

Minimizations of Logic Functions Using Boolean Theorems:

There is one procedure to reduce the given Boolean expression. It follows some rules.

Rule1: Remove the parenthesis by multiplying all the necessary variables.

Rule2: If any identical terms are there, replace all the identical terms by one term.

Rule3: If any term contains a variable and its complement, remove that term from the expression.

Rule4: If any pair of terms that are identical except for one variable which may be missing in one of the terms. The largest term can be removed

Rule5: For the pair of terms which have the same variables, with one or more variables complemented. If a variable in one term of such a pair is complemented while in the second term is not, then such terms can be combined into a single term with that variable removed.

Example: Simplify the following Boolean expression $B+BC^1+ABC^1$

$$B+BC^1+ABC^1$$

$$B+ BC^1(1+A)$$

$$B+ BC^1 \quad (\because 1+A=1)$$

$$B(1+ C^1)$$

$$B \quad (\because 1+ C^1=1)$$

Example: Simplify the following Boolean expression $AB^1C+B+BD^1+ABD^1+A^1C$

$$AB^1C+B+BD^1+ABD^1+A^1C$$

$$AB^1C+B(1+D^1+AD^1)+A^1C$$

$$AB^1C+B(1+D^1(1+A))+A^1C \quad (\because 1+A=1)$$

$$AB^1C+B(1+D^1)+A^1C \quad (\because 1+D^1=1)$$

$$AB^1C+B+A^1C$$

$$C(AB^1+A^1)+B$$

$$C((A+A^1)(A^1+B^1))+B$$

$$C(A^1+B^1)+B$$

$$A^1C+B^1C+B$$

$$A^1C+(B^1+B)+(B+C)$$

$$A^1C+B+C$$

$$C(1+A^1)+B$$

$$B+C$$