



KAMALDNP

kamaldnp.com • IT Training, Varanasi

PDF created by Raj Kamal using AI

VLSI Using VHDL — Complete Syllabus (Elective — Specialisation, Option 2)

BTEUP Diploma in Electronics Engineering • 6th Semester • Session 2026-27
Subject 6.3.2 — Elective (Specialisation), Option 2 (Practicum) • Total 100 Marks • 3 Credits • L 2 – P 3 • Choose this OR Mobile and Wireless Communication OR Power Electronic Devices

Note: The PDF gives no titles for the five units of this subject (only “UNIT 1-”, “UNIT 2-”, etc.), and no marks-distribution table and no reference-books list — so unit titles, weightages and books are not shown.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.3.2	Elective (Specialisation): VLSI Using VHDL	Practicum	2 – 3	3	Practical 60	Practical 40	100
VLSI Using VHDL Total				3	60	40	100

What This Subject Aims To Do

To introduce the fundamentals of VLSI design using hardware description languages, with emphasis on the design and analysis of combinational and sequential digital circuits, simulation and functional verification using VHDL, and exposure to programmable logic devices such as CPLDs and FPGAs.

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 (6 Periods)

Topics: Levels of abstraction in VLSI design, Stages in the VLSI design process: Design Entry, Simulation, Synthesis, Placement, and Routing, Implementation of NOT, AND, OR, NAND, and NOR gates using NMOS, Implementation of NOT, AND, OR, NAND, and NOR gates using CMOS, Design of simple combinational circuits using NMOS, Design of simple combinational circuits using CMOS.

In simple words: The VLSI design flow — entry, simulation, synthesis, placement and routing — and building basic gates in NMOS and CMOS.

Unit 2 (6 Periods)

Topics: Types of HDL, Various modeling techniques, Fundamentals of VHDL language: module, Data types, Operators: Arithmetic operators, Logical shift operators, Relational operators, Logical operators, Syntax for Continuous assignment statements, Procedural assignment statements, Timing control, wait statement, Syntax for control statements.

In simple words: The VHDL language itself: its types, operators, and the syntax for continuous and procedural assignments and control statements.

Unit 3 (6 Periods)

Topics: VHDL code for Half Adder and Full Adder, VHDL code for Half Subtractor and Full Subtractor, VHDL code for 4-to-1 Multiplexer, 1-to-4 Demultiplexer, VHDL code for 4-to-2 Encoder, 2-to-4 Decoder.

In simple words: Writing VHDL for combinational circuits: adders, subtractors, multiplexers, demultiplexers, encoders and decoders.

Unit 4 (6 Periods)

Topics: VHDL code for D, JK, and T Flip-flops, VHDL code for 3-bit Shift register, VHDL code for 3-bit up counter, VHDL code for 3-bit down counter, VHDL code for 3-bit up-down counter.

In simple words: Writing VHDL for sequential circuits: flip-flops, shift registers and up, down and up-down counters.

Unit 5 (4 Periods)

Topics: Introduction to PROM, PLA, and PAL – Design of combinational circuits using PROM, PAL, and PLA (up to 3 variables).

In simple words: Programmable logic: PROM, PLA and PAL, and designing combinational circuits with them (up to 3 variables).

Practical Work

- Simulation of AND and OR gate using VHDL code.
- Simulation of half adder and full adder using VHDL.
- Simulation of half subtractor and full using VHDL.
- Simulation of 4x1 MUX using VHDL.
- Simulation of 1x4 DMUX using VHDL.
- Simulation of 4 to 2 encoder using VHDL.
- Simulation of 2 to 4 decoder using VHDL.
- Write VHDL program for D, JK and T flip-flops.
- Write VHDL program for 3-bit shift register.
- Write VHDL program for 3-bit up counter.
- Write VHDL program for 3-bit down counter.

Reference Books

Reference books are not listed for this subject in the official syllabus.

KAMALDNP • kamaldnp.com • support@kamaldnp.com • +91 8318013442 • Varanasi, UP

Source: BTEUP 3rd 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.