Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐

PRESIDENCY UNIVERSITY

BENGALURU

Make Up Examinations – December 2025

Date: 26 – 12- 2025   **Time:** 9:30am – 12:30pm

School: SOE	Program: B.Tech	
Course Code: ECE2007	Course Name: Digital Design	
Semester: MK	Max Marks: 100	Weightage: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	26	18	16	20	20

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.   **10Q x 2M=20M**

1.	Prove by BOOLEAN EQUATION i). A+AB = A ii) A+A'B = A+B	2 Marks	L2	CO1
2.	The complement of Boolean function F = A'BC' + A'B'C is _____	2 Marks	L2	CO1
3.	Identify the minterms & maxterms of the truth table for F shown below. Write the sum of minterms and product of maxterms expression. | x	y	z	F
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0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0		2 Marks	L2	CO1
4.	Define M u l t i p l e x e r and write the truth table for 4:1 MUX..	2 Marks	L2	CO2

5.		Draw the circuit of 1x2 DMUX using basic gates:	2 Marks	L2	CO2
6.		Bring out the difference between synchronous circuits and asynchronous circuits.	2 Marks	L2	CO2
7.		Explain the steps for designing combinational logic circuit.	2 Marks	L2	CO2
8.		Write the Characteristics table(Functional Table) of D flip-flop	2 Marks	L2	CO3
9.		Write the Characteristics Equation of D Flip Flop:	2 Marks	L2	CO3
10.		Mention the different types of triggering methods. What is the purpose of using a clock in the sequential circuits?	2 Marks	L2	CO3

Part B

Answer the Questions.   **Total Marks 80M**

11.	a.	Logic gates are the basic building block of a digital system which can take two or more inputs and produce one output. Explain all different types of logic gates with truth table, logic symbol and expressions. Also implement special gates using NAND gates.	20 Marks	L1	CO 1
		Or			
12.	a.	Simplify the Boolean function using K-Map $F(A,B,C,D) = \sum (1, 3, 5, 6, 7, 9, 15)$	20 Marks (10M+10M)	L2	CO 1
	b.	Using K-map method, Simplify the given function (minimum SOP) and realize using only NAND gate $F=\sum m(0,2,3,6,7) + d(8,10,11,15)$		L2	CO 1

13.	a.	Using two Half Subtractor and an AND gate, how can a Full Subtractor circuit be designed? Provide a step-by-step derivation of the logic circuit from its truth table:	20 Marks (10M+10M)	L2	CO 4
	b.	A comparator is an electronic circuit, which compares the two inputs that are applied to it and produces an output. Design two bit comparator (Truth Table, K.Map and Logic Circuit)		L3	CO 2
		Or			
14.	a.	A MUX selects specific operations or inputs in an ALU based on control signals. Used in **relay switching**, video signal selection, and other switching circuits. Implement 8*1 MUX with the truth table using 2*1 and 4*1 MUX. Also implement 8*1 MUX using 2*1 MUX	20 Marks	L	CO 4

15.	a.	Design 3 to 8 decoder. Implement full adder using 3 to 8 decoder with necessary boolean expressions and truth table. Also construct the truth table for 2 to 4 decoder and implement using basic gates.	**20 Marks**	L2	CO 4
		Or			
16.	a.	Flip-flops are essential components for storing, processing, and controlling data in all digital systems.Using NAND gates draw the logic diagram for the D Flip-flop and explain its operation with necessary truth table, characteristic table and excitation table with Boolean expressions.	**20 Marks**	L	CO 4

17.	a.	**Implement the given Boolean function Y=Σ(1,3,4,11,12, 13,14,15), Using** **i)** 16x1 MUX **ii)** 8x1 MUX **iii)** 4x1 MUX **iv)** 2x1 MUX	**20 Marks**	L3	CO 5
		Or			
18.	a.	Registers are used to transfer data between memory, input/output devices, and the processor.Define and classify the types of Registers. With a neat block diagram explain the different types of registers.	**20 Marks**	L2	CO 5