BINARY OPERATION AND ITS APPLICATION

BY

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PRESENTED

TO

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(ND)CERTIFICATE IN COMPUTER SCIENCE

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CERTIFICATION

This is to certify that this project work was conducted by Kpogior Alex. B. of the department of mathematics/Computer Science and is being accepted as adequate in scope, and content by the undersigned's on behalf of the Bayelsa State college of Arts and Science Agudama-Epie P.O. BOX 74,

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DEDICATION

I solely dedicate this project to God Almighty and give Him all the glory for His worthiness in giving me the knowledge, wisdom and might to put this work together successfully.

Also this project work is dedicated to the following persons; those whose are deprive of education due to lack of financial assistance and to all illiterate who believe that they can be literate. Finally this project work is dedicated to my grant father late Chief Kpogior Vite, papa, this one is for you we that you left behind will keep the family tree grow for ever.

ACKNOWLEDGEMENT

I am profoundly grateful to the Almighty God for His goodness and mercies: to me. Also I really show my gratitude to Mr.Edisemi Anyaiwe my project Supervisor whose wealth of experience, tolerance, accommodative and painstaking guidance and valuable assistance contributed greatly towards the successful completion of this work. I appreciate him also for his effort to devote his time to read the manuscripts making his office and library available for my research.

I really thank God for my Parent's Elder Chief & Mrs.C.A.Kpogior whose living witness gave me moral and encouraging strength to successfully put this work together. All my relations; brothers and sisters are highly appreciated who has contributed both financially and other wise to the success of this work especially Engr. B. S. Kpogior, Mrs. Gloria K. Daniel Success E. Daniel (Miss) Mr. Bakpo Benjamine.T Mr. Raphael Kpogior and Mr. Stephen Lebara etc. my appreciation also goes to my beloved friends Pham. Adikwu Elias.A & Late Mr.Felix Gava Gbokpege whose share my, problems during this year of my study and adequately lay financial and moral supports to embrace this great achievement. Finally I also want to thanks miss Mercy Kogbara who give me the collage and hope for future betterment.

ABSTRACT

A digital systems function in a binary manner. It employs devices which exist only in two possible states. Binary arithmetic and mathematical manipulation of switching or logic functions are best carried out with classification, which involved two symbols, 0 (zero) and 1 (one).

This work is basically centered on the general preliminary stages of system design and implementations.

In chapter two we studied Boolean algebra and went ahead to extensively; view iteration with Binary operation and logic gate principles.

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We also, will be designing a program and summarily conclude with some recommendations.

TABLE OF CONTENT

CHAPTER ONE

1.0 INTRODUCTION

A Binary operation is a rule that combines any two elements of any given set(s). Let *be a binary operation the mapping A*B, is defined by; A*B = {(a,b)/a€A & b€B}.The symbol *is called a Binary operator. A Binary operators may be denoted by the following symbols; * + - . etc.

The most encountered binary operators are the arithmetic operators commonly known as: addition (+) division (:-) subtraction (-) & Multiplication (x)

1.1 AIM AND OBJECTIVE OF STUDY

(i) One aim of this project work is to actually Increase the understanding of Binary Operator(ions).

(ii) To use the idea of Boolean properties (closure, Associative, commutative, identity element etc.) with respect to a given binary operation to solve problems.

(iii) To understand the concept of Boolean algebra with relation 1logic Gate.

(iv) To Design an efficient program that is capable to show how the inherent properties of any given binary operator in a set, can be determined, with the view of solving mathematical problems.

1.2 SIGNIFICANT OF STUDY

This study intends to review and explore the principle of digital circuits especially as related to Boolean Algebra.

1.3 SCOPE OF STUDY

The scope of this study is dwell on the relationship of Boolean Algebra to logic **Gate,** for the purpose of building and analyzing digital circuits

1.4 LIMITATION OF STUDY

My research work was limited by:

(i)**Time:** The time specified to submit the project topic for approval by the supervisor and submission of approved and complete work is considerably short.

(ii) Financial Barrier: My learn student's budget affected the output of this study.

(iii) Lack of Material: Gaining access to resource materials was a big problem.

