

CS 201: DIGITAL LOGIC DESIGN (3-1-2: 5)

NUMBER SYSTEMS AND CODES

Addition, Subtraction, Multiplication and Division using Different Number Systems; Representation of Binary Number in Sign-Magnitude, Sign 1's Complement and Sign 2's Complement Notation; Rules for Addition and Subtraction with Complement Representation; BCD, EBCDIC, ASCII, Extended ASCII, Gray and other Codes.

BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS

Basic Logic Operation and Logic Gates, Truth Table, Basic Postulates and Fundamental Theorems of Boolean Algebra, Standard Representations of Logic Functions- SOP and POS Forms, Simplification of Switching Functions-K-Map and Quine-Mccluskey Tabular Methods, Synthesis of Combinational Logic Circuits.

COMBINATIONAL LOGIC CIRCUITS USING MSI INTEGRATED CIRCUITS

Binary Parallel Adder, BCD Adder, Encoder Priority Encoder, Decoder, Multiplexer and Demultiplexer Circuits, Implementation of Boolean Functions using Decoder and Multiplexer, Arithmetic and Logic Units, BCD-To-Segment Decoder, Common Anode and Common Cathode, 7-Segment Displays, Random Access Memory, Read Only Memory and Erasable Programmable ROMs, Programmable Logic Arrays(PLA) and Programmable Array Logic(PAL).

INTRODUCTION TO FLIP-FLOPS

Basic Concepts of Sequential Circuits, Cross Coupled SR Flip-Flop Using NAND or NOR Gates, JK Flip-Flop Rise Conditions, Clocked Flip-flops, D-Types and Toggle Flip-flops, Truth Tables and Excitation Tables for Flip-flop. Master Slave Configuration, Edge Triggered and Level Triggered Flip-flop, Elimination of Switch Bounce using Flip-flop, Flip-flop with Preset and Clear.

SEQUENTIAL LOGIC CIRCUIT DESIGN

Introduction to State Machine, Mealy and Moore Model, State Machine Notation, State Diagram, State Table, Transition Table, Table Excitation, Table and Equation, Basic Concepts of Counters and Register, Binary Counters, BCD Counters, Up Down Counter, Johnson Counter, Module-N Counter, Design of Counter using State Diagrams and Tables, Sequence Generators, Shift Left and Right Register, Registers with Parallel Load, Serial -in-Parallel-Out(SIPO) and Parallel-In-Serial-Out(PISO), Register Using Different Types of Flip-flop.

DIGITAL LOGIC FAMILIES

Digital IC Terminology, Transistor-Transistor Logic(TTL), Integrated Injection Logic(I²L), Emitter Coupled Logic (ECL), Metal Oxide Semiconductor(MOS) Logic, Complementary Metal oxide semiconductor (CMOS) Logic.

SUGGESTED LIST OF LABORATORY EXPERIMENTS:

1. Logic Gates using Discrete Components and measuring their Rise-time, Fall-time, Delay characteristics.
2. Study of the Transient, Delay and Load characteristics of TTL and CMOS gates.
3. Half-Adder/ Half-subtractor Circuits using a serial Input.
4. Full-Adder/ Full-subtractor Circuits using a serial Input.
5. 4-Bit Gray to Binary/ Binary to Gray Code convertor using Select input.
6. Implementing Logic Functions using MUX IC 74153.
7. Flip-flops using NAND/ NOR Gate.
8. Modulo-*m* Ripple Counter
9. 4-Bit Shift Left/Right Register
10. Sequence Generator
11. Excess-3 BCD Adder/ Subtractor with Select Input.

Text Books:

1. Floyed Thomas L. and Jain R. P., Digital Fundamentals, Pearson Education.

References:

1. Kime Charies R and Morris Mano, Logic and Computer Design Fundamentals, Pearson Education.
2. Mano Morris, Digital Logic and Computer Design, Pearson Education.
3. Jain R. P. and Anand M. H. S., Digital Electronics Practices using Integrated Circuits, TMH,
4. Lee Samuel, Digital Circuits and Logic Design, PHI.
5. Brown S. and Zvonko Vranesic, Fundamental of Logic with Verilog Design, Tata McGraw Hill,.