Q.P.Code: 23EC0403   **R23**   **H.T.No.** ☐☐☐☐☐☐☐☐☐☐

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Regular & Supplementary Examinations November-2025

DIGITAL CIRCUITS DESIGN
(Electronics & Communications Engineering)

Time: 3 Hours   **Max. Marks: 70**

PART-A

(Answer all the Questions 10 x 2 = 20 Marks)

1	a	List out the types of number systems with one example for each.	CO1	L2	2M
	b	What are Universal Gates? Give their truth tables.	CO1	L1	2M
	c	Define Multiplexer and Demultiplexer.	CO4	L1	2M
	d	Define the following: i) Half adder and ii) Full Adder	CO4	L1	2M
	e	Differentiate between Verilog and VHDL.	CO6	L4	2M
	f	What is the Sensitivity list?	CO6	L1	2M
	g	Difference between Latch and Flip-flop?	CO4	L4	2M
	h	Write a short note on Register.	CO4	L1	2M
	i	State the types of ROM.	CO2	L1	2M
	j	List basic types of programmable logic devices.	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Convert the following numbers: i) $(AB)_{16} = ( )_2$ ii) $(1234)_8 = ( )_{16}$ (iii) $(1000011)_2 = ( )_{10}$	CO1	L5	5M
	b	Perform the following subtraction by using 1's complement. i) 11001-1010 ii) 0011-10001	CO1	L1	5M

OR

3		Illustrate the digital logic gates with graphical symbol, algebraic function and truth table.	CO1	L2	10M

UNIT-II

4		Simplify the expression in S O P form using don't cares. $Y = \Sigma\,(\,4,5,6,8,9\,) + d\,\Sigma\,(\,3,7,10,11,14,15\,)$	CO4	L3	5M

OR

5	a	Draw the circuit for 3 to 8 decoder and explain.	CO4	L2	5M
	b	Define Multiplexer. Construct 4:1 multiplexer with logic gates and truth table.	CO4	L2	5M

UNIT-III

6	a	What is the syntax used to write a Verilog Code	CO6	L1	4M
	b	Write Verilog code to implement the function $f(x1, x2, x3) = m(0, 1, 3, 4, 5, 6)$ using the continuous assignment.	CO6	L1	6M

OR

7	a	Write an Verilog code for Full Adder with the help of Truth table.	CO6	L1	6M
	b	State the importance of CAD Tools in HDL.	CO6	L1	4M

UNIT-IV

8	a	Compare the differences between combinational and sequential circuits.	CO4	L3	5M
	b	Differentiate between synchronous and asynchronous sequential circuits.	CO4	L2	5M

OR

9		Define a Shift register and explain its types.	CO4	L2	10M

UNIT-V

10		Derive the simplified sequential circuit for the following state table.	CO2	L3	10M

PS	Next State		Output	
	X=0	X=1	X=0	X=1
A	a	b	0	0
B	c	d	0	0
C	a	d	0	0
D	e	f	0	1
E	a	f	0	1
F	g	f	0	1
G	a	f	0	1

OR

11	a	Draw and Briefly explain the basic structures of CPLD & FPGA.	CO5	L2	5M
	b	Compare PROM, PLA & PLA.	CO5	L4	5M

*** END ***