

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech I Sem (E.C.E)

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SWITCHING THEORY AND LOGIC DESIGN

COURSE OBJECTIVES:

1. To acquire knowledge about various number systems, binary codes, error detection and correction codes, Boolean algebra and logic gates.
2. To learn simplification of Boolean functions and their realization using logic gates.
3. To understand and design various combinational logic circuits.
4. To study the design of sequential logic circuits in synchronous and asynchronous modes.
5. To introduce programmable logic devices and to realize switching functions using them.

UNIT I: NUMBER SYSTEM & BOOLEAN ALGEBRA

Digital Systems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Error detection and correction codes, Binary codes. Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, other logic operations & Logic gates.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand and apply different number systems.
- Explain importance of different coding schemes and functionality of logic gates.

UNIT II: GATE LEVEL MINIMIZATION

The map method, four variable K-map, Five variable map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-OR Function, Tabular Method- Simplification of Boolean function using Q-M tabulation Method.

Learning Outcomes:

At the end of the unit, the student will be able to

- Apply basic laws to simplify Boolean expressions.
- Compare K- Map and Q-M methods of minimizing logic functions.

UNIT III: ANALYSIS AND SYNTHESIS OF COMBINATIONAL CIRCUITS:

Combinational circuits, Analysis & Design procedure, Binary Adder, Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoders, Encoders, Multiplexers, De-multiplexers.



Learning Outcomes:

At the end of the unit, the student will be able to

- Apply Boolean algebra for describing combinational digital circuits.
- Design and analyse various Combinational logic circuits.

UNIT IV: ANALYSIS AND SYNTHESIS OF SEQUENTIAL CIRCUITS:

Sequential Circuits – Latches and FlipFlops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers, Shift Registers, Counters – Ripple Counters, Synchronous counters and other counters.

Learning Outcomes:

At the end of the unit, the student will be able to

- Describe behaviour of Flip-Flops and Latches.
- Design sequential circuits using flip flops , registers and counters

UNITV: ASYNCHRONOUS SEQUENTIAL LOGIC & PROGRAMMABLE MEMORIES

Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of State flow tables, Race-free State Assignment, Hazards. Random Access Memory, Memory Decoding, Error detection and correction, ROM, PLA, PAL, PLD.

Learning Outcomes:

At the end of the unit, the student will be able to

- Describe functional differences between different types of memories.
- Compare different types of Programmable Logic Devices.

TEXT BOOKS:

1. Digital Design, M.Morris Mano & Michel D. Ciletti, 5th Edition, Pearson Education, 1999.
2. Switching theory and Finite Automata Theory, ZviKohavi and NirahK.Jha, 2nd Edition, Tata McGraw Hill, 2005.

REFERENCE BOOKS:

1. Fundamentals of Logic Design, Charles H Roth,Jr., 5th Edition, Brooks/coleCengage Learning, 2004.
2. Digital & State Machine Design, Comer, 3rd Edition, OXFORD.
3. Fundamentals Digital Circuits, A.Anand Kumar, 3rd Edition, PHI, 2014.

COURSE OUTCOMES:

After the completion of the course, students will be able to

1. Understand various number systems, binary codes, error detection and correction codes, Boolean algebra and functioning of logic gates.



2. Simplify Boolean functions and realize them using logic gates.
3. Design various combinational logic circuits.
4. Analyse the sequential logic circuits in synchronous and asynchronous modes.
5. Appreciate realization of switching functions using programmable logic devices.

