II Year I Semester	**L**	**T**	**P**	**C**
Code: 20EC3102	**0**	**0**	**3**	**1.5**

DIGITAL ELECTRONICS LAB

Course Objectives:

1. Learn the basics of logic gates, SOP and design and verify simple Combinational logic circuits
2. Study, design and verification of higher level combinational logic circuits
3. Understand the concepts of flip-flops and design and verify shift register and counters

Note: The students are required to design the circuit and perform the simulation using Circuit Lab / Equivalent Industrial Standard Licensed simulation software tool. Further they are required to verify the result using necessary hardware equipment.

List of Experiments: (Minimum of Twelve Experiments has to be performed)

1. Verification of truth tables of Logic gates

a. Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive OR (vi) Exclusive NOR

2. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit
3. Verification of functional table of 3x8 line Decoder /De-multiplexer
4. Four variable logic function verification using 8x1multiplexer.
5. Design full adder circuit and verify its function table.
6. Draw the circuit diagram of a two-bit comparator and test the output
7. Construct 7-Segment Display Circuit Using Decoder and test it.
8. Design BCD Adder Circuit and Test the Same using Relevant IC
9. Design Excess-3 to BCD convertor using only four Full Adders and test the Circuit.
10. Verification of functional tables of
    a. D Flip -Flop
    b. T Flip -Flop
    c. JK Edge triggered Flip-Flop
11. Design a four-bit ring counter using D Flip – Flops / JK Flip Flop and verify output
12. Design a four-bit Johnson's counter using D Flip-Flops / JK Flip Flops and verify output
13. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
14. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip- Flops and Test it with a low frequency clock and Sketch the output waveforms.
15. Design MOD-8 synchronous counter using T Flip-Flops and verify the result and sketch the output waveforms.

Equipment required:

Software:

1. Circuit Lab / Equivalent Industrial Standard Licensed simulation software tool.
2. Computer Systems with required specifications

Apparatus required:

1. Trainer kit with inbuilt DC Supply, output LED's, input pulse signals, bread board.
2. Respective IC's.
3. Connecting wires.

Course Outcomes:

A student who successfully fulfils this course requirement will be able to:

S. No	Course Outcome	BTL
1.	Knowledge on basic logic gates, design and verify combinational logic circuits	L5
2.	Design and verify simple combinational logic circuits	L5
3.	Construct and implement higher level combinational logic circuits	L5
4.	Understand the concepts of various flip-flops and design counters	L5
5.	Construct and verify various counters with given specifications	L5

Correlation of COs with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1	-	1	-	-	-	3	-	-	-	1	3
CO 2	3	3	2	-	3	-	-	-	3	-	-	-	2	3
CO 3	3	2	2	-	3	-	-	-	3	-	-	-	2	3
CO 4	3	-	2	-	3	-	-	-	3	-	-	-	1	3
CO 5	3	1	2	1	3	-	-	-	3	-	-	-	2	3