II Year-II Semester		T	P	C
		3+1	0	3
SWITCHING THEORY AND LOGIC DESIGN (RT22022)				

Prerequisite Course:

-Nil-

Course Description and Objectives:

- To solve a typical number base conversion and analyze new error coding techniques.
- Theorems and functions of Boolean algebra and behavior of logic gates.
- To optimize logic gates for digital circuits using various techniques.
- Boolean function simplification using Karnaugh maps and Quine-McCluskey methods.
- To understand concepts of combinational circuits.
- To develop advanced sequential circuits.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes.

COs	Course Outcomes	POs
1	Classify different number systems and apply to generate various codes.	**3**
2	Use the concept of Boolean algebra in minimization of switching functions	**3**
3	Design different types of combinational logic circuits.	**3**
4	Apply knowledge of flip-flops in designing of Registers and counters	**3**
5	The operation and design methodology for synchronous sequential circuits and algorithmic state machines.	**2**
6	Produce innovative designs by modifying the traditional design techniques.	**3**

SYLLABUS

UNIT I: Review of Number systems & Codes:

1. Representation of numbers of different radix, conversion from one radix to another radix, r-1's compliments and r's compliments of signed numbers, problem solving.
2. 4 bit codes, BCD, Excess-3, 2421, 84-2-1, 9's Compliment code etc.,
3. 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 function 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 function 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 another 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. Meelay to Moore conversion and vice-versa.

TEXTBOOKS:

1. Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill MH 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. Microelectronics by Milliman MH edition.