CS-3003 DIGITAL CIRCUIT & DESIGN

PREREQUISITE: Electronic Device & Circuits (Transistors, Capacitors, Inductors,), other Hardware.

OBJECTIVES

To expose the students to perform binary arithmetic and conversion from one number system to another and learn different Boolean simplification techniques. We learn the design and analysis of combinational and sequential circuits.

Course Contents

Number systems & codes, Binary arithmetic, Boolean algebra and switching function. Minimization of switching function, Concept of prime implicant, Karnaugh map method, Quine McCluskey's method,Cases with don't care terms, Multiple output switching function.

Introduction to logic gates, Universal gate, Half adder,Half subtractor, Full adder, Full subtractor circuits, Series & parallel addition, BCD adders, Look-ahead carry generator.

Linear wave shaping circuits, Bistable, Monostable & Astable multivibrator, Schmitt Trigger circuits & Schmitt-Nand gates. Logic families:RTL, DTL, All types of TTL circuits, ECL, I2L, PMOS, NMOS, & CMOS logic, Gated flip- flops and gated multivibrator, Interfacing between TTL to MOS.

Decoders, Encoders, Multiplexers, Demultiplexers, Introduction to various semiconductor memories, & designing with ROM and PLA. Introduction to Shift Registers, Counters, Synchronous & Asynchronous counters, Designing of combinational circuits like code converters.

Introduction of Analog to Digital & Digital to Analog converters, sample & hold circuits and V-F converters.

OUTCOMES: Upon completion of the course, the students will be able to Perform Simplification of Boolean Functions using Theorems and Karnaugh Maps and Convert between digital codes using encoder/decoder .Student can analyze combinational circuits and sequential circuits .

References:

1. M. Mano; " Digital Logic & Computer Design"; Pearson
2. Malvino Leach; "Digital Principles & Applications";TMH
3. Millman & Taub; "Pulse Digital & Switching Waveforms";TMH
4. W.H Gothman; "Digital Electronics";PHI
5. R.P.Jain "Modern Digital Electronics" TMH

List of Experiments :

1. To study and test operation of all logic gates for various IC's)IC#7400, IC#7403, IC#7408, IC#7432, IC#7486)
2. Verification of DeMorgan's Theorem.
3. To construct half adder and full adder.
4. To construct half subtractor and full subtractor circuits.
5. Verification of versatility of NAND gate.
6. Verification of versatility of NOR gate.
7. Designing and verification of property of full adder.
8. Design a BCD to excess-3 code convertor.
9. Design a Multiplexer/Demultiplexer