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Worksheet

Course Name:

Digital Logic Design

Topic:

Minimalisation Technique

MINIMALISATION TECHNIQUES

Minimisation is the calculated process of breaking down or simplifying boolean expressions into simpler terms.

Laws such as annulment law, identity law, idempotent law, associative law, distributive law, and complement law will help to simplify these expressions to a minimum number of terms.

STEPS TO ACCURATE SIMPLIFICATION

1. Look for similar terms
2. Apply Boolean algebra rules
3. Ensure that the simplified expression is logically equivalent to the original expression by comparing their truth tables or applying boolean algebra rules.
4. Applying one simplification at a time to avoid complexities during simplification.

EXAMPLES

Simplify this expression

AB + BC (B+C)

AB + BC.B + BC.C (Applying distributive law)

AB+BBC+BCC

Remember B.B = B and C.C = C using the idempotent law.

Simplifying, we have

AB + BC + BC

BC + BC = BC (Applying idempotent law)

FINAL RESULT
= B(A+C)

EXAMPLES

Simplify the boolean expression below.

$$AB = A(B+C) + B(B+C)$$

Use distributive law to expand the terms in the bracket.

We have

AB + AB + AC + BB + BC

B.B = B (using idempotent law).

AB + AB + AC + B + BC

B + BC = B (using absorption law)

AB + AB + AC + B

Gather like terms

AB + AB + B + AC

AB + AB = AB (using idempotent law)

We have

AB + B + AC

AB + B = B (Using absorption law)

FINAL RESULT
B + AC

EXAMPLES

Simplify this expression

AB + BC (B+C)

AB' + A(B + C) + B(B + C) (Applying distributive law)

AB' + AB + AC + BB + BC

B.B = B (Using idempotent law)

B + BC = B (Using absorption law)

AB' + AB + B + AC

(Gather like terms)

AB' + B + AB + AC

B + BC = B (Using absorption law)

FINAL RESULT
AB' + B + AC

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QUZ 1

CHECK YOUR PROGRESS

Simplify the expression

$$X + Z)(X + XZ') + XY + Y$$

HINT!

Compare original expression and your final result using truth tables. If they give same output then you are correct

QUIZ 2

Simplify this expression

$$XY' + X' + Y'X'$$