

Tutorial Answer sheet 7

Class. Mind

Date:

Page No.:

OPM

1220

①

(a)

$\bar{x}y\bar{z}$	00	01	11	10
0	1	1	1	1
1		1		

$$= \bar{x}\bar{z} + \bar{y}z + xz$$

(b)

$$F(x, y, z) = \sum (0, 1, 6, 7)$$

$\bar{x}y\bar{z}$	00	01	11	10
0	1	1		
1			1	1

$$= \bar{x}\bar{y} + xy$$

(c)

$$F(x, y, z) = \sum (1, 3, 5, 7)$$

$\bar{x}y\bar{z}$	00	01	11	10
0		1	1	
1		1	1	1

$$= z$$

②

(a)

$$F(x, y, z) = \sum (2, 3, 6, 7)$$

$\bar{x}yz$	00	01	11	10
0			1	1
1			1	1

$$= y$$

② (B) $F(A, B, C, D) = \sum (3, 7, 11, 13, 14, 15)$

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

$$= CD + ABD + ABC$$

② (C) $F(\bar{w}, x, y, z) = \sum (1, 4, 5, 6, 7, 13)$

wx yz	00	01	11	10
00		1		
01	1	1	1	1
11		1		
10				

$$= \bar{w}x + \bar{w}\bar{y}z + x\bar{y}z$$

③ (a) four variable

④ $ABC' + B'C'D' + BCD + ACD' + A'B'C + A'BC'D$

	$\bar{C}D$	$\bar{C}D$	CD	$\bar{C}D$
$\bar{A}B$	00	1	1	1
$\bar{A}B$	01	1	1	1
AB	11		1	1
$A\bar{B}$	10	1	1	1

$$= \bar{B}\bar{D} + CD + \bar{A}BD + AC$$

③ (b) $wyz + wy + wxy' + x'y$

	$wxyz$	$\bar{y}z$	yz	$y\bar{z}$
$\bar{w}\bar{x}$			1	1
$\bar{w}x$			1	
wx	1	1	1	1
$w\bar{x}$			1	1

$$wx + \bar{x}y + yz$$

④ (a) $F(A, B, C, D) = \sum(0, 2, 3, 5, 7, 8, 10, 11, 13, 15)$

	$\bar{C}D$	00	01	11	10
$\bar{A}B$	1				
$\bar{A}B$		1	1	1	1
AB				1	1
$A\bar{B}$		1		1	1

$$= \overline{BD} + \overline{BD} + CD$$

(4) b) $f(w, x, y, z) = \sum(0, 2, 7, 8, 9, 10, 12, 13, 14, 15)$

$w \times y \times z$	00	01	11	10
00	1			1
01			1	
11	1	1	1	1
10	1	1	1	1

$$= w\bar{x} + w\bar{y} + \bar{x}\bar{z} + x\bar{y}z$$

(5) (a) Boolean \int^n to product of sum

$$f(w, x, y, z) = \sum(0, 1, 2, 5, 8, 10, 13)$$

$w \times y \times z \times \bar{y} \times \bar{z}$	$y \times z$	$\bar{y} \times z$
$\bar{w} \times \bar{x}$	0	0
$\bar{w} \times x$	0	0
$w \times x$	0	0
$w \times \bar{x}$	0	0

$$(\bar{y} + \bar{z})(\bar{x} + z) + (\bar{w} + x + \bar{z})$$

(5) (b) $f(A, B, C, D) = \pi(1, 3, 6, 9, 11, 12, 14)$

AB\CD	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	0	0	0
10	0	0	0	0

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

(6) (a) $f(x, y, z) = \sum(2, 3, 4, 6, 7)$
 $d(x, y, z) = \sum(0, 1, 5)$

x\y\z	00	01	11	10
0	X	X	1	1
1	1	1	1	1

$$= y + \bar{z}$$

(b) $f(A, B, C, D) = \sum(4, 5, 6, 7, 12, 13, 14)$
 $d(A, B, C, D) = \sum(1, 9, 11, 15)$

