U.S.N.										

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

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

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

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

Course Code: 23IS3PCDLD/22IS3PCDLD **Max Marks: 100**

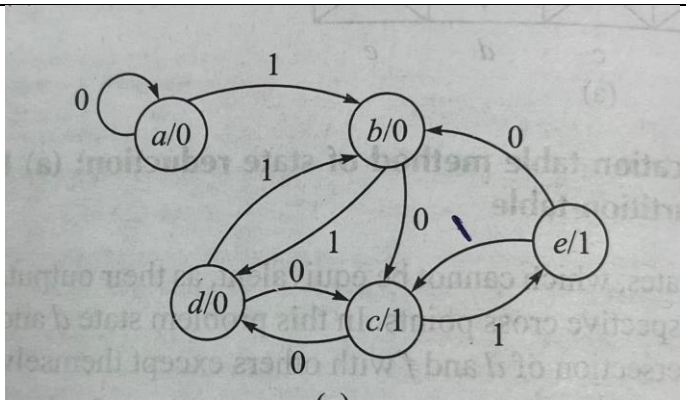
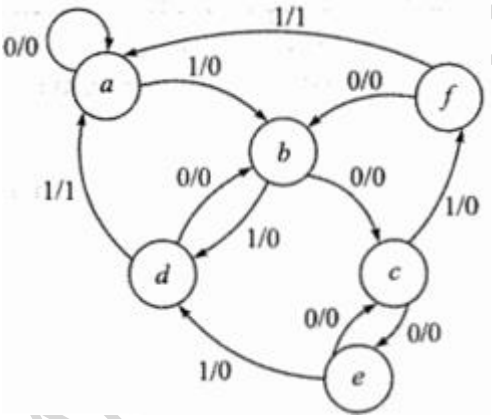
Course: Digital Logic Design

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)	Using K map simplify the following Boolean functions and obtain the minimal sum. i. F(A, B, C, D) = Σm(0, 1, 2, 5, 7, 8, 9, 10, 13, 15) ii. F(A, B, C, D) = Σm(1, 3, 4, 6, 8, 9, 11, 13, 15) + Σd(0, 2, 14)	CO2	PO1	10
	b)	Obtain the prime implicants and essential prime implicants using Quine-McClusky method. f(a,b,c,d) = ∑m (0, 1, 2, 5, 6, 7, 8, 9, 10, 14)	CO3	PO2	10
		OR			
2	a)	Minimize the following function for SOP using K-MAP method and implement it using basic gates. a. F(A, B, C, D) = πM(5, 7, 13, 14, 15) + d(1, 2, 3, 9)	CO2	PO1	10
	b)	Draw the truth table for the logical function M for three inputs A, B and C, where M = F (A, B, C). The output is 0 (zero), if the majority of inputs are zero (0) and one (1) if the majority of inputs are one (1). Write the sum of products expression (SOP) and circuit diagram for M.	CO2	PO1	6
	c)	Construct truth table for each of the following Boolean functions i) F (A, B, C)=(A'+B) (B'+C) ii) F(A, B,C)=AB+BC+CA	CO2	PO1	4
		UNIT - II			
3	a)	With a neat diagram, show the organization of a BCD adder.	CO2	PO1	10
	b)	Realize the following Boolean expression using **i.** An 8-to-1-line multiplexer where w, x and y appear on select lines S2, S1 and S0 respectively.	CO3	PO2	10

			ii. A 4-to-1-line multiplexer where w and x appear on select lines S1 and S0 respectively. **f (w, x, y, z) = Σ*m*(0,1,5,6,7,9,12,15)**			
			OR			
	4	a)	With a neat logic diagram discuss the working of a 4-bit carry look ahead adder.	*CO2*	*PO1*	**10**
		b)	Design a 3-to-8 line decoder using two 2-to-4 line decoders.	*CO2*	*PO1*	**5**
		c)	Realize the Boolean expression using 4:1 where w, x appear for the select lines S_1, S_0. f (w, x, y, z) = ∑m (0,1,5,6,7,9,13,14).	*CO3*	*PO2*	**5**
			UNIT - III			
	5	a)	With a neat block diagram, truth table show the working of i) Gated SR flipflops ii) Gated D flipflops	*CO2*	*PO1*	**10**
		b)	Write the truth table, state transition diagram and excitation table of SR, D, JK flipflops.	*CO2*	*PO1*	**10**
			OR			
	6	a)	With a neat circuit diagram and timing diagram illustrate the working of a Master Slave JK flipflop.	*CO3*	*PO2*	**10**
		b)	Draw the logic diagram of positive edge triggered D flip flop and discuss its working with truth table and timing diagram.	*CO3*	*PO2*	**10**
			UNIT - IV			
	7	a)	With a neat diagram show the working of parallel-in-serial out shift register.	*CO3*	*PO2*	**10**
		b)	Design a 3-bit Asynchronous up counter using JK Flip flop. Show its working.	*CO3*	*PO2*	**10**
			OR			
	8	a)	Design a self-correcting mod 5 synchronous down counter using JK Flip flop. Assume 100 as the next state for all the unused states.	*CO3*	*PO2*	**10**
		b)	With a neat logic diagrams truth table show the working of i) Ring Counter ii) Johnson Counter	*CO3*	*PO2*	**10**
			UNIT - V			
	9	a)	Design a Moore model sequence detector circuit, that outputs 1 whenever the sequence "011" occurs at its input X otherwise output y is 0.	*CO4*	*PO3*	**10**
		b)	Reduce the state transition diagram given below using: i. Row elimination method ii. Implication table method	*CO4*	*PO3*	**10**

						
			OR			
	10	a)	Design a Mealy model sequence detector circuit, that outputs 1 whenever the sequence "011" occurs at its input X otherwise output y is 0.	***CO4***	***PO3***	**10**
		b)	Reduce the state transition diagram given below using: i. Row elimination method ii. Implication table method 	***CO4***	***PO3***	**10**

******