CE252: DIGITAL ELECTRONICS

Credit and Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	3	2	5	4
Marks	100	50	150	

A. Objective of the Course:

Main aim of the course is to teach the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

The objective of the course is,

- To introduce number systems and codes, basic postulates of Boolean algebra and shows the correlation between Boolean expressions.
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits and to introduce the concept of memories and programmable logic devices.
- To understand basic working of computer, computer architecture and the course is a base for subject like microprocessor and advanced microprocessor.

B. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Number Systems	05
2.	Boolean Algebra and Logic Gates	05
3.	Simplification of Boolean Functions	06
4.	Combinational Logic	05
5.	Combinational Logic With MSI AND LSI	05
6.	Sequential Logic	10
7.	Registers, Counters and the Memory Unit	05
8.	Processor Logic Design	04

Total hours (Theory): 45
Total hours (Lab): 30
Total hours: 75

C. Detailed Syllabus:

1.	**Number Systems**	**05 hours**	**12%**
1.1	Digital computer and digital systems, Binary Number, Number base conversion Octal and Hexadecimal Number		
1.2	Complements, Binary Codes		
1.3	Binary Storage and register, Binary Logic, Integrated Circuit		
2.	**Boolean Algebra and Logic Gates**	**05 hours**	**10%**
2.1	Basic Definition, Axiomatic Definition of Boolean Algebra, Minterm And Maxterms		
2.2.	Basic Theorem and Properties of Boolean Algebra		
2.3	Logic Operations, Digital Logic Gates, IC digital Logic Families		
3.	**Simplification of Boolean Functions**	**06 hours**	**15%**
3.1	Two-Three Variable K-map, Four- Five Variable K-map		
3.2	Product of sum Simplification, NAND or NOR implementation		
3.3	Don't Care condition		
3.4	Tabulation method		
4.	**Combinational Logic**	**05 hours**	**10%**
4.1	Introduction, Design Procedure, Hazards		
4.2	Adder, subtractor		
4.3	Code Conversion, Universal Gate, exclusive OR & equivalence functions		
5.	**Combinational Logic With MSI and LSI**	**05 hours**	**10%**
5.1	Introduction, Binary Parallel Adder		
5.2	Decimal Adder, Magnitude Comparator		
5.3	Decoder, Multiplexer		
5.4	ROM, PLA, PAL		

6.	**Sequential Logic**	**10 hours**	**20%**
6.1	Introduction, RS,JK,D,T Flip-Flops, Triggering of Flip-Flops		
6.2	Flip-Flop Excitation Tables, Analysis of Clocked Sequential Circuits		
6.3	State Reduction and Assignment Design Procedure		
6.4	Design of Counters, Design with State Equations		
7.	**Registers, Counters and the Memory unit**	**05 hours**	**13%**
7.1	Introduction, Registers, Shift Registers		
7.2	Ripple Counters, Synchronous Counters		
7.3	Timing Sequences, Memory Unit, Johnson counter		
8.	**Processor Logic Design**	04 hours	10%
8.1	Processor Organization		
8.2	Arithmetic Logic Unit, Design of ALU		
8.3	Status Register		
8.4	Design of Shifter		
8.5	Processor Unit		

D. Instructional Methods and Pedagogy:

- Multimedia Projector
- OHP
- Audio Visual Presentations
- Chalk + Board
- White Board
- Online Demo
- Charts

E. Student Learning Outcomes / objectives:

- Able to Design combinational circuits on bread board
- Able to design different flip-flops
- Able to simulate on VHDL software

F. Recommended Study Material:

- **Text Books:**

  1.Digital Logic and Computer Design By M Morris Mano, PHI- Publication 2002

  2.Digital Principles and Application by Malvino & Leach, THI-1999

- **Reading Materials, web materials with full citations:**

  1.http://zebu.uoregon.edu/~rayfrey/432/DigitalNotes.pdf

  2.http://smendes.com/el10b/gates1.gif

- **Other materials**

  1.Lab Manuals

  2.Hand Outs

  3.Assignment