3/4 B.Tech - FIFTH SEMESTER

EC5T5 **Digital IC Applications** **Credits: 3**

Lecture: 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period/week **Semester end examination: 70 marks**

Prerequisites: Switching Theory and Logic Design (EC 3T6)

Course Objectives:

- To study the detailed features of hardware description language with emphasis on Verilog Hardware Description Language (Verilog HDL).
- To study the various digital logic IC families with emphasis on CMOS and TTL logic and their interfacing.
- To develop the Verilog HDL code for various digital ICs of combinational & sequential logic circuits those are mostly used.
- To study the architecture specifications and applications of various types of ROMs and RAMs.

Learning Outcomes:

Student will be able to

- Design various combinational & sequential logic circuits using Digital ICs.
- Verify and validate architecture, functional specifications & various applications of standard digital IC's of 74 XX series & CMOS IC's of 40 XX series.

UNIT-I

Verilog Hardware Description Language: Design flow, program structure, Verilog Data types and Operations, Binary data manipulation, Combinational and Sequential logic design, Structural Models of Combinational Logic, Dataflow modelling, continuous assignments, Delays, Behavioural modelling.

UNIT-II

Logic Families : Introduction to logic families, CMOS logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Comparison of logic families, Familiarity with standard 74XX series-ICs and 40 XX series-ICs – Specifications.

UNIT-III

Combinational Logic Design : Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits comparators, adders & subtractors, ALUs, Combinational multipliers. Verilog models for the above ICs.

UNIT-IV

Sequential Logic Design: Latches and flip-flops, counters, shift register, and their Verilog models, synchronous design methodology, impediments to synchronous design.

UNIT-V

ROMs: ROM Internal structure, 2D-decoding, commercial types and applications, EPROM and EEPROM Internal structure and applications.

Learning Resources

Text Books:

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
2. Verilog Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition,2003.

References:

1. Introduction to Logic Design – Alan B. Marcovitz,TMH,2nd Edition,2005.
2. Fundamentals of Digital Logic with Verilog Design – Stephen Borwn and Zvonko Vramesic,TMH.2nd Ed. 2005