B. Sc (Information Technology)		Semester – II	
Course Name: Fundamentals of Digital Electronics		**Course Code: VGVUSTVSE201**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**2**	**60**
	Internal	**--**	**40**

Course Objective
To make learner understand concept of
1. Number system and binary arithmetic.
2. Boolean algebra, logic gates and Karnaugh Map.
3. Combinational Logic circuit and arithmetic circuits.
4. Multiplexer, demultiplexer, encoder, decoder and flip-flops.
5. Counters and shift registers

Unit	Details	Lectures
I	**Number System:** Analog System, digital system, Numbering system(Binary, Octal, Hexadecimal), conversion from one number system to another, weighted codes, Error detection and correction, Code Conversion. **Binary Arithmetic:** Binary addition, Binary subtraction, multiplication and division, Negative number representation, Subtraction using 1's complement and 2's complement. **Logic Gates:** Introduction to Logic gates, Exclusive OR and Exclusive NOR gates, Universal Logic gates, Implementation of other gates using universal gates.	**10**
II	**Boolean Algebra:** Boolean theorems and Laws, De Morgan's Theorem, Perfect Induction, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit, **Minterm, Maxterm, and Karnaugh Maps:** Introduction, minterms and sum of minterm form, maxterm and Product of maxterm form, Reduction technique	**10**

	using Karnaugh maps – 2/3/4 variable K-maps, Grouping of variables in Kmaps, minimize Boolean expression using K- map.	
III	**Combinational Logic Circuits:** Introduction, Multi-input, multi-output Combinational circuits, Code converters design and implementations. **Arithmetic Circuits:** Introduction, Adders, Subtractor, Multiplier, Comparator. **Multiplexer, Demultiplexer, Encoder and Decoder:** Introduction, Multiplexer, Demultiplexer, Decoder, Encoders. **Sequential Circuits:** Introduction to flip-flop and its types.	**10**

Course Outcome
Learners should be able to
CO1 Perform conversions among different number systems, become familiar with basic logic gates and understand Boolean algebra.
CO2 Understand the use of K-map for hardware minimization.
CO3 Understand the design of combinational circuits such as multiplexer, demultiplexer, encoder and decoder etc.
CO4 Understand the design of sequential Circuits such as flip-flops, Registers, and Counters.
CO5 Obtain a basic level of Digital Electronics knowledge and set the stage to perform the analysis and design of Complex Digital electronic Circuits.

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Digital Electronics and Logic Design	N. G. Palan	Technova		
2.	Make Electronics	Charles Platt	O'Reilly	1st	2010
3.	Modern Digital Electronics	R. P. Jain	Tata McGraw Hill	3rd	
4.	Digital Principles and Applications	Malvino and Leach	Tata McGraw Hill		
5.	Digital Electronics: Principles, Devices and Applications,	Anil K. Maini	Wiley		2007

B. Sc (Information Technology)		Semester – II	
Course Name: Fundamentals of Digital Electronics Practical		**Course Code: VGVUSTVSEP201**	
Periods per week (1 Period is 120 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Practical Examination**	**2**	**50**
	Internal	**--**	**--**

Course Objective
To make learner
1. Aware of electronic trainer kit and its Usage
2. How to use various integrated circuits for basic logic gates
3. To implement the applications of basic logic gates in Combinational circuits
4. To implement the applications of basic logic gates in Sequential circuits
5. To introduce and use Logisim simulator

List of Practical	
1.	**Study of Logic gates and their ICs and universal gates:**
a.	Study of AND, OR, NOT, XOR, XNOR, NAND and NOR gates.
b.	IC 7400, 7402, 7404, 7408, 7432, 7486, 74266.
2.	**Study of Universal Gates:**
a.	Implement AND, OR, NOT, XOR, XNOR using NAND gates.
b.	Implement AND, OR, NOT, XOR, XNOR using NOR gates.
3.	**Implement the given Boolean expressions using minimum number of gates:**
a.	Verifying De Morgan's laws.
b.	Implement other given expressions using a minimum number of gates.
c.	Implement other given expressions using a minimum number of ICs.
4.	**Implement combinational circuits:**

a.	Design and implement combinational circuit based on the problem given and minimizing using K-maps.
5.	**Implement code converters:**
a.	Design and implement Binary – to – Gray code converter.
b.	Design and implement Gray – to – Binary code converter.
c.	Design and implement Binary – to – BCD code converter
d.	Design and implement Binary – to – XS-3 code converter
6.	**Implement Adder and Subtractor Arithmetic circuits.:**
a.	Design and implement Half adder and Full adder.
b.	Design and implement Half subtractor and Full subtractor.
7.	**Implement Arithmetic circuits:**
a.	Design and implement a 2-bit by 2-bit multiplier.
b.	Design and implement a 2-bit comparator.
8.	**Implement Encode and Decoder:**
a.	Design and implement 8:3 encoder.
b.	Design and implement 3:8 decoder.
9.	**Implement Multiplexer and Demultiplexers:**
a.	Design and implement 4:1 multiplexer. Study of IC 74153, 74157
b.	Design and implement 1:4 demultiplexer. Study of IC 74139
10.	**Study of flip-flops :**
a.	Study of IC 7473.
b.	Study of IC 7474.
c.	Study of IC 7476.

Course Outcome
To make learner
1.To be familiar with the Electronic trainer kit.
2. To understand and design and implement combinational circuits.
3. To understand design and implement Sequential circuits.
4. To Perform simulation of various circuits on Logisim simulator
5. To develop applications (Half adder, Full adder) of combinational circuit and Sequential circuit(Flip Flop).

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Digital Electronics and Logic Design	N. G. Palan	Technova		
2.	Digital Principles and Applications	Malvino and Leach	Tata McGraw Hill		