Reg. No.

B.E./ B.TECH. DEGREE EXAMINATIONS, MAY 2024
Third Semester
EE22308 – DIGITAL LOGIC CIRCUITS: THEORY AND PRACTICES
(Electrical and Electronics Engineering)
(Regulation 2022)

TIME:2 HOURS   **MAX. MARKS: 60**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Apply the concepts of Boolean algebra and reduction techniques to minimize logic expressions.	3
CO 2	Analyze and design various combinational logic circuits.	4
CO 3	Investigate and design synchronous and asynchronous sequential circuits.	4
CO 4	Comprehend the operation, characteristics of memory devices, digital logic families and construct digital circuits with memory devices.	3
CO 5	Design, debug and verify simple digital circuits and systems with the aid of HDL codes, schematic capture tools and simulation tools.	4

PART- A(10x2=20Marks)
(Answer all Questions)

		CO	RBT LEVEL
1.	Convert the octal and hexadecimal equivalent of $(377)_{10}$.	1	2
2.	Compare decoder and demultiplexer.	2	2
3.	Show the truth table of a simple multiplexer.	2	3
4.	Implement full adder logic using 3:8 decoder circuit.	2	3
5.	How many flip flops are required to count up to 2024.	2	2
6.	Draw the logic diagram of T flip-flop using NAND gates.	2	3
7.	Explain briefly Master slave JK flip-flop.	2	2
8.	Explain mealy model and Moore model.	3	3
9.	Differentiate synchronous and asynchronous sequential circuits.	4	2
10.	Compare PROM, PLA and PAL	5	2

PART- B (3x 10=30Marks)

				Marks	CO	RBT LEVEL
11. (a)	(i)	Simplify the following Boolean function using K-map in SOP form F (W, X, Y, Z) =∑ (1,3,4,6,9,11,12,14). Also Realize the Expression using logic gates.		(5)	1	3

(ii) Encode the binary word 1011 into seven bit even parity Hamming code. **(5)** **1** **3**

(OR)

(b) Design and implement the simplest circuit that has three inputs, X_1, X_2, and X_3, which produces an output value of 1 whenever exactly one or two of the input variables have the value 1; otherwise, the output has to be 0. **(10)** **1** **3**

12. (a) A sequential circuit with two D flip-flops A and B; input X and output Y is specified by the following next state and output equations:

$A_+ = AX + BX$; $B_+ = A'X$ and $Y = (A+B) X'$

Derive the state table and state diagram. Also draw the logic diagram of the circuit. **(10)** **3** **4**

(OR)

(b) Design and analyze a 4-bit ring counter and mention its applications. **(10)** **3** **4**

13. (a) Design a Asynchronous decade counter. **(10)** **4** **4**

(OR)

(b) **(i)** What are static-0 and static-1 hazards? Show the removal of hazards using hazard covers in K-map. **(5)** **4** **4**

(ii) Examine cycles and races in asynchronous sequential circuits. **(5)** **4** **4**

PART- C (1x 10=10Marks)

(Q.No.14 is compulsory)

	Marks	CO	RBT LEVEL

14. Implement the combinational circuit with a PLA having 3 inputs, 4 product terms and 2 outputs for the functions. F1(A, B, C) = $\sum$ (0, 1, 2, 4) F2(A,B,C)=$\sum$(0,5,6, 7) **(10)** **5** **5**

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