**Chapter Two: Logic Algebra**

1. Given , then 1, 3, 4, 5）=1, 3)+ 0, 1).

**Solution:**

F= a' b' c' + a' b' c + a b' c + a b c

dual function: FD=(a'+b'+c') (a'+b'+c) (a+b'+c) (a+b+c)= πabc M(7,6,2,0)= ∑abc m(1,3,4,5)

a: a'🡪1, 3 (minterm), a🡪 4, 5 (minterm)

b, c: a'🡪1, 3 (minterm), a🡪 4-4=0, 5-4=1 (minterm)

2. (X⊕Y)+Z is **not** equivalent to (D).

(A) (X'⊕Y')+Z (B) (X☉Y')+Z (C) (X☉Y)'+Z (D) (X'☉Y')+Z

**Solution:**

X'(Y')'+(X')' Y'=X'Y+XY' XY'+(X)'(Y')'=XY'+X'Y

(X☉Y)'=X⊕Y X'☉Y'=X'Y'+(X')'(Y')'= X'Y'+XY

3. Given logical function F(A,B,C,D,E)=(AB')'+(C'D+B'C)'+E, the simplest AND-OR expression is (A'+B+C'D'+E).

**Solution:**

(AB')'+(C'D+B'C)'+E

=A'+B+(C'D)'(B'C)'+E

=A'+B+(C+D')(B+C')+E

=A'+B+BC+BD'+C'D'+E

= A'+B+C'D'+E

4. Which of the following statements is correct? (B)

(A) X·X = X2 (B) XY+XZ+W = X(Y+Z)+W

(C) If X+Y=X+Z, then Y=Z (D) If X·Y=X·Z, then Y=Z

**Solution:**

(A) X·X = X2 (no power) (B) XY+XZ+W = X(Y+Z)+W

(C) If X+Y=X+Z, then Y=Z (X=1, Y≠Z)

(D) If X·Y=X·Z, then Y=Z (X=0, Y≠Z)

5. Which of the following statements is not correct? (B)

(A) X·(Y⊕Z) = (X·Y)⊕(X·Z) (B) X(Y⊙Z)= XY⊙XZ

(C) X⊕(Y⊕Z) = (X⊕Y)⊕Z (D) X⊙(Y⊙Z) = (X⊙Y)⊙Z

**Solution:**

X+(Y⊙Z)= (X+Y)⊙(X+Z)

6. Suppose *F* =, then =(?).

**Solution:**



7. Use Karnaugh map to simplify the following function, write the minimal sum-of-products.



**Solution:**



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB\CD | 00 | 01 | 11 | 10 |
| 00 | 0 | 1 | 1 | 1 |
| 01 | 0 | d | 1 | 1 |
| 11 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 1 |

8. Use Karnaugh map to simplify the following function, write the minimal product-of-sums.



**Solution:**



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB\CD | 00 | 01 | 11 | 10 |
| 00 | 1 | 1 | 0 | 1 |
| 01 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 |
| 10 | 1 | 1 | 1 | 1 |

9. Use Boolean algebra to find a minimal sum-of-products expression for the function *F*.



**Solution:**

