Dr. SNS RAJALAKSHMI COLLEGE OF ARTS & SCIENCE (Autonomous)
Coimbatore -641049

Accredited by NAAC(Cycle–III) with ‘A+’ Grade
(Recognized by UGC, Approved by AICTE, New Delhi and
Affiliated to Bharathiar University, Coimbatore)

DEPARTMENT OF GRAPHIC & CREATIVE DESIGN AND DATA ANALYTICS

COURSE NAME : COMPUTER SYSTEM ARCHITECTURE (23UCU402)

I YEAR /I SEMESTER

Unit II- LOGICAL GATES

Topic 5: De Morgan’s Law

De Morgan's First Law

✓De Morgan's First Law states that **(A.B)' = A'+B'.**

✓The first law states that the complement of the product of the variables is equal to the sum of their individual complements of a variable.

✓The truth table that shows the verification of De Morgan's First law is given as follows:

A	B	A′	B′	(A.B)′	A′+B′
0	0	1	1	1	1
0	1	1	0	1	1
1	0	0	1	1	1
1	1	0	0	0	0

De Morgan's Second Law

✓De Morgan's Second law states that **(A+B)' = A'. B'.**

✓The second law states that the complement of the sum of variables is equal to the product of their individual complements of a variable.

✓The following truth table shows the proof for De Morgan's second law.

A	B	A′	B′	(A+B)′	A′. B′
0	0	1	1	1	1
0	1	1	0	0	0
1	0	0	1	0	0
1	1	0	0	0	0

Examples

Question: Simplify the following expression:

$c + \bar{B}C$

Solution:

Given:

$C + \bar{B}C$

According to Demorgan's law, we can write the above expressions as

$C + (\bar{B} + \bar{C})$

From Commutative law:

$(C + \bar{C}) + \bar{B}$

From Complement law

$1 + \bar{B} = 1$

Therefore,

$C + \bar{B}C = 1$

Examples

Draw a truth table for A(B+D).

Solution: Given expression A(B+D).

A	B	D	B+D	A(B+D)
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	1	0
1	0	0	0	0
1	0	1	1	1
1	1	0	1	1
1	1	1	1	1

References

1.M.Morris Mano, “Computer System Architecture” 3rd Edition, Prentice Hall of India ,2000, ISBN-10: 0131663631

2. V.K. Puri, —DIGITAL ELECTRONICS CIRCUITS AND SYSTEMS” McGraw Hill Education (1 July 2017). ISBN-10: 9780074633175 , ISBN-13: 978-0074633175

3.William Stallings, “Computer Organization and Architecture, Designing for Performance” PHI/ Pearson Education North Asia Ltd., 10th Edition 2016, ISBN 978-0- 13-410161-3 — ISBN 0-13-410161-8.

Thank You