Code No.: R22EC303PC	R22	H.T.No.			8	R						

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Regular) - December- 2025
DIGITAL LOGIC DESIGN
(ECE)

[Time: 3 Hours] **[Max. Marks: 60]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(10 Marks)**

1. a)	State the duality theorem.	[1M]
b)	Given that $(432.354)_{10} = (X)_{2}$, Determine the value of X.	[1M]
c)	Write the TTL characteristics.	[1M]
d)	Draw the NOT gate using CMOS logic.	[1M]
e)	Define preset and clear inputs.	[1M]
f)	Write any two differences between combinational and sequential circuits.	[1M]
g)	How many states are there in a n-bit ring counter?	[1M]
h)	Define right shift register.	[1M]
i)	What is FSM?	[1M]
j)	Define merger graph.	[1M]

PART-B **(50 Marks)**

2. Explain about binary number systems and BCD codes with example. [10M]

OR

3.a) Determine the standard sum-of-products representation of the following functions. [5M]

$$f(x,y,z) = z + (\bar{x} + y)(x + \bar{y})$$

b) Realize the AND, OR and NOT gates using NAND gate. [5M]

4. Minimize the following function using K-Map and draw the logic diagram. [10M]

$$f(v,w,x,y,z) = \sum m(1,2,6,7,9,13,14,15,17,22,23,25,29,30,31)$$

OR

5. Realize a NAND and NOR gates using CMOS logic. [10M]

6. Design a BCD-to-decimal decoder. [10M]

OR

7 Realize the given function using 8x1 MUX. [10M]

$$F(A,B,C,D) = \sum (1,2,5,6,7,8,10,14,15)$$

8. Design a 4-bit Ring counter and explain its operation. [10M]

OR

9. Implement the state diagram and state stable for a parity-bit generator. [10M]

10. Find the stat equivalence and the corresponding reduced machine [10M]

	NS, z	
PS	$x = 0$	$x = 1$
A	$B, 0$	$E, 0$
B	$E, 0$	$D, 0$
C	$D, 1$	$A, 0$
D	$C, 1$	$E, 0$
E	$B, 0$	$D, 0$

OR

11. Analyze the procedure of state minimization using the merger graph with example. [10M]

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