(iv) Since this work is to fulfill the requirement of an OND the purpose limited my study.

1.5 DEFINITION OF TERMS

(i) Binary operation is a rule that combines any two elements of any given set(s).

(ii) SET: is the collection of well-defined object

(iii) Element: is the member of a set.

(iv) Closure Property: when a binary operation is defined over a set's then the set is said to be closed under,the operation*

(v) **COMMUTATIVE PROPERTY:** When a binary operation *is said to be commutative if, for each elements of a set;a,b,€S,we have a*b = b*a.

(vi) Associative property: a binary operation is said to be associative if for each element: a,b,c€s the relationship, a*(b*c)*c holds.

(vii) Distributive property: Let a,b,c,€,s suppose a*(bΔ(a*c) then 'a' is distributive.

(viii) AND Gate: Is a computer logical decision element which provides an output if and only if the input functions are satisfied.

(ix) Not-Gate: is a circuit which provides a logical inverter of the input signal.

(x) Or-GATE: is logical decision element which has the characteristics of providing a binary '1' output if any of the input signals are in a binary '1' state.

(xi) NAND GATE: is logical decision element which has the characteristics that the output 'y' is zero's(o) if, and only if, all the output are '1s'.

(xii) NOR-GATE: is a computer logical decision element which

Provides a binary '1' output if all the input signals are a binary zero's (o).

(xiii) Ex-OR (Exclusive or Gate):is a logical element which has the properties that if either of the input is a binary '1 'if both input a Binary "l or 0', then the output is a binary O.

(xiv) Logic: Is a circuit which perform the arithmetic and central Operation in a computer.

(xv) Modulus: The absolute value of a complex number.

(xvi) Boolean algebra: a distributive lattice which has universal bounds and has complement.

(xvii) GATE (Computer system): A circuit having a binary output which is fully determined by binary state of input signals, such as in the AND OR Gate circuit.

(xviii) Inverse: The inverse of an operation is one that undoes what has been done or is the reciprocal.

(xix) €: This symbol implies, "contained in" member of" "element of" the expression a€B means that, the element 'a' is contained in B.

(xx) V: This symbol 'means'/stands for' all; The expression V a,b,c,€S means all a,b,c containing S

22 ≠: This symbol implies: Not equal to. The expression $a \neq b$, mean a not equal to b.

23. /: This symbol implies: such that. The expression a*b={x/x is an even number}.

24. ≠>" This symbol implies: Not implies that. The expression a*b ≠> A*B.

25. =>: The symbol means implies: Implies that. The expression a+b=C => = a+b

26. =: The symbol implies: equal to A=B

27. : The symbol implies: not contained in", "Not member of", "Not element of" The expression A, S

28. Mapping:

29. $\triangle$ or $\bigtriangledown$ This symbol implies Binary operator The expression A $\bigtriangledown$ B or A $\triangle$ B meaning that 'A' acted (operate) on B.

CHAPTER TWO

BOOLEAN ALGEBRA

2.0 INTRODUCTION

In practical terms of computer technology, Boolean algebra, first proposed by George Boolean (1815-1864) provides a mathematical procedure for manipulating logical relation in symbolic forms. We shall explicitly establish here, the principles of Boolean Algebras (BA).These principles or rulcr are naturally algebraic properties that are true and admissible to all sets, A first course is the mathematics of set theory which extends to the rigorous concept of groups. This concept is deeply rooted in the application to logics, functional analysis (algebra of projection) and ring theory (Boolean Ring). The study of Boolean algebra extends to several aspects whose scopes are outsides this study.

2.1 PRINCIPLES OF BOOLEAN ALGEBRA

For any given elements; a, b, c, in a Set S, (a, b, c, ЄS), the following properties

may hold;

(1) CLOSURE PROPERITY:

If for any element a,bЄS and the Binary operation *we have that a*bЄS, then we say that the set is closed under the operation *i.e. Which a binary operator *is defined over a set, S then the set is said to be closed under the operation *.for example, set R, real numbers is closed under the binary operation -Addition and multiplication- since the sum of any real number is real number and the product of any two real number is also a real number.