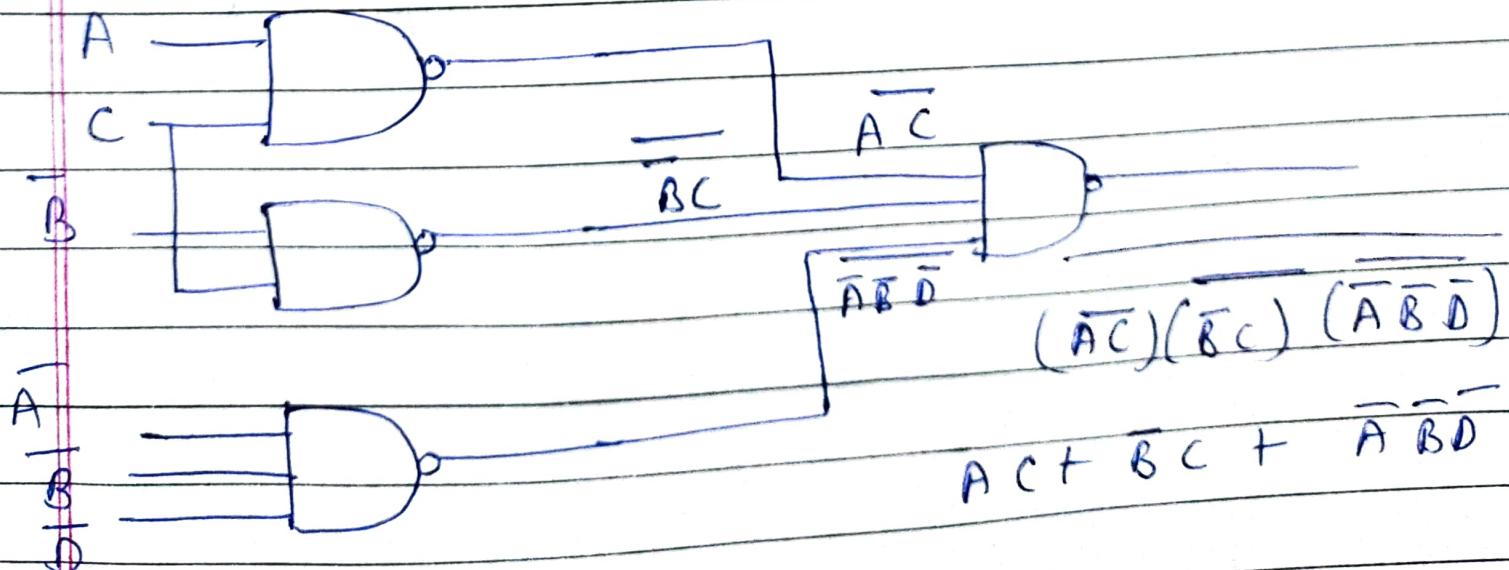
$AB \backslash CD$	00	01	11	10
00	X			
01	1	1	1	1
11	1	1	X	1
10		X	X	

