

# Digital Electronics

(Core Subject)

<b>Course Code:</b>	10B11EC401	<b>Semester:</b>	3 <sup>rd</sup> Semester B.Tech. (CSE and IT) 4th Semester, B. Tech. (ECE)
<b>Credits:</b>	4	<b>Contact Hours:</b>	L-3, T-1, P-0

## Course Objectives

The objectives are to study

1. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
2. To prepare students to perform the analysis and design of various digital electronic circuits.

## Course Outcomes

After studying this course the students would gain enough knowledge

1. Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
2. To understand and examine the structure of various number systems and its application in digital design.
3. The ability to understand, analyze and design various combinational and sequential circuits.
4. Ability to identify basic requirements for a design application and propose a cost effective solution.
5. The ability to identify and prevent various hazards and timing problems in a digital design.
6. To develop skill to build, and troubleshoot digital circuits.

## Course Contents

Unit	Topics	References (chapter number, page no.)	Lectures
1.	<b>Number System, Binary Codes and Boolean Algebra</b> : Conversion of bases, Representation of negative numbers, 1's complement, 2's complement, arithmetic using 2's complement Hexadecimal code, weighted codes - BCD, Excess-3 code, Gray Code. Logic gates and Boolean Algebra.	1,2	6
2.	<b>Boolean function representation and minimization techniques</b> : Standard and canonical representation and minimization of Boolean expressions using Karnaugh map.	3,4	7

3	<b>Combinational Logic Circuits</b> : Half Adder, Full Adder, Half Subtractor, Full Subtractor, Full adder using half adder, BDC Adder. Carry Look ahead, Multipliers. Multiplexer/de- multiplexers, Encoders and Decoders.	5,6	8
4	<b>Waveform and wave shaping generator using IC-555 based:</b> 555 Timer, Astable and monostable multivibrator and bistable multivibrator.	8	2
5	<b>Sequential Logic Circuits:</b> Latches, Edge Triggered Flip Flops: SR, D, JK, Master slave JK,. Excitation tables, conversion of Flip Flops. State Diagrams	8	4
6	<b>Counters:</b> Synchronous and Asynchronous counters, Up/Down Counters, Design of Synchronous counters, Cascaded Counters, Counter Decoding, Counter applications	9	8
7	<b>Shift registers:</b> Shift register functions, Serial in/serial out shift registers, serial in parallel out/shift registers, Parallel In/ Parallel out shift registers, bidirectional Shift registers, Shift register counters, Shift register Applications.	10	5
8	<b>Analog to Digital &amp; Digital to Analog Converters:</b> Design of various A to D and D to A Converters.	14	2
9	<b>Digital Logic Families:</b> Parameters of Logic Families. Introduction to logic Families: DTL, RTL, TTL, CMOS.	15	2
<b>Total Number of Lectures</b>			<b>44</b>

## Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
  - 10 Marks : Class performance, Tutorials & Assignments
  - 10 Marks : Quizzes
  - 5 marks : Attendance

## **Text Books**

1. Thomas L Floyd “Digital Fundamentals”

## **Reference Books**

1. M. Morris Mano. “Digital Logic and Computer Design”,
2. M . Morris Mano, “Digital Design”, Pearson Education Asia,.