(2)COMMUTATIVE PROPERTY:

A Binary operation *is said to be commutative if for each elements of a set a,b€S, We have that a*b =b*a The operations addition and multiplication' are commutative over the set of real number (R), illustratively:

(i) a + b = b + a and

(ii) a + b = b + a

On the other hands, let a'b€S where S is a set of real number.

(i) a-b≠b-a unless a =b, similarly,

(ii) a/b≠b/a unless a =b, hence division and subtraction of real number are not commutative over the set of real numbers (R).

(3) **ASSOCIATE PROPERTY**

A Binary operation is said to be associative if, for each element; a,b,c€S the relationship a*(b*c)=(a*b)*c holds. Again only addition and multiplication are associative since; a+(b+c)=(a+b)+c and ax(bxc): (axb)xc

(4) **DISTRIBUTION PROPERTY**

let a,b,c€S suppose a*(b △c) = (a*b)△(a*c)where "*and△" are binary: operations then *is lift distributive over △ and also (a △b)*c =(a*c) △

(b*c) then *is Right distributive over △.

In general a+(bxc)≠I=>(a+b)x (a+c),ie.Addition is not distributive over multiplication, while multiplication is distributive over addition.

(5)**THE IDENTITY ELEMENT**

When zero is added to any number the sum is always the number, ie.The value remains unchanged.

e.g.3+0 =3=0+3, similar case occurs when any number is multiplied by one (1).for instance 2xl =2 =lx2.These two numbers (0,and 1)are called identity or Neutral elements. Zero (0) is the identity element for addition, while one (1) is the identity element or number for multiplication. The identity (Neutral) element denoted by 'e', has the property that; a*e =e =e *a, for all (∀) a€S.The identity element 'e' if it exists in a sets is always: unique -The proof of this statement is outside the scope of this study.

(6) **THE INVERSE ELEMENT**

Consider a Set S, of real numbers which is closed under a binary operation and if for instance, a€S and we can find an element a'€S such that; a*a =a'a*=e where 'e' is the identity element in S under *, then a' is called the inverse of the element 'a' in S (a€s). It is quit usual to denote the inverse of 'a' as a-1, a-1 is not necessary the reciprocal of a (1/a) unless the operation is multiplication for a Set S, under an operation *, and only talk of the inverse of an element a€S.

CHAPTER THREE

OPERATIONS WITH BINARY OPERATIONS AND LOGIC GATE.

1.0 INTRODUCTION

This chapter divides the project topic into two sections. We shall first consider some algebraic expressions which will be evaluated with the aid of binary operators and secondly, show the digital application of binary operation and logic gates.

3.1 BINARY OPERATIONS

We shall learn how operations with numbers or quantities, will enable us to discover simple relationships between two numbers such operation as 'add 2 to 3','subtract 6 from 10','Multiply 5 by 4','divide 16 by 2; defending some rules in which two element of a Set are combined.

3.1.1 EXAMPLE OF CLOSURE RULE (PROPERTIES)

(a) (i) An operation is defined on the Set of real numbers R such that if x, y€R, then.

$\underline{x*y} = \underline{x+y}$ determine (i)3*2, (ii)-5*4, (iii)'l'2 *'l'2 (iv)7*3

is the Set R close under the x?

Sol.

} = x + y
}

(i) $x * y = \frac{x+y}{2}$ => (ii) $x * y = \frac{x + y}{2}$

$3*2 = \frac{3+2}{2} \Rightarrow$

$\underline{5/2}$ Ans;

$\frac{1}{2} \times \frac{1}{2} = \frac{\frac{1}{2}+\frac{1}{2}}{2}$ (LCM)

$\Rightarrow \frac{\frac{1+1}{2}}{2} = \frac{2/2}{2} = \frac{1}{2}$

(iii) $-5x4 >$

$-5x4 = \frac{-5+4}{2}$

$= \underline{-\frac{1}{2}}$ ans.

(iv $X*y = \frac{X+y}{2}$

$7x3 = \frac{7+3}{2} = 10/2$

$\underline{=5}$Ans.

