There is a flux of terms in recent times that starts with the word ‘digital’. Examples are digital camera, digital watch, digital weighing machine, digital signature, digital payment, digital art and so on. The digital prefix associates a term with digital technology and is considered a step up in the delivered performance at a given cost. The world of digital provides easy storage and reproduction, immunity to noise and interference, flexibility in processing, different transmission options, and very importantly, inexpensive building blocks in the form of integrated circuits. Digital systems represent and manipulate digital signals. Such signals represent only finite number of discreet values. A signal can be discreet by nature whereas, a continuous signal can be discretized for digital processing and then converted back. Manipulation and storage of digital signal involves switching. This switching is done through electronic circuits. Basic gates made from electronic circuits are primary building blocks of digital systems. These gates combine in different ways to develop digital circuits that are associated with different functionalities.

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Week 01: Introduction; Relation between switching and logic operation; Use of Diode and Transistor as switch; Concept of noise margin, fanout, propagation delay; TTL, Schottky TTL, Tristate; CMOS Logic, Interfacing TTL with CMOS

Week 02: Basic logic gates, Universality of NAND, NOR gates, AND-OR-Invert gates, Positive and Negative Logic; Boolean Algebra axioms and basic theorems; Standard and canonical representations of logic

Week 03: Minimization using Entered Variable Map, Minimization of multiple output functions, Minimization using QM algorithm

Week 04: Multiplexer; Demultiplexer / Decoder, BCD to 7-segment decoder driver; Encoder, Priority encoder; Parity generator and checker

Week 05: Number systems-binary, Signed binary, Octal, hexadecimal number; Binary arithmetic, One’s and two’s complements arithmetic

Week 06: Carry look ahead adder; Magnitude comparator; ALU; Error detecting and correcting codes

Week 07: Bistable latch, SR, D, JK, T Flip-Flop: level triggered, edge triggered, master – slave, Various representations of flip-flops

Week 08: Register, Shift register, Universal shift register; Application of shift register: ring counter,

Week 09: Up and down counter, Ripple (asynchronous) counters, Synchronous counters; Counter design using flip flops,

Week 10: Design of synchronous sequential circuit using Mealy model and Moore model

Week 11: Digital to analog converters: weighted resistor/converter, binary ladder, converter, accuracy and resolution; Analog to digital converter

Week 12: Memory organization and operation, Memory expansion; Memory cell; Different types of memory