II Semester
Course 4: Digital Logic Design
Credits -3

Course Objectives
To familiarize with the concepts of designing digital circuits.
Course Outcomes
Upon successful completion of the course, the students will be able to

1. Understand how to Convert numbers from one radix to another radix and performarithmetic operations.
2. Simplify Boolean functions using Boolean algebra and k- maps
3. Design adders and subtractors circuits
4. Design combinational logic circuits such as decoders, encoders, multiplexers and demultiplexers.
5. Use flip flops to design registers and counters.

UNIT – I

Number Systems: Binary, octal, decimal, hexadecimal number systems, conversion of numbers from one radix to another radix, r's, (r-1)'s complements, signed binary numbers, addition and subtraction of unsigned and signed numbers, weighted and unweighted codes.

UNIT – II

Logic Gates and Boolean Algebra: NOT, AND, OR, universal gates, X-OR and X-NOR gates, Boolean laws and theorems, complement and dual of a logic function, canonical and standard forms, two level realization of logic functions using universal gates, minimizations of logic functions (POS and SOP) using Boolean theorems, K-map (up to four variables), don't care conditions.

UNIT – III

Combinational Logic Circuits – 1: Design of half adder, full adder, half subtractor, fullsubtractor, ripple adders and subtractors, ripple adder / subtractor.

UNIT – IV

Combinational Logic Circuits – 2: Design of decoders, encoders, priority encoder, multiplexers, demultiplexers, higher order decoders, demultiplexers and multiplexers, realization of Boolean functions using decoders, multiplexers.

UNIT – V

Sequential Logic Circuits: Classification of sequential circuits, latch and flip-flop, RS- latch using NAND and NOR Gates, truth tables, RS, JK, T and D flip-flops, truth and excitation tables, conversion of flip- flops, flip-flops with asynchronous inputs (preset and clear).

Design of registers, shift registers, bidirectional shift registers, universal shift register, design of ripple counters, synchronous counters and variable modulus counters.

Text Books:

1. M. Morris Mano, Michael D Ciletti, "Digital Design", 5th edition, PEA.

Reference Books

1. Kohavi, Jha, "Switching and Finite Automata Theory", 3rd edition, Cambridge.
2. 2. Leach, Malvino, Saha, "Digital Principles and Applications", 7th edition, TMH.
3. 3. Roth, "Fundamentals of Logic Design", 5th edition, Cengage.

SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: JAM (Just a Minute) Session: Explaining Radix Conversion
Evaluation Method: Communication Skills and Knowledge Presentation

Unit 2: Activity: Boolean Algebra Assignment
Evaluation Method: Assignment Completion and Correctness

Unit 3: Activity: Hands-on Lab Activity: Building Adder and Subtractor Circuits
Evaluation Method: Lab Performance and Correctness of Circuit Implementation

Unit 4: Activity: Group Discussion: Applications of Decoders, Encoders, Multiplexers
Evaluation Method: Participation and Critical Thinking

Unit 5: Activity: Quiz on Flip-Flops and Register-Counter Design
Evaluation Method: Quiz Performance and Knowledge Retention