Dr.SNS RAJALAKSHMI COLLEGE OF ARTS AND SCIENCE

(AUTONOMOUS)
COIMBATORE-2241049
Accredited by NAAC(Cycle III) with "A+" Grade
Recognised by UGC, Approved by AICTE, New Delhi and
Affiliated to Bharathiar University, Coimbatore.

DEPARTMENT OF COMPUTER SCIENCE

Computer System Architecture

I YEAR - I SEM

Unit II – Digital Logic Circuit

Boolean Laws

Commutative law

(i) A.B=B.A

(ii) A+B=B+A

Associative law

(i) A.(B.C)=(A.B).C

(ii) A+(B+C)=(A+B)+C

Distributive law

A.(B+C)=(A.B)+(A.C)

AND law

(i) A.0=0 (ii) A.1=A (iii) A.1=A (iii) A.A' =0

OR law

(i) A+0=A (ii) A+1=1 (iii) A.+A=A (iii) A+A' =1

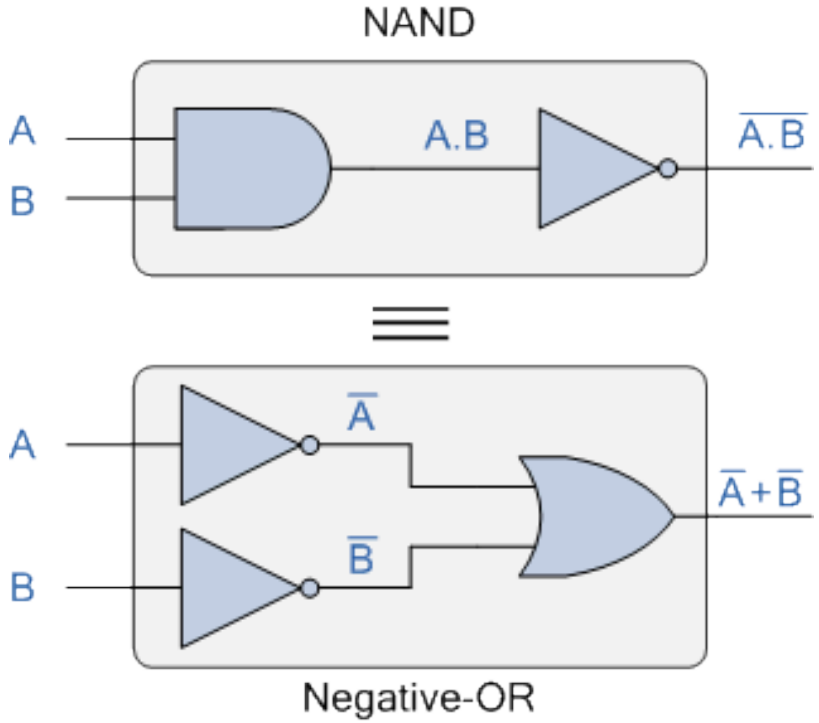
INVERSION law

$\overline{\overline{A}} = A$

DeMogan's Law

(i) $\overline{A.B} = \overline{A}+\overline{B}$

Logic Diagram



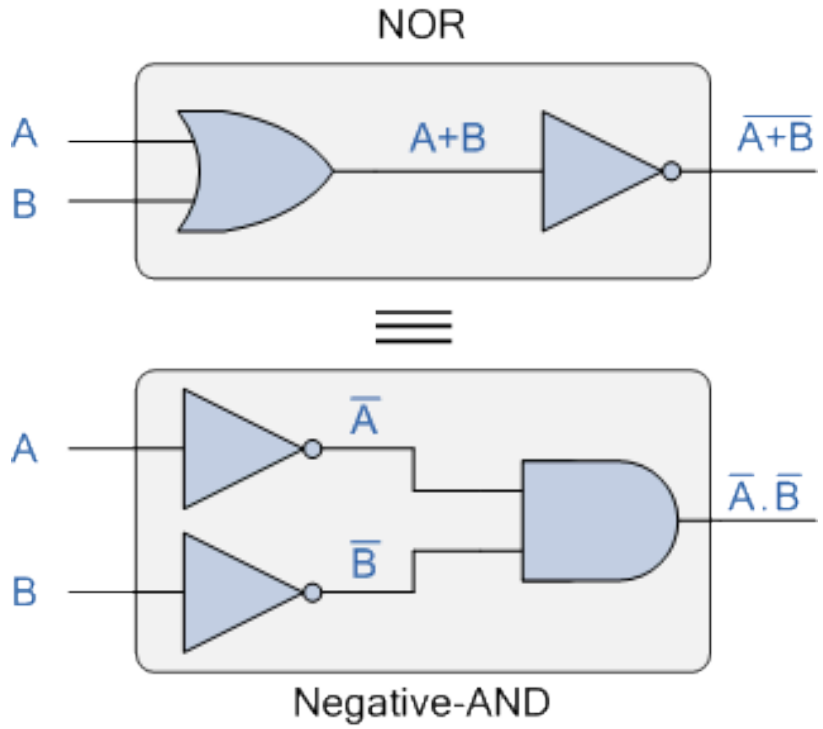
Truth Table

Inputs		Truth Table Outputs For Each Term					
B	A	A.B	A.B	A	B	A + B	
0	0	0	**1**	1	1	**1**	
0	1	0	**1**	0	1	**1**	
1	0	0	**1**	1	0	**1**	
1	1	1	**0**	0	0	**0**	

DeMogan's Law

(ii) $\overline{A+B} = \overline{A} + \overline{B}$

Logic Diagram



Truth Table

Inputs		Truth Table Outputs For Each Term					
B	A	A+B	A+B	A	B	A . B	
0	0	0	**1**	1	1	**1**	
0	1	1	**0**	0	1	**0**	
1	0	1	**0**	1	0	**0**	
1	1	1	**0**	0	0	**0**	

Boolean Expression Simplification

1. Simplify: C + BC

Expression	Rule(s) Used
C + BC	Original Expression
C + (B + C)	DeMorgan's Law.
(C + C) + B	Commutative, Associative Laws.
T + B	Complement Law.
T	Identity Law.

2. Simplify: AB(A + B)(B + B)

Expression	Rule(s) Used
AB(A + B)(B + B)	Original Expression
AB(A + B)	Complement law, Identity law.
(A + B)(A + B)	DeMorgan's Law
A + BB	Distributive law.
A	Complement, Identity.

Boolean Expression Simplification

3. Simplify: (A + C)(AD + AD) + AC + C

Expression	Rule(s) Used
(A + C)(AD + AD) + AC + C	Original Expression
(A + C)A(D + D) + AC + C	Distributive.
(A + C)A + AC + C	Complement, Identity.
A((A + C) + C) + C	Commutative, Distributive.
A(A + C) + C	Associative, Idempotent.
AA + AC + C	Distributive.
A + (A + T)C	Idempotent, Identity, Distributive.
A + C	Identity, twice.

Thank You