, PROM, EPROM, EEPROM, Flash memory. Data Converters – Introduction: Digital to Analog converters, Analog to Digital Converters.

In simple words: How digital systems store data (RAM, ROM and their variants) and how the digital world talks to the analog world through ADCs and DACs.

Practical Work

- Verification of Demorgan's Theorems.
- To verify the truth tables for all logic Gates– NOT,OR,AND,NAND,NOR, X-OR, X-NOR Gates.
- Realization of Logic Gates using universal Gates.
- Design and verification of the truth tables of Half and Full Adder circuits.
- Design and verification of the truth tables of Half and Full Subtractor circuits.
- Design and verification of the truth tables of 4 to 1 Multiplexer (74150) and 1 to 4 De-Multiplexer (74154) circuits.
- To convert a given octal input to the binary output and to study the LED display using 7447 7-segment decoder.
- Construct and test the performance of parity generator.
- Design and test of an S-R flip-flop using NOR/NAND gates.
- Design and test of an J-K flip-flop using NOR/NAND gates.
- Design and test of an T flip-flop using NOR/NAND gates.
- Construct and test the performance of Decade counter.
- Design a Programmable Up-Down Counter with a 7 Segment Display.
- Design of 4-bit shift register.
- To conduct an experiment to store a set of data in a RAM using IC 2114 starting from location to location and retrieve the same data.

Reference Books (as listed in the syllabus)

- Digital principles & Applications Albert Paul Malvino& Donald P. Leach McGraw Hill Education; Eighth edition ISBN: 978-9339203405
- Digital Electronics Roger L. Tokheim Macmillian McGraw-Hill Education (ISE Editions); International 2 Revised edition ISBN: 978-0071167963
- Digital Electronics – an introduction to theory and practice William H. Gothmann Prentice Hall India Learning Private Limited; 2 edition ISBN: 978-8120303485
- Fundamentals of Logic Design Charles H. Roth Jr. Jaico Publishing House; First edition ISBN: 978-8172247744
- Digital Electronics R. Anand Khanna Publications, New Delhi (Edition 2018) ISBN: 978-93-82609445
- Rahul Wadhwa, Digital Electronics, Asian Publishers, Muzaffarnagar. ISBN: 978-93-91541-21-7

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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.