If x, y€R then $\frac{x+y}{2}$ €R. Hence on the Set R is closed under the operation.

(b)(ii) TABLE OF RULE COMBINATION

Consider the tables of the rule of addition and multiplication in modulus 6.

<u>Sol</u>

In modulus 6 the Set of number to be considered is S6 = (0,1,2,3,4,and 5)

Table (a) Addition

+	0	1	2	3	4	5
0	0	1	2	3	4	5
1	1	2	3	4	5	0
2	2	3	4	5	0	1
3	3	4	5	0	1	2
4	4	5	0	1	2	3
5	5	0	1	2	3	4

Table (b) Multiplication

X	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	1	2	3	4	5
2	0	2	4	0	2	4
3	0	3	0	3	0	3
4	0	4	2	0	4	2
5	0	5	4	3	2	1

In Table (a), addition is performed the normal way, but if the result of the addition is 6 or more, we subtract the highest multiple of 6 from the result and write down the remainder.

3.1.2 EXAMPLE FOR COMMULATIVE RULE (PROPERTY)

(a) An operation * is defined on the Set of real numbers R by

a*b =a+b+3ba for all a,b€S.Is the operation *commutative.

Sol

a *b =a+b+3ab =b *a-=b+a+3ba =>

b* a = b+a+3ba

= a =b = 3ab

= a * b. hence the operation* is commutative.

3.1.3 EXAMPLE FOR ASSOCIATIVE RULE (PROPERTIES)

(a)The operation *is defined on the Set of Real numbers by

a*b =a+b+ab V a,b€R
2

(i) Is the operation *associative over the Set R

Sol

(a x b) xc =(a + b + ab) xc =a+b+½ab+c+½ (a+b+½ab)c
2

a+b+c+½ab +½ac +½ bc + ¼abc

=a+b+c+½ab +½ (ab+ac+bc)+ ¼abc

ax(bxc)=a+(bxc)+1/2bc)+½a(b+c+½bc)

=a+(b+c+½ab+½ac+¼abc)

:.(axb)xbc =a+b+c+½(ab+ac+bc)+¼abc

Hence the operation* is associative over the Set R.

3.1.4 EXAMPLE FOR SISTRIBUTIVE RULE (PROPERTIES)

(a)The operation *and △ are defined on the Set R of real numbers by

$a*b = \frac{a+b}{3}$ ∀a,b€R a△b =ab ∀a, b€R. Does the operation, △distributive over the operation *?

Sol.

Let a,b,c€R

$a\nabla(b*c)=a \nabla \frac{(b+c)}{3}$

$=\frac{a(b+c)}{3} = \frac{ab+ac}{c}$

(a ▽ b)*(a▽b) =ab*ac =>

$= \frac{ab +ac}{3}$

: a▽(b*c) =(a ▽c)*(a ▽ c)

3.1.5 EXAMPLE DOR IDENTITY ELEMENT

(a) An operation * is defined on the Set R of real numbers by: $a*b=\frac{ab}{3}$ ∀ a,b€R.

Find the identity element.

Sol.

Let the identity element in r be ė, if a€R then a*e =e*a =a

:.a *e $=\frac{ae}{3}$ =a: .$\frac{ae}{3}$ =9 : ; e=3

Hence identity element in R under*is 3.

3.1.6 EXAMPLE FOR INVERSE ELEMENT

(a) The operation *on the Set R of real number. excluding zero is defined by: Pq = pq, for all P,q€R. Find the inverse element?

Sol.

Let the identity element be e then x*e =e*x =x

:. Xe = x,e =1

Let the inverse of X be X_I, then xx ,x^{-1} =e xx $^{-1}$ =1

x^{-1} = l/x

3.2 LOGIC GATE

In designing digital Computer, the principle of Boolean algebra is highly employed. The logical elements of AND, OR and NOT etc; are combined to perform specific functions. Logical statements are implemented as electronics circuits. These are in turn connected to other circuits(s) to achieve the desired result(s).

