



ANSWER BOOKLET

Student: <u> Digital </u> Number <u> 10 </u>
Course: Department: _____ Number: _____ Division: <u> PLD "2" </u> Instructor: _____
Date: _____ Day Month Year

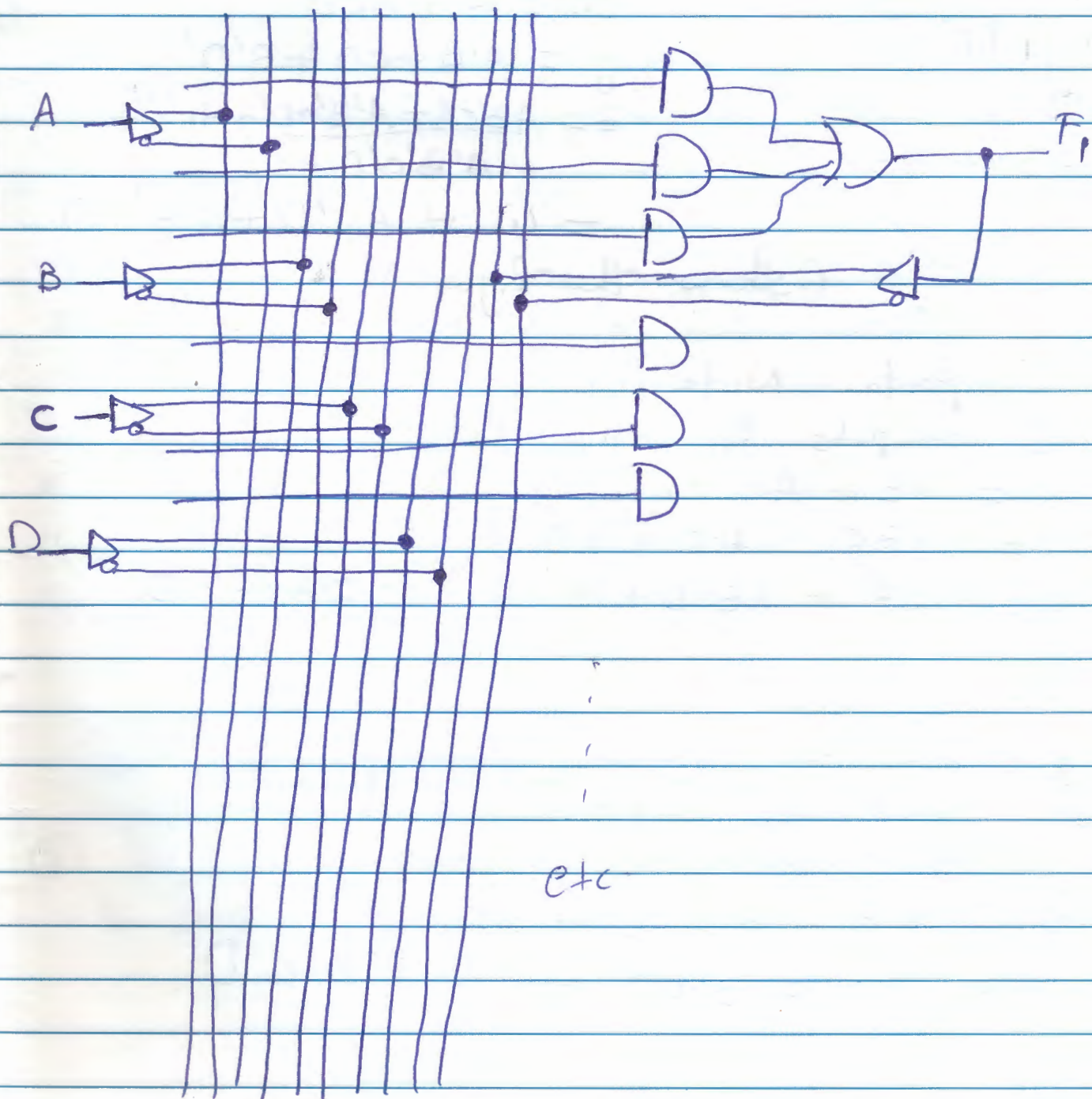
For Instructor's Use

Question	Grade
1	
2	
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10	
11	
12	
Total	

⑧ PAL

- fixed OR array and a Programmable AND array.

- Example of PAL with 4 inputs, 4 outputs, 4 sections of a three-wide AND-OR array (3 programmable AND gates in each section and one fixed OR gate).



$$W(A, B, C, D) = \sum (2, 12, 13)$$

$$X(A, B, C, D) = \sum (7, 8, 9, 10, 11, 12, 13, 14, 15)$$

$$Y(A, B, C, D) = \sum (0, 2, 3, 4, 5, 6, 7, 8, 10, 11, 15)$$

$$Z(A, B, C, D) = \sum (1, 2, 8, 12, 13)$$

AB \ CD	00	01	11	10
00				1
01				
11	1	1		
10				

⇒ In the same way :-

$$X = A + BCD$$

$$Y = A'B + CD + B'D'$$

$$Z = \underbrace{ABC'D + A'B'c'D' + Ac'D' + A'B'c'D}$$

$$W = ABC'D + A'B'c'D'$$

$$= W + Ac'D' + A'B'c'D$$

(show the figure)

⊗ Important Note

3- outputs for this Pal

$$X = AB + AC + CD$$

$$Y = A'BC + ACD + BD$$

$$Z = A'B + ABCD + B'cD' + c'D + B'c'D$$

x- is ok

y- is ok

z- must be divided such that
(for example)

$$Z = A'B + ABCD + m$$

$$\text{where } m = B'cD' + c'D + B'c'D$$

⊗ Programming Table for the previous example:-

product term	AND Inputs					outputs
	A	B	C	D	W	
1	1	1	0	-	-	$w = ABC't$
2	0	0	0	0	-	$A'B'cD'$
3	-	-	-	-	-	
4	1	-	-	-	-	$x = A +$
5	-	1	1	1	-	BCD
6	-	-	-	-	-	
7	0	1	-	-	-	$y = A'B +$
8	-	-	1	1	-	$CD +$
9	-	0	-	0	-	$B'D$
10	-	-	-	-	1	$z = w +$
11	1	-	0	0	-	$AC'D' +$
12	0	0	0	1	-	$A'B'c'D$

Ex. ~~if~~
 ~~$z = ABC'D + A'B'c'D' + A$~~

⊗ for not used AND gate \rightarrow intact
 because $A'.A = 0$ (also $B'.B = c'.c \dots$).