0210

National University of Computer and Emerging Sciences

Digital Logic Design (EE1005)

Date: February 28, 2024

Course Instructor(s)

Ms. Sobia Tariq Javed
Ms. Maimona Akram
Dr. Amjad Hussian
Mr. Amjad Ali
Mr. Aftab Alam
Mr. Zummar Saad

Sessional-I Exam

Total Time: 1 Hours
Total Marks: 50
Total Questions: 04

Semester: SP-2024
Campus: Lahore
Dept: Computer Science

Q1	Q2	Q3	Q4
10	10	20	10

[redacted] Student Name | [redacted] Roll No | [redacted] Section | [redacted] Student Signature

Vetted by ____________________ Vetter Signature ____________________

CLO#1: Understand different number systems and their conversion.

Q#1: $(236.25)_7 + (102)_3 = (253.25)_7$ **[10 marks]**

$236.25 + 14 = 253.25$

$6+4 = 10 - 7 = 3$

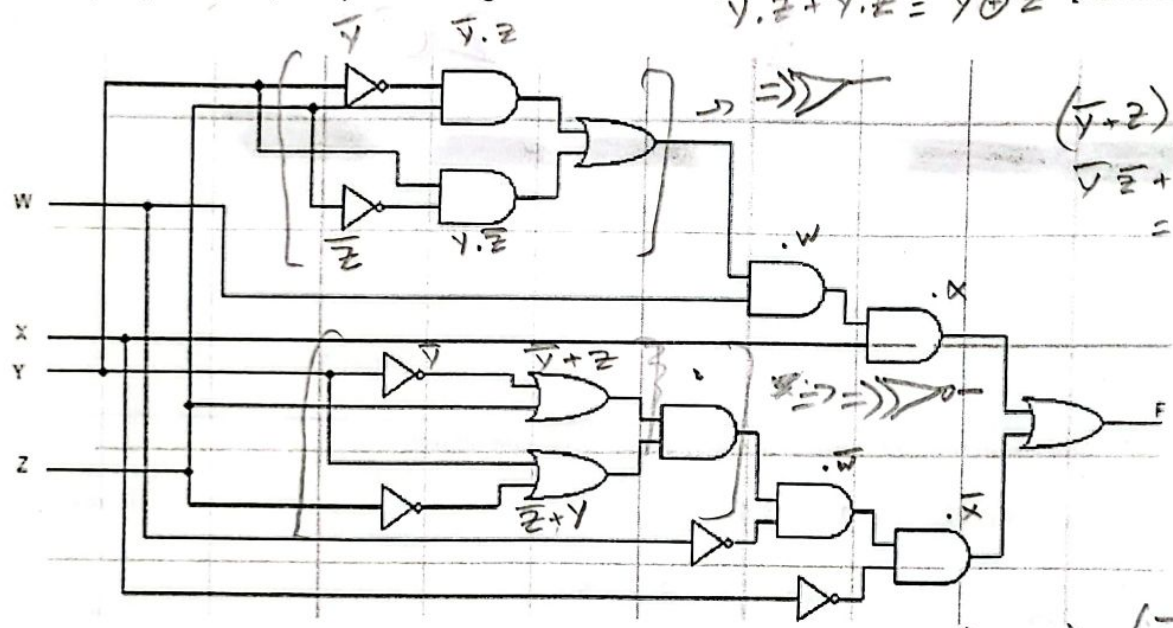
$2 \times 3^0 = 2$
$0 \times 3^1 = 0$
$1 \times 3^2 = 9$
$(11)_{10}$

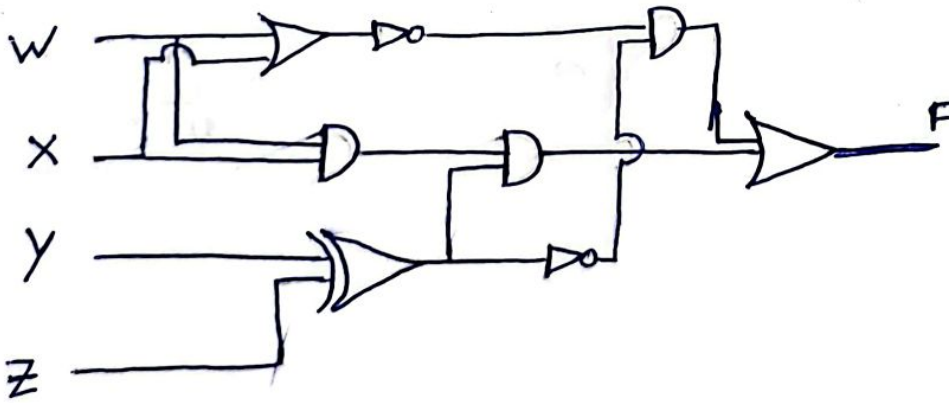
$7 \,|\, 11$, $1 \,|\, 4$ → $(14)_7$

10

CLO#2: Recognize and use basic gates to implement logic circuits

Q#2: ***Redraw the following logic diagram with the reduced number of gates. Available resources are 2-input (AND, OR, XOR) and NOT gate.*** **[10 marks]**





National University of Computer and Emerging Sciences

CLO#3: Constructs optimized logic circuit design.

