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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: III**

Branch: Computer Science and Engineering **Duration: 3 hrs.**

Course Code: 23CS3PCLOD / 22CS3PCLOD **Max Marks: 100**

Course: Logic Design

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Explain Boolean expression and notations with examples	*CO1*	*PO1*	**5**
	b)	Describe 4-variable K-maps? Sketch the Karnaugh map for the given example and find the final expression by solving K-maps i) F (A, B, C, D) = ∑(0, 2, 5, 7, 8, 10, 13, 15) ii) F (P, Q, R) = π(0,3,6,7)	*CO3*	*PO3*	**10**
	c)	Explain Product of Sum, minterms and Sum of Product in K-maps.	*CO2*	*PO2*	**5**
		OR			
2	a)	Explain the step involved in minimize a Boolean expression using Karnaugh Maps	*CO1*	*PO1*	**5**
	b)	Using Karnaugh maps, determine all the minimal sum and minimal products for the following incomplete Boolean function f (A, B, C, D) = πM (1,2,3,4,9,10) + ∑d (0,14,15)	*CO1*	*PO1*	**10**
	c)	List & explain the different steps of Quine-McCluskey method	*CO2*	*PO2*	**5**
		UNIT - II			
3	a)	Explain the working of 1-bit comparator and write the truth table and logic diagram for the same.	*CO2*	*PO2*	**5**
	b)	Describe combinational circuits? Explain multiple bit comparators and its application	*CO2*	*PO2*	**10**
	c)	Interpret the working of digital circuits used in digital systems for combining and separating multiple signals.	*CO2*	*PO5*	**5**
		OR			
4	a)	What is a multiplexer, and how does it differ from a demultiplexer?	*CO3*	*PO3*	**5**
	b)	Describe the working of demultiplexer, and what are its primary applications?	*CO2*	*PO2*	**10**

		c)	Compare and contrast a multiplexer and an encoder.	*CO2*	*PO5*	**5**
			UNIT - III			
	5	a)	Design PROM for the following Boolean functions f1(x2,x1,x0)= ∑m(0,1,2,5,6) f2(x2,x1,x0)= ∑m(1,2,4,6)	*CO3*	*PO3*	**7**
		b)	Using 4 input and 3-output PAL, implement the following functions f1(a,b,c)= ∑m(0,3,5,6,7) and f2(a,b,c)= ∑m(1,2,3,5,7).	*CO3*	*PO3*	**8**
		c)	Differentiate between programmable logic devices and Programmable Array Logic (PAL)	*CO3*	*PO3*	**5**
			OR			
	6	a)	Design PROM for the following Boolean function also write the truthtable. Here ' represents complement. f1(a,b,c)= a'b'c'+ ab'c+abc'+abc f2(a,b,c)= abc'+ a'bc+abc	*CO3*	*PO3*	**7**
		b)	Design a PAL with 3 input and 2 output to implement the following Boolean functions X(a,b,c)= ∑m(1,2,4,6) , Y(a,b,c)= ∑m(0,1,3,6,7) and Z(a,b,c)= ∑m(2,4,6)	*CO3*	*PO3*	**8**
		c)	Why is PROM considered non-volatile memory? Discuss the underlying mechanism.	*CO3*	*PO3*	**5**
			UNIT - IV			
	7	a)	Explain undefined or forbidden state in SR flip-flop	*CO1*	*PO2*	**5**
		b)	Compare the working of SR flip flops and JK flip flops using timing diagram.	*CO3*	*PO3*	**10**
		c)	Describe the behavior and characteristics of D and JK flip flops.	*CO2*	*PO2*	**5**
			OR			
	8	a)	Explain latch and a flip-flop?	*CO1*	*PO2*	**5**
		b)	Differentiate between JK and T flip-flops?	*CO3*	*PO3*	**10**
		c)	Draw the excitation table for a T flip-flop and explain its significance.	*CO2*	*PO2*	**5**
			UNIT - V			
	9	a)	Demonstrate the working of binary ripple counter with timing diagram? Explain its disadvantages.	*CO2*	*PO5*	**5**
		b)	Describe the steps to design a 3-bit Synchronous Counter using JK Flip-Flops.	*CO2*	*PO2*	**10**
		c)	Mention the types of counters used in digital system? Explain the factors considered in choosing these counters?	*CO1*	*PO1*	**5**
			OR			
	10	a)	Explain how synchronous sequential circuits are implemented and its behaviors' are defined	*CO2*	*PO2*	**5**
		b)	Describe the key components of a state transition diagram for a synchronous sequential circuit.	*CO1*	*PO1*	**10**
		c)	Mention the advantages and disadvantages of synchronous sequential circuits over asynchronous.	*CO2*	*PO2*	**5**

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