JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech II Semester (E.C.E) **L – T – P – C3 – 0 – 0 – 3**

DIGITAL INTEGRATED CIRCUITS & APPLICATIONS

COURSE OBJECTIVES:

1. To introduce digital logic families and interfacing concepts for implementing digital systems.
2. To gain knowledge on VHDL fundamentals, compilers, simulators and synthesis tools.
3. To design and implement different combinational logic circuits.
4. To understand how to implementsequential logic circuits.
5. To get a comprehensive idea about different types of memories.

UNITI

CMOS Logic: Introduction to logic families, CMOS logic, CMOS steady stateelectrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

Bipolar Logic And Interfacing: Bipolar logic, Transistor logic, Transistor-transistor logic (TTL) families,Integrated injection logic (I^2L), CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emittercoupled logic, Comparison of logic families, Familiarity with standard 74XXand CMOS 40XX seriesICs, Specifications.

Learning Outcomes:

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

- Understand the structure of digital integrated circuit families and their characteristics.
- Learn how to interface different logic families.

UNIT II

The VHDL Hardware Description Language: Design flow, program structure,types and constants, functions and procedures, libraries and packages.

The VHDL design elements: Structural design elements, behavioral designelements, time dimension and simulation synthesis.

Learning Outcomes:

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

- Learn the Hardware Description Language (VHDL).
- Model the complex digital systems at different levels of abstractions.

UNITIII

Combinational Logic Design: Decoders (74x138), Dual Decoder (74x139), 8 to 3 Encoders, Priority Encoder (74x148), three state devices, multiplexers (74x151) and de-multiplexers (74x155), Code Converters, EX-OR gates and parity circuits, comparators (74x85), adders

&subtractors, ALUs, Combinational multipliers, Design considerations of the above mentioned combinational logic digital IC's, VHDL models for the above ICs.

Learning Outcomes:

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

- Understand the implementation of different combinational logic circuits.
- Design and analyze combinational logic circuits using VHDL.

UNIT- IV

Sequential logic Design: Latches & flip flops, counters (74x163), shift register (74x164 and 74x166)and PLDs.Design considerations of the above mentioned sequential logic digital IC's, VHDL models for the above ICs. Design process of FSM: Moore and Mealy machines and their VHDL models, Synchronous design methodology and it's impediments.

Learning Outcomes:

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

- Acquire knowledge about differentsequential logic circuits.
- Implement sequential logic circuits using VHDL.

UNIT-V

ROMs: Internal Structure, 2D – decoding commercial types, timing and applications.

Static RAMs: Internal Structure, timing and standard SRAMs, Synchronous SRAMs.

Dynamic RAMs: Internal Structure, timing and standard DRAMs, Synchronous DRAMs.

Learning Outcomes:

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

- Understand the internal architectures of ROM and RAM.
- Use ROM and RAM for different memory applications.

TEXT BOOKS:

1. John F. Wakerly, "Digital Design Principles & Practices," 3rd Edition, PHI/ Pearson Education Asia, 2005.
2. J. Bhasker, "A VHDL Primer," 3rd Edition, Pearson Education/ PHI.

REFERENCES:

1. Morris Mano M, Michael D. Ciletti, "Digital Design",Pearson Education, 4th Edition, 2007
2. Charles H. Roth Jr., "Digital System Design Using VHDL," 2nd Edition, PWS Publications, 2008.
3. Stephen Borwn and ZvonkoVramesic, "Fundamentals of Digital Logic with VHDL Design," 2nd Edition, McGraw Hill, 2005.

COURSE OUTCOMES:

At the end of this course the student will able to:

1. Learn about digital logic families and interfacing concepts for implementing digital systems.
2. Gain knowledge on VHDL fundamentals, compilers, simulators and synthesis tools.
3. Design and implement different combinational logic circuits.
4. Understand how to implement sequential logic circuits.
5. Get a comprehensive idea about different types of memories.