

# (TC-201) - Digital Logic Design

## Course Outline:

### Theory:

#### 1. Computer Operations:

1. Evaluation of the computer.
2. Basic organization of digital computer.
3. Instruction formats.
4. Different types of computers, special purpose and general purpose computers.

#### 2. Number Systems:

1. Conversion between bases.
2. Arithmetic with bases other than ten, negative numbers, binary coded decimal numbers, octal, and hexadecimal number systems.

#### 3. Truth Function:

1. Binary connectives.
2. Evaluation of truth functions.
3. Many statement compounds.
4. Physical realizations.
5. Sufficient sets of connectives.
6. Digital computer examples.

#### 4. Boolean Algebra:

1. Truth functional calculus as Boolean algebra.
2. Duality, fundamental theorems of Boolean algebra.
3. Examples of Boolean simplifications.
4. Remarks on Switching functions.

#### 5. Switching Devices:

1. Switches and relays logic circuits.
2. Speed and delays in logic circuits.
3. integrated logic circuits.

#### 6. Minimization of Boolean Functions:

1. Standard forms of Boolean functions.
2. Minterm and maxterm.
3. Designation of Boolean functions.
4. Karnaugh map representation of Boolean functions.
5. Simplification of functions on Karnaugh maps.
6. Map minimization of product of sums expressions.
7. Incompletely specified functions.

#### 7. Tabular Minimization:

1. Cubical representation of Boolean functions.
2. Determination of prime implicants.
3. Selection of an optimum set of prime implicants.
4. Design of NAND and NOR Networks and properties of combinational network.
5. Introduction to design of NAND and NOR Networks.
6. Switching expressions for NAND and NOR Networks.
7. Transient response of combination Networks.

#### 8. Introduction to sequential Networks:

1. Latches.
2. Sequential Networks in fundamental mode.
3. Introduction to the Synthesis of Sequential Networks.
4. Minimization of the number of states.
5. Clocked Networks.

**9. Introduction to Verilog HDL and VHDL Lab work: ## List of Practicals:**

10. Digital Logic Gates
11. Simplification of Boolean Functions
12. Combinational Circuits
13. Code Converters
14. Design with Multiplexers
15. Adders and Subtractors
16. Flip Flops
17. Sequential Circuits
18. Counters
19. Shift Registers
20. Serial Addition
21. Memory Unit
22. Clock Pulse Generator
23. Parallel Adder
24. Binary Multiplier
25. Asynchronous Sequential Circuits ## **Suggested Teaching Methodology:**

- Lecturing
- Written Assignments Report Writing ## **Suggested Assessment: ### Theory (100%)**
- Sessional (20%)
- Quiz (12%)
- Assignment (8%)
- Midterm (30%)
- Final Term (50%)

**Laboratory (100%)**

- Labs
- Open-Ended Labs

**Recommended Text and Reference Books:**

1. M. Morris Mano, Digital Logic & Computer Design
2. D. J. Comer, Digital Logic and State Machine Design, Oxford University Press.
3. Victor P. Nelson, et al, Digital Logic Circuit Analysis and Design
4. Brian Holdsworth, Clive Woods, Digital Logic Design, Fourth Edition
5. M. Rafiquzzaman, Fundamentals of Digital Logic and Microcomputer Design, 5th Ed.

6. Tocci, Ronald J, Digital Systems principles and application. 10th Ed, 2009.
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