Course Title	Digital Circuit Design
Course Code	**EC201**
Course Credit	Theory : 03
	Practical : 02
	Tutorial : 00
	Total : 05

Course Objective

After completing the course students will be able to

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

7	**Registers, Counters and the Memory unit** Introduction, Registers, Shift Registers, Ripple Counters, Synchronous Counters, Timing Sequences	**05**
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**

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

Reference Books:

1. M Morris Mano "*Digital Logic and Computer Design*", third edition Prentice Hall of India ISBN-81-203-0417-9, 2006.
2. 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

List of Experiments

Subject Code : EC201
Subject Name: Digital Circuit Design

Sr. No.	Aim of experiment
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.