Digital Logic Fundamentals – Complete Notes (Units 1–5)

UNIT 1: Number Systems & Boolean Algebra
- Number systems: Binary, Octal, Decimal, Hexadecimal
- Conversions: Decimal↔Binary, Binary↔Octal, Binary↔Hex
- Binary arithmetic: addition, subtraction, multiplication, division
- Complements: 1's and 2's complement
- Boolean algebra laws, theorems, De Morgan's laws
- Canonical forms: SOP, POS, minterms, maxterms

UNIT 2: Logic Gates & Minimization
- Basic gates: AND, OR, NOT
- Universal gates: NAND, NOR
- Derived gates: XOR, XNOR
- Boolean simplification
- Karnaugh Maps (2, 3, 4 variables)

UNIT 3: Combinational Circuits
- Adders: Half adder, Full adder, Ripple-carry adder
- Subtractors: Half subtractor, Full subtractor
- Multiplexers, Demultiplexers
- Encoders, Decoders
- Code converters: BCD, Gray code, Excess-3
- Comparators

UNIT 4: Sequential Circuits
- Latches: SR, JK, D, T
- Flip-flops: SR, JK, D, T (edge-triggered)
- Registers: SISO, SIPO, PISO, PIPO
- Counters: asynchronous, synchronous, modulo-n
- Timing parameters: setup time, hold time, propagation delay

UNIT 5: Memory & Logic Families
- Memories: RAM, ROM, Cache memory
- Programmable Logic Devices: PLA, PAL, FPGA
- Logic families: TTL, CMOS, ECL characteristics
- A/D and D/A converters: Flash ADC, SAR ADC, R-2R DAC