2/4 B.Tech - FIRST SEMESTER

IT3T1   **DIGITAL SYSTEM DESIGN**   **Credits: 3**

Lecture: 3 Periods/week   **Internal assessment: 30 marks**

Practice/Interaction: 1Period/week   **Semester end examination: 70 marks**

Objectives:

- To study the basics of various number systems, negative number representation, binary codes.
- To study representation of switching functions using Boolean algebra.
- To study the combinational logic design of various logic and switching devices and their realization.
- To study the sequential logic circuits design both in synchronous and asynchronous modes.
- To study some of the programmable logic devices and their use in realization of switching functions.

Outcomes:

Students will be able to

- Understand different number systems, binary addition and subtraction, 2's complement representation.
- Apply Boolean algebra Concepts for logic functions
- Implement the combinational circuits.
- Understand the concepts of Memory and Programmable Logic.
- Understand the flip-flops, sequential circuits like counters and shift registers.

Syllabus:

UNIT- I

Digital Systems and Binary Numbers: Digital Systems ,Binary Numbers, Number-Base conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Logic.

UNIT-II

Boolean Algebra and Logic Gates : Introduction, Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuits.
Gate Level Minimization: Introduction, The Map Method, Four Variable K-map's, Product-of-Sums Simplification, Don't Care Conditions – NAND and NOR Implementation.

UNIT- III

Combinational Logic: Introduction, Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Magnitude Comparator, Decoders, Encoders, Multiplexers, and Demultiplexers.

UNIT- IV

Memory and Programmable Logic: Introduction Random-Access Memory, Read-Only Memory, Programmable Logic Array, Programmable Array Logic.

UNIT- V

Synchronous Sequential Logic: Introduction, Sequential Circuits, Storage Elements: Latches, Storage Elements: Flip Flops, Design Procedure.
Registers and Counters: Registers, Shift registers, Ripple Counters, Synchronous Counters.

Text Book:

1. Digital Design by M. Morris Mano, Michael D.Ciletti Pearson 4th Edition.

References Books:

1. Fundamentals of Digital circuits by A. Anand Kumar, PHI, 2nd Edition.
2. Digital Principles and Applications by Leach, Paul Malvino. Mc.GrawHill 5th Edition
3. Digital Electronics by G.K. Kharate. Oxford University Press.

e-Learning Resources:

1. http://nptel.ac.in/video.php?subjectId=117105080
2. http://www.jntuk-coeerd.in/