a.) $F = A.B + \bar{A}.B.\bar{C}.D + \bar{A}.B.C.D + A.\bar{B}.\bar{C}.\bar{D}$

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

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

So $F = A.\bar{C}.\bar{D} + A.B + B.D$

---

b.) $F = A.B + \bar{A}.B.\bar{C}.D + \bar{A}.B.C.D + A.\bar{B}.\bar{C}.\bar{D}$

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

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

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

$= A.B + \bar{A}.B.D + A.\bar{B}.\bar{C}.\bar{D}$ Distributive OR + Rearranged

$= B(A + \bar{A}.D) + A.\bar{B}.\bar{C}.\bar{D}$ Distributive OR form

$= A.B + B.D + A.\bar{C}.\bar{D}$ Absorption OR + Inverse AND