Digital Logic

BIM 2nd Semester

Nature of the course: Theory + Practical

Credits: 3
Lecture Hours: 48

Course Description:
This course familiarizes students with number systems, Boolean algebra, logic gates, simplification of Boolean functions, combinational and sequential logic, registers, counters and memory.

Course Objectives:
The main objective of this course is to provide students both theoretical and practical knowledge of different concepts that are used in the design of digital systems.

Course Contents:

Unit 1: Binary Systems (6 Hrs.)
Digital Computers and Digital Systems; Binary Numbers; Number Base Conversions; Octal and Hexadecimal Numbers; Complements; Binary Codes

Unit 2: Boolean Algebra and Logic Gates (6 Hrs.)
Basic Definitions; Axiomatic Definition of Boolean Algebra; Basic Theorems and Properties of Boolean Algebra; Boolean Functions; Canonical and Standard Forms; Digital Logic Gates

Unit 3: Simplification of Boolean Functions (8 Hrs.)
The Map Method; Two- and Three-Variable Maps; Four-variable Map; Product of Sums Simplification; NAND and NOR Implementation; Don't-care Conditions

Unit 4: Combinational Logic (13 Hrs.)
Introduction and Design Procedure; Adders; Subtractors; Binary Parallel Adders; Encoders and Decoders; Multiplexers and Demultiplexers; Read-Only Memory (ROM); Programmable Logic Array (PLA)

Unit 5: Sequential Logic (8 Hrs.)
Introduction; Flip-Flops; Triggering of Flip-Flops; Analysis of Clocked Sequential Circuits

Unit 6: Registers, Counters, and the Memory Unit (7 Hrs.)
Registers; Shift Registers; Ripple Counters; Synchronous-counters; Timing Sequences; Memory Unit

Laboratory Works: The laboratory work includes designing and realizing all the concepts studied in each unit of the course particularly focusing on:

- Logic gates
- Adders and subtractors
- Decoder and multiplexers
- Sequential circuits

- Counters

Text Book:

1. Digital Logic and Computer Design, M. Morris Mano, Pearson Education, 2016.

References Books:

1. Digital Logic Design, Fourth Edition, Brian Holdsworth and Clive Woods.
2. Introduction to Digital Logic Design, John Patrick Hayes, Addison-Wesley.