 $\Rightarrow B$

7) (a) $f(A, B, C, D) = A'B'C + AC + ACD + ACD' + A'B'D'$
 $+ B'C'D$

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

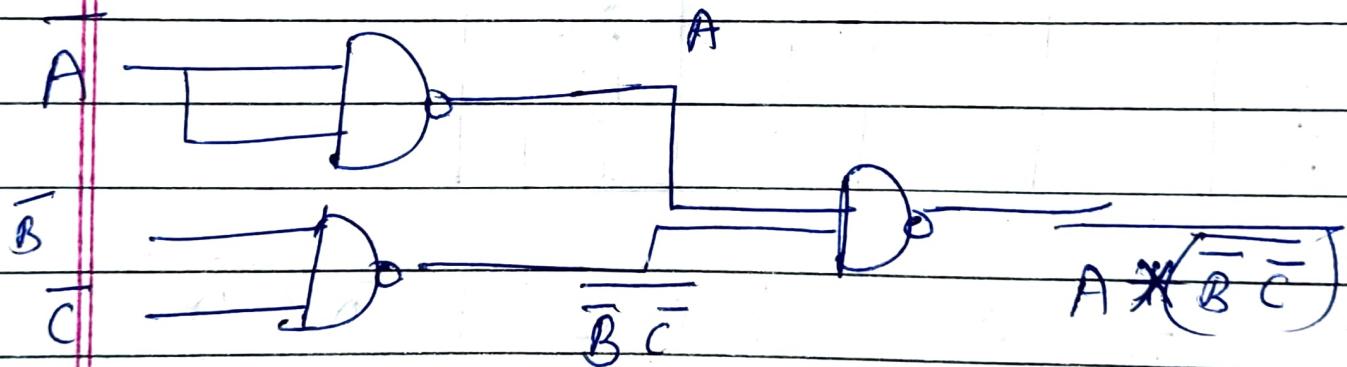
$$= AC + \overline{BC} + \overline{A}\overline{B}\overline{D}$$



$$\textcircled{A} \textcircled{B} \quad f(A, B, C) = (A' + B' + C')(A' + B')(A' + C')$$