Q#3: *A Boolean function is given as follows:* **[10+10 marks]**

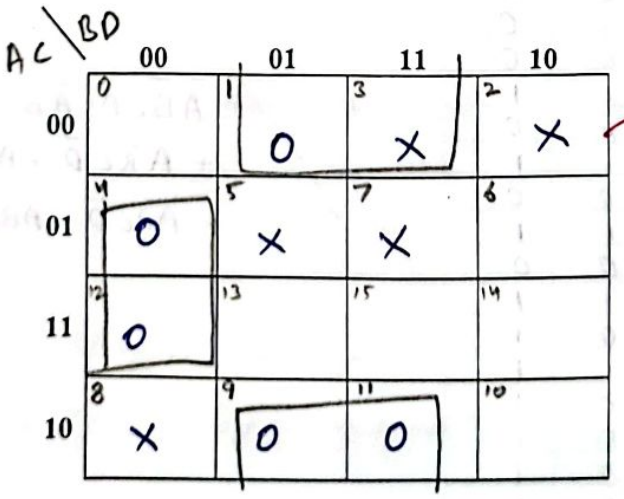
$F(A, C, B, D) = \prod M(1, 4, 9, 11, 12)$

Don't care: $d(A, C, B, D) = \Sigma m(2, 3, 5, 7, 8)$

*(**Note:** No marks will be given if K-map is not properly filled.)*

- *Minimize the function F in **Product of Sums** form using K-maps shown below:*

$F(A, C, B, D) = (\bar{C}+B+D)(C+\bar{D})$ (10)

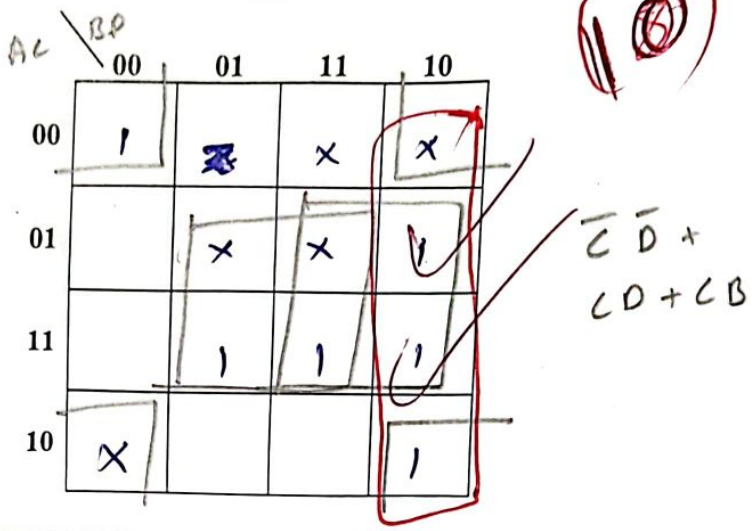


$(\bar{C}+B+D)$

$(C+\bar{D})$

- *Minimize the function F in **Sum of Products** form using K-maps shown below:*

$F(A, C, B, D) = \bar{C}\bar{D} + CD + CB$



10

CLO#4: Construct and utilize the basic functional blocks to design combinational circuits

Q#4: ***A combinational circuit is required to be designed for coordinating a meeting among four parties (A, B, C, and D). The circuit should output 'F=1' if meeting can take place while ensuring that either party A or D must be present, and the meeting can only be scheduled if at least two parties express their willingness to attend. Otherwise, the meeting cannot take place i.e., 'F=0'. You don't need to draw the circuit. Only fill-in the truth table and write down the Boolean expression of function F in Sum of Minterms form (SOP). Do not optimize the expression.*** **[10 marks]**

(Note: The presence and willingness of a party is represented by high logic level)

Inputs				Output
A	B	C	D	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

A+D.

$F(A, B, C, D) = \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}BCD + A\bar{B}\bar{C}D + A\bar{B}CD + AB\bar{C}\bar{D} + AB\bar{C}D + ABC\bar{D} + ABCD$

10

Simplified (Extra):-

$AB + CD + BD + AD + AC$