SNS COLLEGE OF TECHNOLOGY
(An Autonomous Institution)
COIMBATORE-35
Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

19EET204/ DIGITAL ELECTRONICS AND LINEAR INTEGRATED CIRCUITS

II YEAR / IV SEMESTER

UNIT-I: MINIMIZATION TECHNIQUES AND LOGIC GATES

3.BOOLEAN ALGEBRA –POSTULATES, LAWS, THEOREMS

TOPIC OUTLINE

Postulates

Laws

Demorgan’s Theorem

A Boolean Expression

BOOLEAN POSTULATES

(1) X * 0 = 0

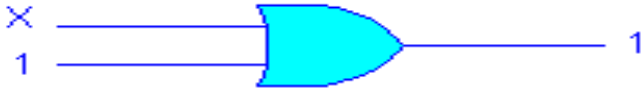
(2) X * 1 = X

(3) X * X = X

(4) X * X' = 0

(5) X + 0 = X

(6) X + 1 = 1



(7) X + X = X

(8) X + X' = 1

BOOLEAN LAWS

LAWS	EXPRESSION
Commutative law	x + y = y + x
Commutative law	x * y = y * x
Associative law	x+ (y+z) = (x+y) +z = x+y+z
Associative law	x (yz) = (xy) z = xyz
Expansion	x (y+z) = xy + xz
Expansion	(w+x)(y+z) = wy + xy + wz + xz
Absorption law	x + xy = x
Absorption law	x + x'y = x + y

DE MORGANS THEOREM

Statement:

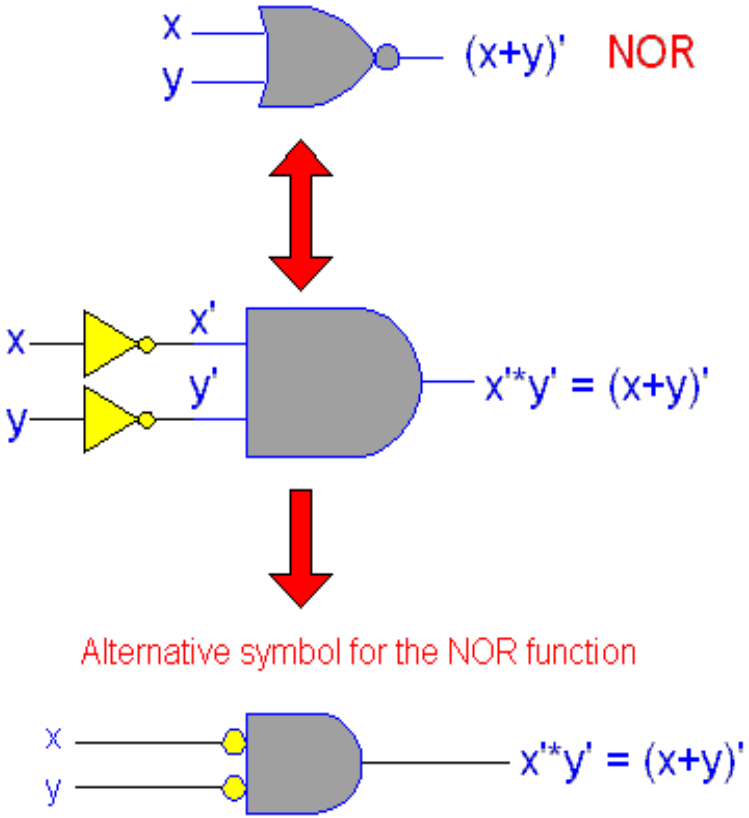
1. (x+y)' = x' * y‘

2. (x*y)' = x' + y'

x	y	x+y	(x+y)'	X’	Y’	x' * y‘
0	0	0	**1**	1	1	**1**
0	1	1	**0**	1	0	**0**
1	0	1	**0**	0	1	**0**
1	1	1	**0**	0	0	**0**

Truth table verification

DE MORGANS THEOREM



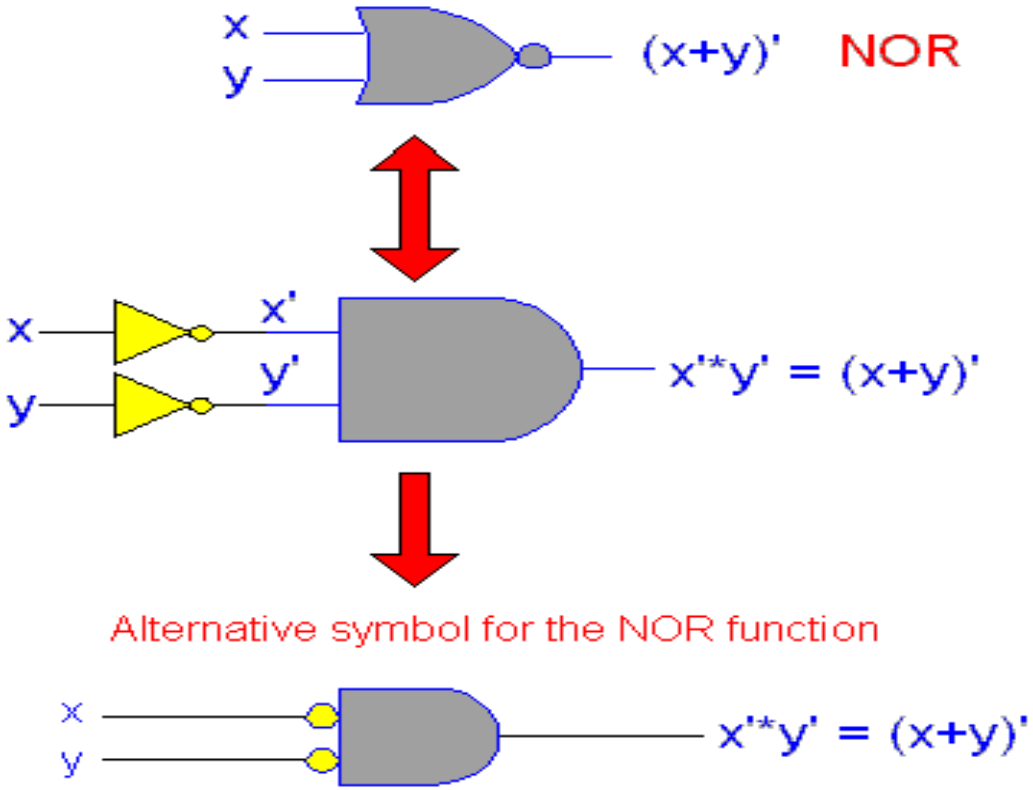
Statement:

1. (x+y)' = x' * y'

2. (x*y)' = x' + y'

Logical verification

BOOLEAN LOGICAL EXPRESSION



A BOOLEAN EXPRESSION

SOP: The sum-of-products form for our function is:

$$F(x,y,z) = \bar{x}y\bar{z} + \bar{x}yz + x\bar{y}\bar{z} + xy\bar{z} + xyz$$

We note that this function is not in simplest terms. Our aim is only to rewrite our function in canonical sum-of-products form.

$$F(x,y,z) = x\bar{z} + y$$

x	y	z	$x\bar{z}+y$
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

RECAP