II B.Tech – I Semester
(17EC302) DIGITAL ELECTRONICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

Pre-Requisites: None

Course Objectives:

- To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
- To prepare students to perform the analysis and design of various digital electronic circuits.
- Work in a design team that can propose, design, successfully implement and report on a digital systems project.

UNIT–I: **REVIEW OF NUMBER SYSTEMS & CODES:**

i) Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving.
ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9's compliment code etc.
iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR – Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code, NAND-NAND and NOR-NOR realizations

UNIT–II: MINIMIZATION TECHNIQUES:

Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

UNIT–III: COMBINATIONAL LOGIC CIRCUITS DESIGN

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

UNIT–IV: INTRODUCTION OF PLD's

PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

UNIT–V: SEQUENTIAL CIRCUITS I

Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (NAND RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

UNIT–VI: SEQUENTIAL CIRCUITS II

Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Mealy to Moore conversion and vice-versa.

Course Outcomes:

After successful completion of the course, the students can be able to:

S. No	Course Outcome	BTL
1.	Understand and Classification of number systems, Codes and Error Detection Techniques.	L1,2
2.	Understand and apply of Boolean algebra for minimization of switching Functions.	L2,3
3.	Understand and Design of combinational logic circuits	L2,3
4.	Classification and Realization of Boolean Functions using Programmable Logic Devices	L2,3
5.	Classify, Understand and Design of Sequential logic Circuits	L2,3
6.	Understand, Analyze and Design of Meelay and Moore Machines	L2,3

Correlation of COs with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1	-	2	-	-	-	2	2	-	-	3	2
CO 2	3	3	2	-	2	-	-	-	2	2	-	-	3	2
CO 3	3	2	3	-	3	-	-	-	2	2	-	-	3	3
CO 4	3	2	1	-	-	-	-	-	-	-	-	-	3	-
CO 5	3	3	3	-	2	-	-	-	2	2	-	-	3	2
CO 6	3	3	3	-	-	-	-	-	-	-	-	-	3	-

Text Books:

1. Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition.
2. Switching Theory and Logic Design by A. Anand Kumar
3. Digital Design by Mano PHI.

Reference Books:

1. Modern Digital Electronics by RP Jain, TMH.
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers.
3. Micro Electronics by Milliman MH edition.