

Course Title	Digital Circuit Design	
Course Code	EC201	
Course Credit	Theory	: 03
	Practical	: 02
	Tutorial	: 00
	Credits	: 05
Course Objective		
<p>After completing the course students will be able to</p> <ul style="list-style-type: none"> • Apply knowledge of Boolean algebra to Digital Circuit minimization. • Design digital systems from component (gate) level to meet desired needs. • Identify, formulate and solve engineering problems related to digital system design using project-based learning approach. 		
Detailed Syllabus		
Sr. No.	Name of chapter & details	Hours Allotted
Section – I		
1	Boolean Algebra and Logic Gates Basic Definition, Axiomatic Definition of Boolean Algebra, Basic Theorem and Properties of Boolean Algebra, Min terms And Max terms, Logic Operations, Digital Logic Gates, IC digital Logic Families	05
2	Simplification of Boolean Functions Different types Map method, Product of sum Simplification, NAND or NOR implementation, Don't Care condition, Tabulation method	07
3	Combinational Logic Introduction, Design Procedure, adder, subtractor, Code Conversion, Universal gate	04

No.	
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SYLLABUS

4	Combinational Logic With MSI AND LSI Introduction, Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoder and Encoder, Multiplexer and De-multiplexer	05
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Section – II

5	Binary System Digital computer and digital systems, Binary Number, Number base conversion Octal and Hexadecimal Number, complements, Binary Codes, Binary Storage and register, Binary Logic, Integrated Circuit	06
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6	Sequential Logic Introduction, Flip-Flops, Triggering of Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design Procedure, Design of Counters, Design with State Equations	07
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7	Registers, Counters and the Memory unit Introduction, Registers, Shift Registers, Ripple Counters, Synchronous Counters, Timing Sequences	05
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8	Processor Logic Design Introduction, Processor Organization, Arithmetic Logic Unit, Design of Arithmetic and logic circuit, Design of ALU. Status Register, Design of shifter, Processor Unit, Design of Accumulator.	03
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Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, blackboard, OHP etc. Assignments based on course contents will be given to the students at the end of each unit/topic and will be evaluated at regular interval
- Minimum five experiments shall be there in the laboratory related to course contents
- Minimum six tutorials which includes solution of minimum five computer programs in each head

List of Experiments

1.	To perform operation of all logic gates.
2.	To implement AND, OR, NOT, NAND, NOR logic gate using transistor configuration.
3.	To implement NAND gate and NOR gate as universal gate.
4.	To perform the arithmetic function by building Half Adder, Full Adder, Half Subtractor and Full Subtractor circuit using logic gates.
5.	To Implement 4-bit Parallel Adder and subtractor using IC74LS83
6.	To Implement 4-bit incrementor and decrementor using IC74LS83
7	To Implement BCD adder using IC74LS83
8.	To perform Binary to Gray and Gray to Binary Code Conversion.
9.	To design BCD-to-EX3 and EX3-toBCD using 4-bit adder (IC74LS83)
10	To implement parity generator and checker using IC74LS180
11	To understand concept of Seven-Segment Display Decoder.
12	To implement 4-bit magnitude comparator using 74LS85
13	To perform and verify the truth table of different types of Flip Flop.
14	To study and implement synchronous and asynchronous Counters.
15	To implement ring and johnson Counters.
16	To design SISO and SIPO using SN74HC595.
17	To perform and understand the operation of Multiplexer and Demultiplexer
18	To implement all logic gates using Multiplexer IC(74LS151A)
19	To implement Full-adder and Full-subtractor using Multiplexer IC(74LS151A)
20	To design 4x1 multiplexer using 2x1 multiplexer ICs
21	To perform and understand the operation of Encoder and Decoder.
22	To implement Full-adder and Full-subtractor using 3-to-8 line decoder IC (74LS138)

23	To understand TTL (74LS00) and CMOS (74HC00) transfer characteristics.
24	To study about Digital IC Tester.

Reference Books:

1. M Morris Mano “Digital Logic and Computer Design”, third edition Prentice Hall of India ISBN-81-203-0417-9, 2006.
2. A. Anand kumar “Fundamental of digital circuits”, Second edition, Prentice Hall of India ISBN-978-81-203-3679-7, 2013
3. Donald P Leach, Albert Paul Malvino & Goutam Saha “Digital Principles and Applications”, Sixth edition, ISBN-978-0-07-060175-8, 2009.
4. R.P.Jain “Modern Digital Electronics”, third edition, Tata McGraw-Hill, ISBN-007-0494924,2006

Additional Resources

- <http://bwrc.eecs.berkeley.edu/classes/icbook/SLIDES/slides4.pdf>
- <http://www.wiley.com/college/engin/balabanian293512/pdf/ch04.pdf>
- <http://www.electronics-tutorials.ws>
- http://www.csee.umbc.edu/~cpatel2/links/640/lectures/lect17_seq.pdf