

DIGITAL ELECTRONICS LOGIC DESIGN - I

By A.P.GODSE



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Number Systems and Codes : Digital number systems, Base conversion, Binary, Decimal, Octal, Hexadecimal, Number system with radix r , Gray codes.

Alphanumeric codes - ASCII code and EBCDIC codes, Hollerith code, Concept of parity, Complement r s and $(r-1)$ s, Subtraction with complements, Signed binary numbers, Error detecting and correcting codes. Basic theorems and properties of Boolean algebra : AND, OR, NOT operators, Laws of Boolean algebra, Demorgons theorem, Boolean expression and logic diagram. Negative logic, Alternate logic gate representation (concept of bubbled gates) canonical and standard forms (minterms and maxterms), Sum of minterms and product of maxterms, Conversion between canonical forms Truth table and maps, 2,3,4,5 and 6 variable maps, Solving digital problems using maps, Dont care conditions, Tabular minimization. Sum of product and product of sum reduction, Exclusive OR and exclusive NOR circuits, Parity generator and checkers.

Combinational Circuits : Design procedure, Adders (half and full), Subtractor (half and full) code converters, Analysis of design, Universal building blocks, Implementation of any logic circuit with only NAND gates or with only NOR gates, Binary serial adder, Parallel adder, Serial/parallel adder, Look ahead carry generator, BCD adder, Binary multiplier, Magnitude comparator, Decoder, Demultiplexer, Encoders, Priority encoder, Multiplexers and implementation of combinational logic diagram, HDL for combinational circuit.

Sequential Logic Circuit : Latches, SR latch with NAND and NOR gates, D latch, Edge triggered flip-flop, J-K flip-flop, T flip-flop, Master slave flip-flop, Analysis of clocked sequential circuit, State table, State diagram, State reduction state equations, State assignments, Flip-flop excitation table and characteristic equations, Design procedure for sequential circuits, Design with state reduction, Applications of flip-flop.

Registers and Counters : Asynchronous and synchronous counter, Counters with MOD numbers, Down counter, UP/DOWN counter, Propagation delay in ripple counter, Programmable counter, Pre-settable counter, BCD counter, Cascading, Counter applications, Decoding in counter, Decoding glitches, Ring counter, Johnson counter, Rotate left and rotate right counter, Registers - Buffer, Shift left, Shift right, Shift left/right registers, Parallel in parallel out, Serial in serial out, Parallel in serial out, Serial in parallel out registers. Random access memory, Timing waveform, Memory decoding, Internal construction, Coincident decoding, Address multiplexing, Read only memory - Combinational circuit implementation, Type of ROMs, Combinational PLDs, Programmable Logic Array (PLA), Programmable Array Logic (PAL),

Sequential programmable device. Analog to digital conversion - Ramp type, Dual slope, Integration, Successive approximation, Parallel conversion, Parallel/serial conversion, Converter specifications, Digital to analog converters - Binary weighted and R/2R D to A converters.

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