

2.4 c

a

$$abc \text{ XOR } (ab'c')'$$

is simplified as

$$\begin{aligned} &= (abc)'(ab'c')' + (abc)(ab'c')' \\ &= (a'+b'+c')(a'+b+c) + (abc)[ab'c'] \\ &= aa' + a'b + a'c + b'a' + b'b + b'c + c'a' + c'b + c'c \\ &= a'b + b'a' + a'c + b'c + c'a' + c'b \\ &= a' + a'(c+c') + b'c + c'b \\ &= a' + a' + b'c + c'b \end{aligned}$$

c/d

a	b	c
F	F	F
F	F	T
F	T	F
F	T	T
T	F	F
T	F	T
T	T	F
T	T	T

$a' + b'c + c'b$

T
T
T
T
F
T
T
F

c

d

$$c/d = (FFF, TTT)$$

$$c = (FTF, TFT)$$

$$d = (FFF, TFF)$$

$$TOF = b'c + c'b, a' + c'b, a' + b'c$$

$$TNF = a + b'c + c'b, a' + b + c' + c'b, a' + b'c + c + b'$$

$$\begin{aligned}
 b) & ((a+b)(b'+c))' \\
 &= (ab' + ac + bc)' \\
 &= (ab'c' + ab'c + abc + ab'c + abc + a'bc)
 \end{aligned}$$

		c	
		0	1
ab	00	1	1
	01	1	0
	11	1	0
	10	0	0

$$= a'b' + c'b$$

	a	b	c
c/d	F	F	F
	F	F	T
	F	T	F
	F	T	T
	T	F	F
	T	F	T
	T	T	F
	T	T	T

		$a'b' + c'b$	
		T	
	T		d
	F		
	T		
	F		
	T		c
	F		
	T		
	F		

$$c/d = (FFF, TTT)$$

$$c = (CFFT, TTFF)$$

$$d = (CFFF, FTT)$$

$$TNF = a + b + c'b, a'b' + c + b'$$

$$TOF = a'b', c'b$$

c) $(ab' + ac + c'd)'$

$$(ab'cd + ab'c'd' + ab'c'd + ab'cd' + abcd + ab'cd' + ab'cd + abcd' + abc'd + a'b'c'd + a'bc'd + ab'c'd)'$$

	cd			
	00	01	11	10
ab				
00	1	0	1	1
01	1	0	1	1
11	1	0	0	0
10	0	0	0	0

$$= a'c'd' + bc'd' + a'c$$

$$a'c'd' + bc'd' + a'c$$

a	b	c	d
F	F	F	F
F	F	F	T
F	F	T	F
F	F	T	T
F	T	F	F
F	T	F	T
F	T	T	F
F	T	T	T
T	F	F	F
T	F	F	T
T	F	T	F
T	F	T	T
T	T	F	F
T	T	F	T
T	T	T	F
T	T	T	T

T
F
T
T
T
F
T
T
F
F
F
F
T
F
F
F

- $c/d = (FFFF, TTTT)$
- $c = (FFT T, TTFF)$
- $d = (FFFF, FFFT)$

- $TNF = a + c + d + bc'd' + a'c, a'c'd' + b' + c + d + a'c, a'c'd' + bc'd' + a + c'$
- $TOF = bc'd' + a'c, a'c'd' + a'c, a'c'd' + bc'd'$

2) UC MCD solutions

a) $(a'b'c' + a'b'd')$

$(a'b'c'd + a'b'c'd' + a'b'c'd' + a'b'cd')$

		cd			
		00	01	11	10
ab	00	0	0	1	0
	01	1	1	1	1
	11	1	1	1	1
	10	1	1	1	1

$= a + b + cd$

COI a

XFFF, XF FT, XF TF

COI b

FXFF, FX TF, FX FT

COI c

FFXT

COI d

FFTX

Base Sol: FFFT, FF TT, FF TF

UC1 = FFFT, FF TT, FF TF, TF FT, FT TF

UC2 = FFFT, FF TT, FF TF, TF FT, FT TF

UC3 = FFFT, FF TT, FF TF, TF FT, FT TF

UC4 = FFFT, FF TT, FF TF, TF FT, FT TF

2)

b

$(a'c' + a'd' + a'b)'$

		cd	00	01	11	10
ab						
00			0	0	1	0
01			0	0	0	0
11			1	1	1	1
10			1	1	1	1

$= a + b'cd$

COI a

XTFF, XFFF, XFTF
XFFT, XTFT, XTTF, XT TT

COI b

FXTT

COI c

FFXT

COI d

FFT X

Base Sol :- FT TT, FFTT, FFFT, FF TF
 $UC_1 = FT TT, FFTT, FFFT, FF TF, TFFT$
 $UC_2 = FT TT, FFTT, FFFT, FF TF, TTF T$
 $UC_3 = FT TT, FFTT, FFFT, FF TF, TTT T$

c)

$$(abd + acd)'$$

$$(abcd + abc'd + abcd + ab'cd)'$$

		cd			
	ab	00	01	11	10
00		1	1	1	1
01		1	1	1	1
11		1	0	0	1
10		1	1	0	1

$$\Rightarrow a' + d' + b'c'$$

COI a

X T T T, X T F T, X F T T

COI b

T X F T

COI c

T F X T

COI d

T T T X, T F T X, T T F X

Base Sol :- T T F T, T F T T, T F F T

UC 1 - T T F T, T F T T, T F F T, F T F T, T F T F

UC 2 - T T F T, T F T T, T F F T, F T F T, T T F F

UC 3 - T T F T, T F T T, T F F T, F F T T, T F T F

UC 4 - T T F T, T F T T, T F F T, F F T T, T T F F