SILVER OAK UNIVERSITY

College of Technology (01)

Bachelor of Technology in Computer Engineering
Bachelor of Technology in Information & Technology
Subject Code : 1010083212
Subject Name : Digital Fundamentals
Semester – 3rd

Prerequisite: Basic Electronics and Number Systems

Objective: The students need to learn basic concepts of digital circuits and systems which leads to the design of complex digital systems such as microprocessors. The students need to know combinational and sequential circuits using digital logic fundamentals. This is the first course by which students get exposure to the digital electronics world.

Teaching and Examination Scheme:

Teaching Scheme					Evaluation Scheme				Total Marks
					Theory		Practical		
L	T	P	Contact Hours	Credits	CIE (TH)	ESE (TH)	CIE (PR)	ESE (PR)	
3	0	2	5	4	40	60	20	30	150

Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	**Number systems and Logic gates** Number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra and logic diagram	8	20
2	**Combinational Digital Circuits** Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, digital comparator, parity checker/generator, code converters, priority encoders, decoders.	8	20
3	**Sequential circuits and systems**	10	25

	SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.		
4	**A/D and D/A Converters** Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs	10	25
5	**Memory architecture** Semiconductor memories and Programmable logic devices. Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), , ROM as a PLD, Programmable logic array.	5	10

Course Outcome:

Sr. No.	CO statement	Unit No
CO-1	Solve the given problem using fundamentals of Number systems and Boolean algebra	1
CO-2	Analyze working of logic gates and design the simple circuits using various gates for a given problem	2
CO-3	Design and implement Combinational and Sequential logic circuits and verify its working	2,3
CO-4	Examine the process of Analog to Digital conversion and Digital to Analog conversion	4
CO-5	Analyze the memory architecture.	5

Teaching & Learning Methodology:-

1. Direct Instruction
2. Flipped Classrooms
3. Kinesthetic Learning

List of Experiments/Tutorials:

1. Verify the truth table of AND and OR gates.

2. Configuring NAND and NOR logic gates as universal gates.
3. Implementation of Boolean Logic Functions using logic gates and combinational circuits. Measure digital logic gate specifications such as propagation delay, noise margin, fan in and fan out.
4. Study and configure of various digital circuits such as adder, subtractor,
5. Study and configure of various digital circuits such as decoder and encoder.
6. Study and configurations of multiplexer circuits.
7. Study and configurations of demultiplexer circuits.
8. Study and configure flip-flop. Design digital system using these circuits.
9. Study and configure of registers using digital ICs. Design digital system using these circuits.
10. Study and configure of counters using digital ICs. Design digital system using these circuits
11. Study and configuration of A to D and D to A converter.

Major Equipment:

1. Digital Storage Oscilloscopes
2. Digital Integrated Circuits Tester.
3. Complete Bread Board Systems, switches and I/O indicators, multimeters, pulse, square wave generators and display facility.
4. Digital Electronics Trainer kit.

Books Recommended:-

1. "Digital logic and Computer design", M. M. Mano, Pearson Education India, 2016.
2. "Fundamentals of Digital Circuits", A. Kumar, Prentice Hall India, 2016.
3. “Digital Principles and Applications” Malvino & Leach, McGraw-Hill Education
4. "Modern Digital Electronics", R. P. Jain, McGraw Hill Education, 2009.

List of Open Source Software/learning website:

1. LogiSim software
2. Xcircuit
3. Scilab
4. NPTEL website
5. https://www.vlab.co.in/
6. www.silveroakuni.ac.in