	A'	B'	C'	00	01	11	10
0	1	1	1	1	1	1	1
1	1	1	1	0	0	0	0

$$= \overline{A} + \overline{B} \overline{C}$$



$$\overline{A} + \overline{B} \overline{C}$$

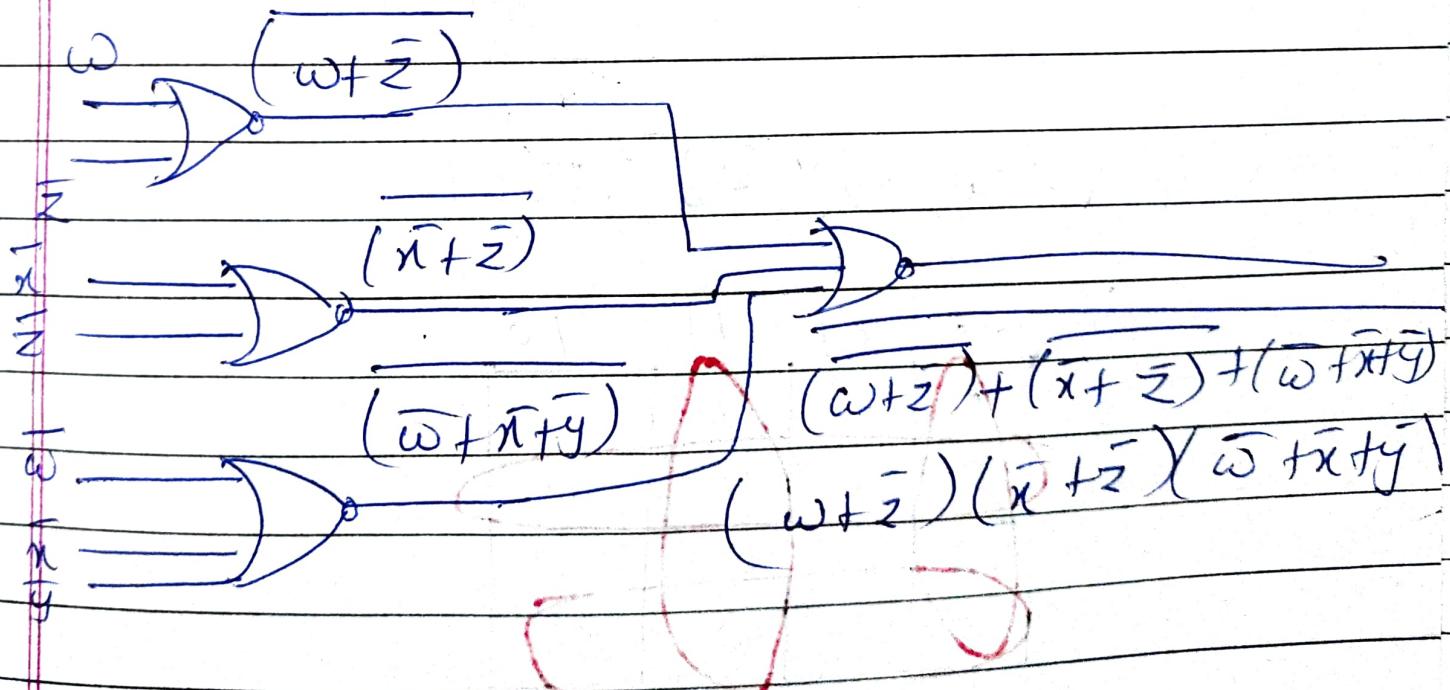
(8) (a) two level NOR gate

$$F = \omega x' + y'z' + \omega'y z'$$

	$\bar{y}\bar{z}$	$\bar{y}z$	$y\bar{z}$	$y\bar{z}'$
ωx	00	01	11	10
$\bar{\omega}x$	00	1	0	1
ωx	11	1	0	0
$\bar{\omega}x$	10	1	1	1

POS Form

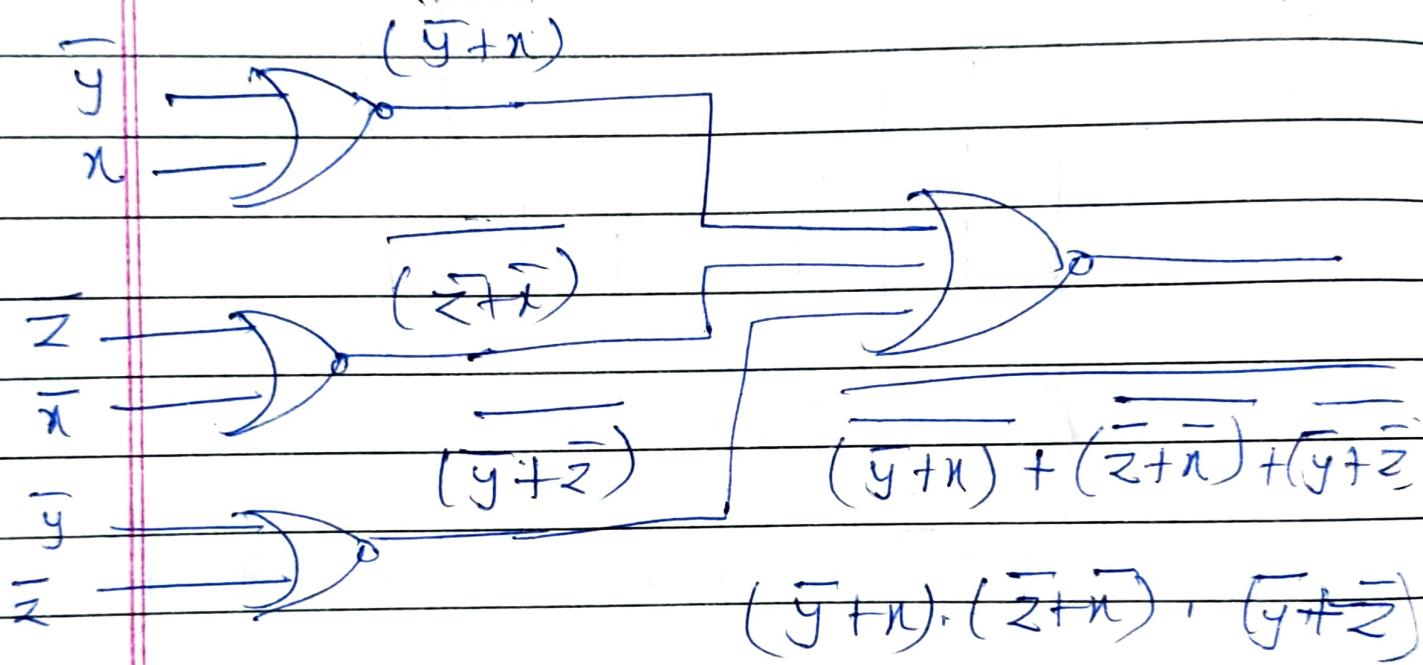
$$(\omega + \bar{z}) (\bar{x} + \bar{z}) (\bar{\omega} + \bar{x} + \bar{y})$$



