Course Name: Digital Electronics and Logic Design
Course Code: T7997
Faculty: Engineering
Course Credit: 3
Course Level: 1
Sub-Committee (Specialization): Computer Science
Learning Objectives:

The students are able to:

Convert a number from one number system to another and perform arithmetic operations in various types of number system such as binary, octal and hexadecimal etc.

Study different types of logic gates and properties of Boolean algebra

Reduce Boolean expression to the minimum terms using logic design minimization techniques and formulate Sum of Product and Product of Sum.

Design combinational circuits such as half adder, full adder, half subtractor, full subtractor, BCD adder, parity generator/checker, magnitude comparator, multiplexers and de-multiplexers etc.

Explain the concept of synchronous and asynchronous sequential circuits like flip flops, latches and apply the concepts of flip flops to design registers and counters.

Books Recommended:

Book	Author	Publisher
Digital design, 4th edition	M.M. Mano	PHI
Fundamentals of Digital Logic with VHDL Design, 2nd edition	Stephen Brown, Zvonko Vranesic	McGraw-Hill
Modern Digital Electronics, 3rd Edition	R. P. Jain	Tata McGraw-Hill

Course Outline:

Sr. No.	Topic	Actual Teaching Hours	Contact Hours Equivalence
1	**Number System:** Binary numbers Decimal numbers hexadecimal numbers octal numbers and number conversion signed binary number representation: signed magnitude 1's complement and 2's complement representation Arithmetic operations: binary addition binary subtraction using 1's complement and 2's complement binary multiplication and division 2's complement arithmetic octal addition Octal subtraction using 8's complement hexadecimal addition Hexadecimal subtraction using 16's complement	**10**	**10**
2	**Boolean Algebra for logic circuits:** Basic Logic variables and logic functions -NOT, AND, NOR, XOR, OR, XNOR, NAND	**7**	**7**

	idealized logic gates and symbols Truth tables, Basic theorems and properties of Boolean algebra, DeMorgan's rules Axiomatic definition of Boolean algebra basic theorems and properties of boolean algebra		
3	**Logic Design Minimization Techniques:** Logic minimization representation of truth-table SOP form POS form simplification of logical functions minimization of SOP and POS forms don't care conditions reduction techniques: k-maps up to 4 variables	**8**	**8**
4	**Combinational Logic:** Different types of Codes:- BCD, excess-3, Gray code , binary code and their conversion BCD addition and subtraction circuits: - half- adder full adder half subtractor full subtractor BCD adder using IC7483 look ahead and carry parity generator and checker using 74180 magnitude comparator using 7485 Multiplexers (MUX):- working of MUX implementation of expression using MUX (IC 74153 74151) Demultiplexers (DEMUX):- implementation of expression using DEMUX decoder (IC 74138)	**10**	**10**
5	**Sequential Logic Circuit Design:** sequential circuits Introduction difference between combinational circuits and sequential circuits flip- flop: SR, JK, D, T preset & clear master and slave flip flops their truth tables and excitation tables conversion from one type to another type of flip flop application of flip-flops: bounce elimination switch registers counters Registers: buffer register; shift register Counters: asynchronous counter synchronous counter ring counters BCD counter johnson counter modulus of the counter	**10**	**10**
	Total	**45**	**45**

Pre Requisites:

None

Evaluation:

Assignment

Quiz

Examination

Pedagogy:

Design Examples

Classroom teaching

Expert:

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