3.2.1 TYPES OF LOGIC GATE

There are three basic operations aside from the various logic gates. These are; NOT,AND and OR gates others are: NOR,NAND,EX-NOR and EX-OR

3.2.2. NOT GATE

Not gate (inverter) is a circuit which provides a logical inverter of the input signal. If the input signal is a binary '1'the output signal is a binary '0' if the input signal is in the zero (0) state, the output is in the one (1) state.

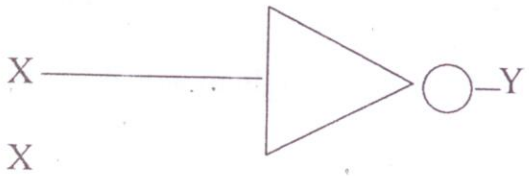
Supposing x and y are two events, where x not occurring, produces y and vice versa. This is expressed in Boolean algebra as $F = A^1$, where the prime denote the Not function.

A truth table below reveals the above explanation.

Table 3.1

X	Y
0	I
I	0

$\overline{X} = y$



$X = \overline{y}$ X

3.2.3 AND GATE

AND Gate (Circuit) is a computer logical decision element which provides an output if the input functions are satisfied. Supposing that A,B and Y, are events, whereby Y is the output, then 'Y' will only occur if A and AB occurs. This may be represented in Boolean algebra as: Y =A.B or Y= AB. In the AND Circuit, output Y is positive. If one or both input A &B is negative, the output will be negative A truth table below explain the above statement.

Table 3.2

A	B	Y
0	0	0
0	I	0
I	0	0
I	I	I

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

Dig. 3.2

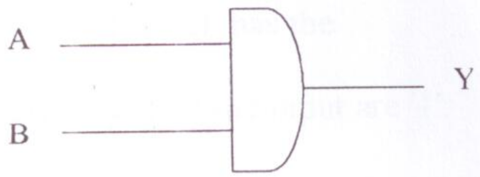


Table 3.2 illustrate the operation and truth table of an AND Gate, while Dig. 3.2 illustrate the symbol.

3.2. A OR GATE

OR GATE (circuit is a computer logical decision element which has the Characteristic of providing a binary '1' output if,any of the input signals are in a binary 'I' state. This is express interms of Boolean algebra as: Y -A + B. Illustrates the above explanation.

Table 3.3

A	B	Y
0	0	0
0	I	I
I	0	I
I	I	I

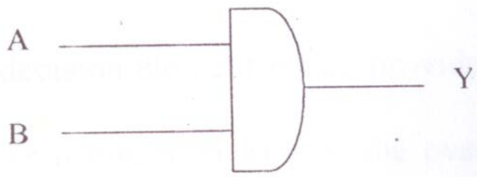
$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

Dig. 3.3



3.2.5 NAND GATE

NAND Gate (circuit) is a logical decision element which has the characteristic of the output 'Y' being '0 'if and only if all the input are '1'. This is use as an inverting switch. When an input is at logic zero (0) irrespective of the other input the output stages at logic '1' ie. When both input are the same the out is '1'and when both output are difference the output is ‘0’. Supposing A and B are inputs, a truth table below is used to demonstrate the above operation.

Table 3.4

A	B	Y
0	0	I
0	I	0
I	0	0
I	I	I

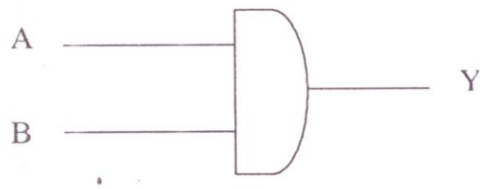
$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

Dig. 3.4



An inverting Switch

3.2.6 NOR GATE

NOR Gate (circuit) is a computer logical decision element which provides a binary 'I' output if all the input signals are a binary '0'.This is the overall NOT of the logical OR Operation. It has a function as: A or B =Y. the below table demonstrate the operation.

