MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act,1956

COURSE CONTENT

DIGITAL LOGIC DESIGN							
III Semester: ECE							
Course Code	Category	Hours / Week		Credits	Maximum Marks		
2530404	Core	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:45		
Prerequisites: knowledge on Digital logic design							

Couse Overview:

This course provides a comprehensive foundation in digital logic design, beginning with Boolean algebra and simplification methods. It explores the systematic analysis and design of combinational and sequential circuits, along with memory elements. The course also introduces programmable logic devices, equipping students with the skills to design and implement complex digital systems.

Course Objectives:

The students will try to learn

- Fundamentals of number systems, Boolean algebra, and logic simplification.
- The ability to design and implement combinational logic circuits.
- Strong foundation in sequential logic through the study of latches and flip-flops.
- Skills in designing synchronous sequential circuits for digital applications.
- Programmable logic devices for modern digital system design.

Course Outcomes:

After successful completion of the course, students shall be able to

- Apply Boolean algebra and minimization techniques to simplify Boolean functions
- Design combinational circuits using logic gates
- Analyze latches and flip-flops to design sequential logic circuits
- Construct synchronous sequential circuits combining flip-flops and logic gates
- Utilize programmable logic devices in digital system design

Module – I: Number Systems, Boolean Algebra and Logic Gates   10L

Number Systems: Binary, Octal, Decimal, Hexadecimal, Fixed-point and Floating-point Number Representations, Complements of Numbers: 1's and 2's Complement, Error Detection and Correction Codes: Parity Check, Hamming Code. Boolean Algebra and Logic Gates: Axiomatic definitions, basic theorems and properties, Boolean Functions: Canonical and standard forms, Digital Logic Gates Overview.

Module – II: Gate-Level Minimization Techniques   8L

Karnaugh maps: 2, 3, and 4 variables, Sum-of-products (SOP) and product-of-sums (POS) simplification don't care conditions, Implementation using NAND and NOR gates.

Module – III: Combinational Logic Circuits 7L

Analysis and design procedures, Binary adder-subtractor and BCD adder, magnitude comparator, decoders, encoders, multiplexers and demultiplexers.

Module – IV: Sequential Logic Circuits 7L

Gated latches, Flip-flops: Clocked S-R, D, T, JK, Master-Slave JK, Design of synchronous and asynchronous counters, Shift registers: types and applications.

Module – V: Synchronous Sequential Logic, Programmable Logic Devices 6L

Moore and Mealy state machines, State diagrams, state tables, and state reduction, Case studies: sequence detector, traffic light controller, vending machine.

Programmable Logic Devices: Memory devices - RAM, ROM, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL).

TEXT BOOKS:

1. M. Morris Mano, Michael D. Ciletti, Digital Design with an Introduction to the Verilog HDL, 6th Edition, Pearson Education/PHI, 2017.
2. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge.

REFERENCES:

1. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, Digital Systems: Principles and Applications, 10th Edition, Pearson Education.
2. Charles H. Roth Jr., Larry L. Kinney, Fundamentals of Logic Design, 6th Edition, Cengage Learning.
3. Introduction to Switching Theory and Logic Design – Fredric J. Hill, Gerald R. Peterson, 3rd Ed, John Wiley & Sons Inc.

REFERENCE LINK:

1. **https://www.youtube.com/playlist?list=PLBF3763AF2E1C572F**
2. **https://www.youtube.com/thefuturishere**
3. **https://www.youtube.com/satorigraphic**
4. **https://www.youtube.com/yesimadesigner**
5. **https://www.youtube.com/JesseShowalter**

MATERIALS ONLINE:

1. Course template.
2. Tutorial question bank.
3. Tech Talk and Concept Video topics.
4. Open-ended experiments.
5. Definitions and terminology.
6. Assignments.
7. Model question paper–I.
8. Model question paper–II.
9. Lecture notes.
10. Drshya Siksha Sangrah Videos(DSSV).