F1) $f = ab + ac + bc + a'de$

$$\frac{df}{da} = (bc + de) \oplus (b + c + bc) = (bc + de) \oplus (b+c)$$

F2) (a) $(A+B)c + c'D$

A	B	C	D	F	F_{H0}	F_{H1}	F_{K0}	F_{K1}
0	0	0	0	0	0	0	0	1
0	0	0	1	1	1	1	0	1
0	0	1	0	0	0	1	0	1
0	0	1	1	0	0	1	0	1
0	1	0	0	0	0	0	0	1
0	1	0	1	1	1	1	0	1
0	1	1	0	1	0	1	1	1
0	1	1	1	1	0	1	1	1
1	0	0	0	0	0	0	0	1
1	0	0	1	1	1	1	0	1
1	0	1	0	1	0	1	1	1
1	0	1	1	1	0	1	1	1
1	1	0	0	0	0	0	0	1
1	1	0	1	1	1	1	0	1
1	1	1	0	1	0	1	1	1
1	1	1	1	1	0	1	1	1

(b)

A	B	C	D	H0	H1	K0	K1
0	0	0	0				1
0	0	0	1			1	
0	0	1	0		1		1
0	0	1	1		1		1
0	1	0	0				1
0	1	0	1			1	
0	1	1	0	1			
0	1	1	1	1			
1	0	0	0				1
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			

(c)

A	B	C	D	H0	H1	K0
0	0	0	0			
0	0	0	1			1
0	0	1	0		1	
0	0	1	1			1
0	1	0	0			
0	1	0	1			1
0	1	1	0		1	
0	1	1	1		1	
1	0	0	0			
1	0	0	1			1
1	0	1	0	1		
1	0	1	1	1		
1	1	0	0			
1	1	0	1			1
1	1	1	0	1		
1	1	1	1	1		

(d)   Apply 0001, If output is 0, there's a fault
      Apply 0010, if output is 1, there's a fault
      Apply 0110, if output is 0, there's a fault

F3) $(WX)'\,YZ + WX\,(YZ)'$

(a)

W	X	Y	Z	T	T_{m1}	T_{m0}	T_{n1}	T_{n0}	T_{p1}	T_{p0}	T_{q1}	T_{q0}
0	0	0	0	0	1	2	1	0	1	0	1	0
0	0	0	1	0	1	0	1	0	1	0	1	0
0	0	1	0	0	1	0	1	0	1	0	1	0
0	0	1	1	1	0	1	1	0	1	1	1	0
0	1	0	0	0	1	0	1	0	1	0	1	0
0	1	0	1	0	1	0	1	0	1	0	1	0
0	1	1	0	0	1	0	1	0	1	0	1	0
0	1	1	1	1	0	1	1	0	1	1	1	0
1	0	0	0	0	1	0	1	0	1	0	1	0
1	0	0	1	0	1	0	1	0	1	0	1	0
1	0	1	0	0	1	0	1	0	1	0	1	0
1	0	1	1	1	0	1	1	0	1	1	1	0
1	1	0	0	1	1	0	0	1	1	0	1	1
1	1	0	1	1	1	0	0	1	1	0	1	1
1	1	1	0	1	1	0	0	1	1	0	1	1
1	1	1	1	0	0	1	0	1	1	1	0	1

(b)

W	X	Y	Z	$m1$	$m0$	$n1$	$n0$	$p1/q1$	$p0$	$q0$
0	0	0	0	1		1		1		
0	0	0	1	1		1		1		
0	0	1	0	1		1		1		
0	0	1	1	1			1		1	
0	1	0	0	1		1		1		
0	1	0	1	1		1		1		
0	1	1	0	1		1		1		
0	1	1	1	1			1		1	
1	0	0	0	1		1		1		
1	0	0	1	1		1		1		
1	0	1	0	1		1		1		
1	0	1	1	1			1		1	
1	1	0	0		1	1		1		
1	1	0	1		1	1		1		
1	1	1	0		1	1		1		
1	1	1	1		1		1		1	

(c)

W	X	Y	Z	f/a1	f0	90
0	0	0	0	①		
0	0	0	1	1		
0	0	1	0	1		
0	0	1	1			①
0	1	0	0	1		
0	1	0	1	1		
0	1	1	0	1		
0	1	1	1		1	
1	0	0	0	1		
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		

(d)   Apply 0000, if the output is 1, there's a fault

Apply 0011, if the output is 0, there's a fault

Apply 1100, if the output is 0, there's a fault.