# EOPC2004 DIGITAL ELECTRONICS (3-0-0)

## Course Objective:

- Introduce the concept of digital and binary systems
- inculcate concepts of K-MAP to simplify a Boolean expression
- To facilitate students in designing combinational and sequential logic circuits.

Module 1 **7 Hours**

Introduction: Logic design, transistors as switches, CMOS gates, sequential circuits,some examples.

Digital Systems: Representation of numbers, binary codes, Gray code, error-detecting and error-correcting codes, registers, binary logic, basic logic gates.

Boolean Algebra: Boolean operations, Boolean functions, algebraic manipulations, minterms and maxterms, sum-of-products and product-of-sum representations, two-input logic gates, functional completeness.

Module 2 **7 Hours**

Minimization of Boolean Functions: Karnaugh map, don't-care conditions, prime implicants, Quine—McCluskey technique, Logic gates, NAND/NOR gates, Universal gates.

Module 3 **6 Hours**

Combinational Circuits: Adder, subtractor, multiplier, comparator, decoders, encoders, multiplexers, demultiplexers, MUX Realization of switching functions, Parity bit generator, Code-converters, Hazards and hazard free realizations.

Module 4 **5 Hours**

Synchronous Sequential Circuits: Finite-state machines, latches and flip-flops (SR, D, JK, T), synthesis of clocked sequential circuits, Steps in synchronous sequential circuit design. Design of modulo-N Ring & Shift counters, Serial binary adder.

Module 5 **5 Hours**

Registers and Counters: Registers and shift registers, sequential adders, binary and BCD ripple counters, synchronous counters

Algorithmic State Machines: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

## Course Outcome:

At the end of the course, students will be able to:

CO1: Understand various types of number systems and their conversions

CO2: Identify the importance of canonical forms in the minimization of Boolean functions in digital circuits.

CO3: Design and implement variety of logical devices using combinational circuits and Sequential circuits.

CO4: Analyse sequential circuits like Registers and Counters using flip-flops

CO5: Design the finite state machine using algorithmic state machine charts

## Text Books:


1. Digital Design — Morris Mano, PHI, 3rd Edition, 2006.
2. Digital Electronics by G.K. Kharate, Oxford University Press
3. Switching & Finite Automata theory — Z. Kohavi, TMH,2nd Edition.
4. An Engineering Approach To Digital Design — Fletcher, PHI.
5. Fundamentals of Logic Design — Charles H. Roth, Thomson Publications, 5th Edition, 2004.
6. Digital Logic Applications and Design — John M. Yarbrough, Thomson Publications, 2006