$$(c) f(x, y, z) = \overline{[(x+y)(\bar{x}+z)]}$$

$$= y\bar{x} + z\bar{x} + yz$$

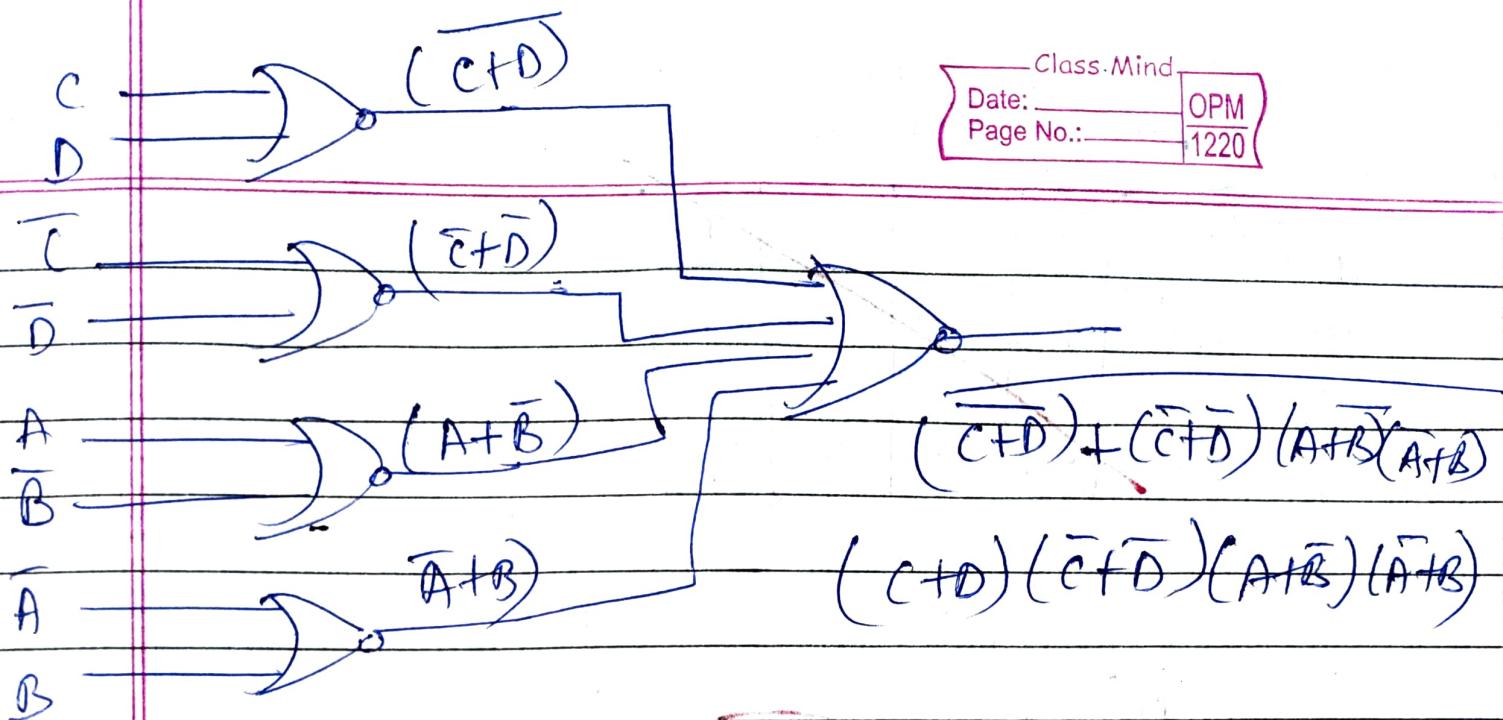
$$= (\bar{y} + x) \cdot (\bar{z} + \bar{x}) \cdot (\bar{y} + \bar{z})$$



