Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 50007

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025
Third Semester
Computer Science and Engineering
U19CS306 – DIGITAL LOGIC DESIGN
(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	State De Morgan's theorem and Commutative property of Boolean Algebra.	2	K1	CO1
2.	Convert the decimal number $(178)_{10}$ into binary and hexadecimal.	2	K2	CO1
3.	Write the canonical SOP form of the function F(A, B, C) = A′ B + BC .	2	K2	CO2
4.	Differentiate between prime implicant and essential prime implicant.	2	K2	CO2
5.	Distinguish between encoder and decoder.	2	K2	CO3
6.	Draw the block diagram of a 4 × 1 multiplexer.	2	K2	CO3
7.	List the different types of Flip-Flops and their characteristic equations.	2	K2	CO4
8.	Write the Differences between Synchronous and Asynchronous counters.	2	K2	CO4
9.	Differentiate between Moore machine and Mealy machine.	2	K2	CO5
10.	What is hazard in asynchronous circuits? Mention one method of elimination.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	State and prove any three laws of Boolean Algebra.	6	K2	CO1
		ii.	Simplify using Boolean algebra laws: $F(A, B, C, D) = A' B + A B' + C D + C' D'$ Realize the simplified function using NAND gates only.	7		
			(OR)			
	b)	i.	Convert $(AF2B)_{16}$ into binary and decimal.	6	K2	CO1
		ii.	Subtract $(1101011)_2 - (101011)_2$ using 2's complement method.	7		
12.	a)		Minimize the function using a 4-variable K-map and realize using gates: $F(A, B, C, D) = \Sigma m (0, 1, 2, 3, 5, 7, 8, 9, 11, 15)$.	13	K2	CO2
			(OR)			
	b)		Minimize $f(A, B, C, D) = (0, 1, 2, 3, 5, 7, 8, 10, 12, 13, 15)$ using Quine-McCluskey method.	13	K2	CO2
13.	a)		Design a BCD to Excess-3 code converter using K-map and implement with logic gates.	13	K3	CO3
			(OR)			
	b)		Enumerate the implementation of combinational circuits using PLA and PAL with suitable diagrams.	13	K3	CO3
14.	a)		Design a mod-6 synchronous counter using JK flip-flops and draw the state diagram.	13	K3	CO4
			(OR)			
	b)		Illustrate the process of state reduction and state assignment with an example. Write HDL code for a 3-bit up counter.	13	K3	CO4
15.	a)		Illustrate how to avoid races, cycles in asynchronous sequential circuits with suitable examples.	13	K2	CO5
			(OR)			
	b)	i.	Enumerate the types of hazards in sequential circuits with examples.	6	K2	CO5
		ii.	Write a technical note on "Design of asynchronous sequential circuits".	7		

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Design a full adder using 4X1 multiplexer; also write its truth table and logical diagram.	15	K3	CO3
		(OR)			
	b)	Design an asynchronous sequential circuit with two inputs x and y and with one output z. whenever y is 1, input x is transferred to z. When y is 0, the output does not change for any change in x.	15	K3	CO5