Digital Design

1. Introduction to Digital Design:- What is Digital ? - Specification and Implementation of digital design - Structured and Trial-Error methods in design - Digital Computer Aided Design (CAD) tools

2. Digital Logic - Binary Number System - Octal, Hexa-decimal and BCD Codes - Number System Conversion - Use of different number systems in digital design - Logic gates – AND, OR, NOT, NAND, NOR etc. - NAND and NOR implementation of real life digital circuits - Digital Circuit Characterization – Fan-in/Fan-out, Switching functions, Switching times, Noise margin etc.

3. Boolean Algebra - AND, OR and other relations - DeMorgan's law - Karnaugh Maps - Minimization of Sum of Products and Product of Sums - Design of minimal two-level gate networks - Design of multiple output two level gate networks

4. Combinational Circuit Design - Design Procedure - Design of Multiplexer, Decoder, Encoder, Comparator - Design of Seven-segment display, Parity generator - Design of large circuits using the above modules

5. Synchronous Sequential Circuit Design - Design of sequential modules – SR, D, T and J-K Flip-flops - Flip-flop applications – Clock generation, Counters, Registers - Basic State machine concepts

6. Design of Programmable Logic - Introduction to Programmable circuits - Design of Read-Only Memory (ROM), Programmable Logic Arrays (PLA), Programmable Array Logic (PAL)

7. Digital Computing - Introduction to digital computer - Design of Arithmetic circuits – Adders, Multipliers - Design of Memory – ROM/RAM - Design of a simple CPU