19EC203 DIGITAL SYSTEM DESIGN

SOURCE:
https://i0.wp.com/blog.oureducation.in/wp-content/uploads/2013/01/Digital-Electronics-Projects.jpg?ssl=1

Hours Per Week :

L	T	P	C
3	-	2	4

COURSE DESCRIPTION AND OBJECTIVES:

Digital Electronics deals with fundamentals of number systems and boolean expressions that are used to realize combinational and sequential circuits. Its objective is to minimize the logical expressions using Boolean postulates, to design various combinational and sequential circuits and to provide with sufficient number of applications to demonstrate the techniques and mathematics used.

COURSE OUTCOMES:

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

COs	Course Outcomes
1	Apply the knowledge of digital logic concepts to optimize digital circuits.
2	Analyze Combinational and sequential digital circuits for given problem statement by applying the digital techniques.
3	Compare the characteristics of logic families.
4	Synthesize given application/problem statement using HDL.
5	Experiment using digital ICs to demonstrate a given application / problem statement.

SKILLS:

- ✓ Perform conversions between numbers of different radices.
- ✓ *Identify the different gates and their properties.*
- ✓ *Minimize Boolean expressions.*
- ✓ *Design combinational and sequential circuits for a given application.*
- ✓ *Develop VHDL Code for a given application.*

UNIT - I **L-9**

NUMBER SYSTEMS AND BOOLEAN ALGEBRA: Review of number systems - conversions, arithmetic operations, binary codes, parity code, hamming code; Fundamental concepts of boolean algebra-basic theorems and properties; Canonical and standard forms - SOP and POS forms; logic gates, algebraic simplification and realization with basic gates and universal gates, karnaugh maps.

UNIT - II **L-9**

COMBINATIONAL LOGIC DESIGN: Design using conventional logic gates, Decoder, Encoder, Multiplexer, De-multiplexer, Parity generator, code converters, Basic PLDs - PAL, PLA, PROM.

UNIT - III **L-9**

SEQUENTIAL LOGIC DESIGN: Classification of sequential circuits, Latches, Flip-Flops - SR, JK, D, T, triggering and excitation tables; Design of sequential circuits - shift registers, counters, FSM, sequence detectors.

UNIT - IV **L-9**

DIGITAL LOGIC FAMILIES: Introduction to logic families, TTL logic family, Totem pole, Open collector and tri-state output operations; MOS transistor switches - NMOS, PMOS; CMOS inverter and logic gates, ECL logic families, Comparison of TTL, CMOS and ECL logic families.

UNIT - V **L-9**

INTRODUCTION TO HDL: Hardware description language - VHDL design flow, program structure, types and constants, functions and procedures, libraries and packages; VHDL design elements - structural design elements, data flow design elements, behavioral design elements.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS **TOTAL HOURS: 30**

Design and Implementation of

1. Basic Logic Gates.
2. Adders: Half Adder, Full Adder, Ripple Carry Adder.
3. Subtractors: Half Subtractors, Full Subtractors.
4. Encoder.
5. Decoder.
6. Multiplexer.
7. De-Multiplexer.
8. Parity Circuits.
9. Code Converters.
10. Flip Flops: SR, JK, D, T.
11. Registers.
12. Counters.
13. Sequence Detectors.

* Above said Experiments can be verified with the Hardware ICs and /or Simulated with VHDL coding.

TEXT BOOKS:

1. Morris Mano and M.D. Ciletti, “Digital Design”, 4th edition, Pearson Education, 2007.
2. John. F. Walkerly, “Digital Design Principles and Practices”, 3rd edition, PHI/Pearson Education, 2015.

REFERENCE BOOKS:

1. Floyd. T. L, “Digital Fundamentals”, 9th edition, Pearson Education, 2009.
2. A. Anand kumar, “Fundamentals of Digital circuits”, 3rd edition, Prentice Hall of India, 2014.