DIGITAL SYSTEMS AND APPLICATIONS

Integrated Circuits (Qualitative treatment only): Active & Passive components. Discrete components. Wafer. Chip. Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only).Classification of ICs. Examples of Linear and Digital lCs. (2 Lectures)

Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. AND, OR and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity Checkers. (4 Lectures)

Boolean algebra: De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Idea of Minterms and Maxterms. Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. (6 Lectures)

Data processing circuits: Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders. (3 Lectures)

Arithmetic Circuits: Binary Addition. Binary Subtraction using 2's Complement Method. Half and Full Adders. Half and Full Subtractors, 4-bit binary Adder/Subtractor. (4 Lectures)

Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset & Clear Operations. Race-around conditions in JK Flip-Flop. M/S JK FlipFlop. (6 Lectures)

Timers: IC 555: block diagram and applications:Astable and Monostable multivibrators. (3 Lectures)

Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits). (2 Lectures)

Counters (4 bits): Ring Counters. Asynchronous counters, Decade Counter. Synchronous Counter. (3 Lectures)

Computer Organization: Input/Output Devices. Data Storage (idea of RAM and ROM). Computer Memory. Memory Organization and Addressing. Memory Interfacing. Memory Map. (6 Lectures)

Intel 8085 Microprocessor Architecture: Main Features of 8085. Block Diagram. Components. Pin-out Diagram. Buses. Registers. ALU. Memory. Stack Memory. Timing and Control Circuitry. Timing States. Instruction Cycle, Timing Diagram of MOV and MVI (6 Lectures)

Introduction to Assembly Language: 1 byte, 2 byte and 3 byte instructions. (3 Lectures)

Reference Books:

- Digital Principles & Applications, A.P.Malvino, D.P.Leach & Saha, 7th Ed., 2011, Tata McGraw
- Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd.
- Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
- Digital Systems: Principles and Applications, R.J. Tocci, N.S.Widmer, 2001, PHI Learning.
- Logic circuit design, Shimon P. Vingron, 2012, Springer.
- Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning.
- Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.
