

Branch Name:	Artificial Intelligence & Data Science
Semester/Year:	Semester - III/ Second Year
Subject Title:	Digital Electronics
Subject Code:	1ET1040303
Pre-requisite:	Basic Electronics and Number Systems

Course Objective:

To learn and understand fundamentals of number systems, digital devices (combinational/sequential devices), memory design, terminology of digital IC circuits etc.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
04	-	02	05	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Binary System: Digital computer and digital systems, Binary Number, Number base conversion Octal and Hexadecimal Number, complements, Binary Codes, Binary Storage and register, Binary Logic, Integrated Circuit	4	8
2	Boolean Algebra and Logic Gates: Basic Definition, Axiomatic Definition of Boolean Algebra, Basic Theorem and Properties of Boolean Algebra, Minterms And Maxterms, Logic Operations, Digital Logic Gates, IC digital Logic Families	5	10
3	Simplification of Boolean Functions: Different types Map method, Product of sum Simplification, NAND or NOR implementation, Don't Care condition, Tabulation method	6	13
4	Combinational Logic: Introduction, Design Procedure, Adder, Subtractor, Code Conversion, Universal Gate	5	11
5	Combinational Logic with MSI AND LSI: Introduction, Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoder, Multiplexer, ROM, Programmable Logic Array, PAL, PLD, Introduction of CPLD and FPGA	9	18

6	Sequential Logic: Introduction, Flip-Flops, Triggering of Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design Procedure, Design of Counters, Design with State Equations	8	16
7	Registers, Counters and the Memory unit : Introduction, Registers, Shift Registers, Ripple Counters, Synchronous Counters, Timing Sequences, Memory Unit	7	14
8	Digital Integrated Circuits: Introduction, Special characteristics, Bipolar-Transistor characteristics, RTL and DTL Circuits, TTL, ECL, MOS, CMOS	5	10

Course Outcome:

After learning the course the students should have knowledge about digital number systems and logic circuits. The student should be able to solve logic function minimization. The students should be able to understand and differentiate between combinational and sequential circuits such as decoders, encoders, multiplexers, de-multiplexers, flip-flops, counters, registers. They should be able to design using FSM. In the laboratory, they should be able to verify the functions of various digital integrated circuits. The students should be able state the specifications of logic families. At the end they should be able to develop a course project using digital integrated circuits.

List of Text Book:

1. Digital Logic and Computer Design by M Morris Mano, Fourth Edition, Prentice Hall Publication

List of Reference Books:

1. Digital Logic & State Machine Design By David J. Comer, Third Indian Edition, Oxford University Press
2. Digital Design, M. Morris Mano and Michael D. Ciletti, Pearson Education.

List of Suggested titles of Experiments:

1. To study and verify performance of various Logic Gates.
2. To study and perform De-Morgan's Theorem.
3. To perform NAND and NOR as Universal Gates.
4. Design and analyze Half Adder and Full Adder.
5. Design and analyze Half Subtractor and Full Subtractor.
6. Design and analyze Multiplexers.
7. Design and analyze Decoder and De-Multiplexer.
8. Design and analyze Encoder.
9. To study and perform 4 bit Magnitude Comparator.
10. To verify performance of RS and D Flip Flops.
11. To verify performance of JK and T Flip Flops.
12. To study and perform Decade Counter.
13. To study and perform Shift Register.
14. To study and verify performance of ROM design.
15. To study about PLDs.