

Boolean Algebra

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- 2 Minimize $F(A,B,C) = A'BC + AB'C' + AB'C + AB + A'B'$ using Karnaugh Map
- 3 Minimize the 4 variable Boolean function
 $F(A,B,C,D) = ABC'D + A'BCD + A'B'C + A'B'D' + AC' + A'B'C + B'$
- 4 Draw the circuit for the following function using NAND Gate
 $F(A,B,C,D) = D(A + B(C + A') + B')$
- 5 Design $(A+B).(C+D)$ using NOR Gate.
- 6 Simplify the following Boolean Expression using Boolean postulates and laws of Boolean Algebra.
 - (a) $E = xyz + x'y + xyz'$
 - (b) $Z = (a'+a).b'.c + a.b'.c' + a.b.(c+c')$
- 7 Simplify the following Boolean Expression using Boolean postulates and laws of Boolean Algebra.
 $X = a'.b'.c' + a'.b'.c + a.b'.c' + a.b'.c$
- 8 Simplify the following Boolean Expression using Boolean postulates and laws of Boolean Algebra.
 $F = (A+B'+C+D').(A'+B'+C+D).(A+B'+C+D').(A'+B'+C+D').(A'+B+C+D')$
- 9 Prove $x'.y'+y.z = x.y'.z' + x'.y'.z + x'.y.z + x.y.z$ algebraically.
- 10 A Boolean function F defined on three input variable X,Y,Z is 1 if and only if the number of 1(One) input is odd (e.g. F is 1 if X=1,Y=0,Z=0). Draw the truth table for the above function and express it in canonical sum of product form.
- 11 Draw the logic circuit diagram of the following expression using NOR Gate only $P = (x'+y'+z')(x+y'+z)(x+y+z')$
- 12 Check the validity of the following Boolean Expression:
 $(y+z)(z+x) = (x'+y')(x'+z')(y'+z')$
- 13 Prove that $(a'+b')(a'+b)(a+b') = a'b'$.
- 14 Simplify $AB + (AC)'+ AB'C(AB+C)$ algebraically.
- 15 Convert $(A+B)(AB'+AC)(A'C'+B'C')$ to SOP form.
- 16 Convert $(A+B)(B'+C)(A'+C)$ to SOP Form.
- 17 Prove $XY + YZ + Y'Z = XY + Z$ algebraically.
- 18 Draw the Truth Table for XOR and XNOR Gate.
- 19 Prove that NAND and NOR Gate are universal gate.
- 20 Explain the Relation ship between minterms and maxterms. An Expression is given in SOP form $F(x,y,z) = \sum(0,1,4,5)$ show its min terms and maxterms.
- 21 Represent $(A'+B'+C')(A+B'+C')$ in NOR to NOR logic network.
- 22 Draw the simplified logic diagram using only NAND gates to implement the three input function f denoted by the expression (Not By using K Map) $F = \sum(0,1,2,5)$
- 23 Express $P+Q'R$ in canonical SOP Form and POS Form.
- 24 Express the Boolean Function $F(x,y,z) = xy + x'z$ in a product of max term form.
- 25 Write the equivalent canonical Sum of Product expression for the following Product of Sum Expression $F(X,Y,Z) = \pi(1,3,6,7)$
- 26 A majority gate is a digital circuit whose output is equal to 1 if the majority of the inputs are 1. The output is 0 otherwise. By means of a truth table, find the Boolean expression implemented by 3 input majority gates.
- 27 An even parity gate is a digital circuit whose output is equal to 1 if the odd numbers of inputs are 1. The output is 0 otherwise. By means of a truth table
 - (a) Find the Boolean function implemented by a 3 input odd parity gate.
 - (b) Which single gate can be used to represent this circuit