$$\textcircled{8} \textcircled{5} F(w, x, y, z) = \Sigma(1, 2, 13, 14)$$

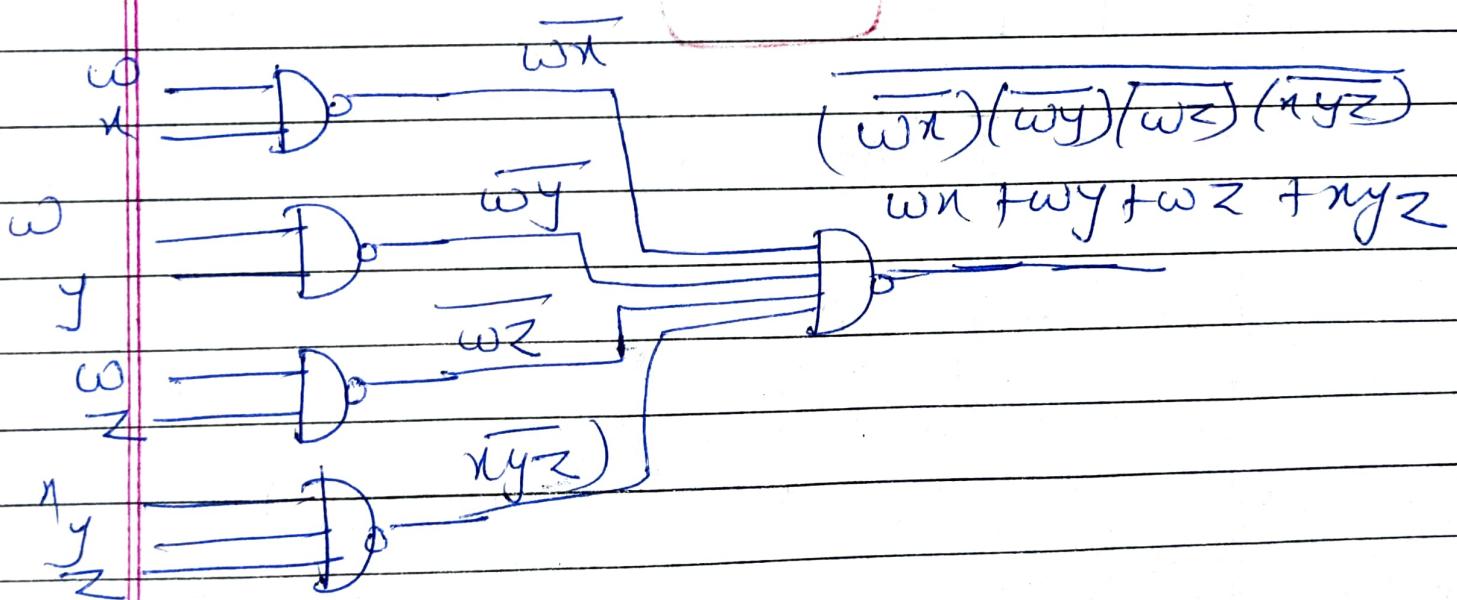
w\bar{x}\bar{y}\bar{z}	00	01	11	10
00	0		0	
01	0	0	0	0
11	0		0	
10	0	0	0	0

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



⑨ Multi level NAND

$$(w(x+y+z)) + xyz$$



⑩ $f(A, B, C, D) = \sum (2, 4, 6, 10, 12)$

$$d(A, B, C, D) = \sum (0, 8, 9, 13)$$

Two NOR gate

	$\bar{C}\bar{D}$	$\bar{C}D$	$C\bar{D}$	CD
$\bar{A}B$	00	X	0	0
$\bar{A}B$	01		0	0
$A\bar{B}$	11		X	0
$A\bar{B}$	10	X	X	0

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