Table 3.5

Dig. 3.5

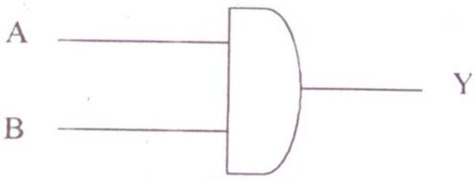
A	B	Y
0	0	I
0	I	0
I	0	0
I	I	0

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$



NOR Inverter

3.2.7 EX-OR (EXCLUSIVE OR GATE)

Ex-OR Gate (circuit) is a logical element which has the properties that if either of the input is a binary'1"then the output is a '1'or 0', the output is a binary '0'.In the terms of Boolean algebra this function is represented as: Y =AB'+A'B Below is the truth table and symbol.

Table 3.6

Dig. 3.6

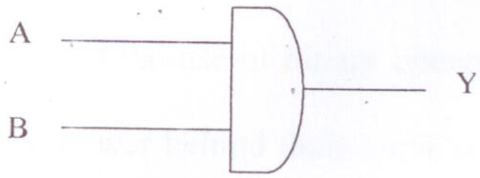
A	B	Y
0	0	0
0	I	I
I	0	I
I	I	0

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

$\overline{AB} = \overline{Y}$

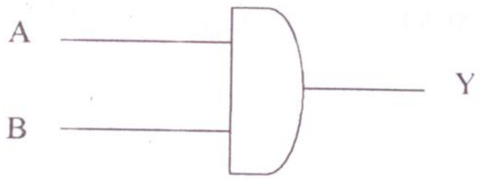


An Ex-OR Inverter

Table 3.5

Dig. 3.5

A	B	Y	
0	0	I	$\overline{A}B = \overline{Y}$
0	I	0	$\overline{AB} = \overline{Y}$
I	0	0	$\overline{AB} = \overline{Y}$
I	I	0	$\overline{AB} = \overline{Y}$



NOR Inverter

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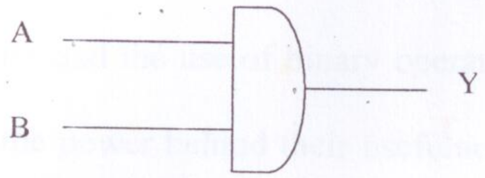
Table 3.6

Dig. 3.6

A	B	Y	
0	0	0	$\overline{A}B = \overline{Y}$
0	I	I	$\overline{AB} = \overline{Y}$
I	0	I	$\overline{AB} = \overline{Y}$
I	I	0	$\overline{AB} = \overline{Y}$



An Ex-OR Inverter

EX-NOR GATE (EXCLUSIVE NOR GATE)

This out of an event says 'Y' will occur if, the input both occur and do not. But if one of the inputs occurs the out-put will not occur. Consider the truth table below.

Table 3.8

A	B	Y
0	0	0
0	I	0
I	0	0
I	I	I

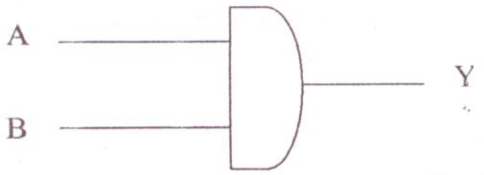
$\overline{A}B = \overline{Y}$

$\overline{A}B = \overline{Y}$

$\overline{A}B = \overline{Y}$

$\overline{A}B = \overline{Y}$

Dig. 3.8



This gate is used as a comparator. It has it function as Y =AB'+A'B OR

$AB \pm \overline{A}B + AB$.`

One could say, conclusively, that the principles and idea of logic gates is one of the bedrocks for the family of electronics and the use of binary operator and Operation is the ling with which lies the power behind their usefulness and importance. All the logic gates considered has many uses but follow the same principle of the use of binary operation in respect to the values of the inputs and the output.

CHAPTER FOUR

SYSTEM DESIGN AND IMPLEMENTATION

4.0 INTRODUCTION

With great consideration of the scope of limitation of this study, this chapter dwells on the preliminary stages of system design, applications of Binary numbers, Binary operators and logic gates. We also went ahead to developed a program.

The essence of developing a program lies in the fact that it concludes the preliminary stages of designing any digital circuit (system). Its success determines when and how the industrial and production stage can commence.

4.1 ALTHORITHM

A PROGRAM TO PRE-DEFINE BOOLEAN PROPERTIES

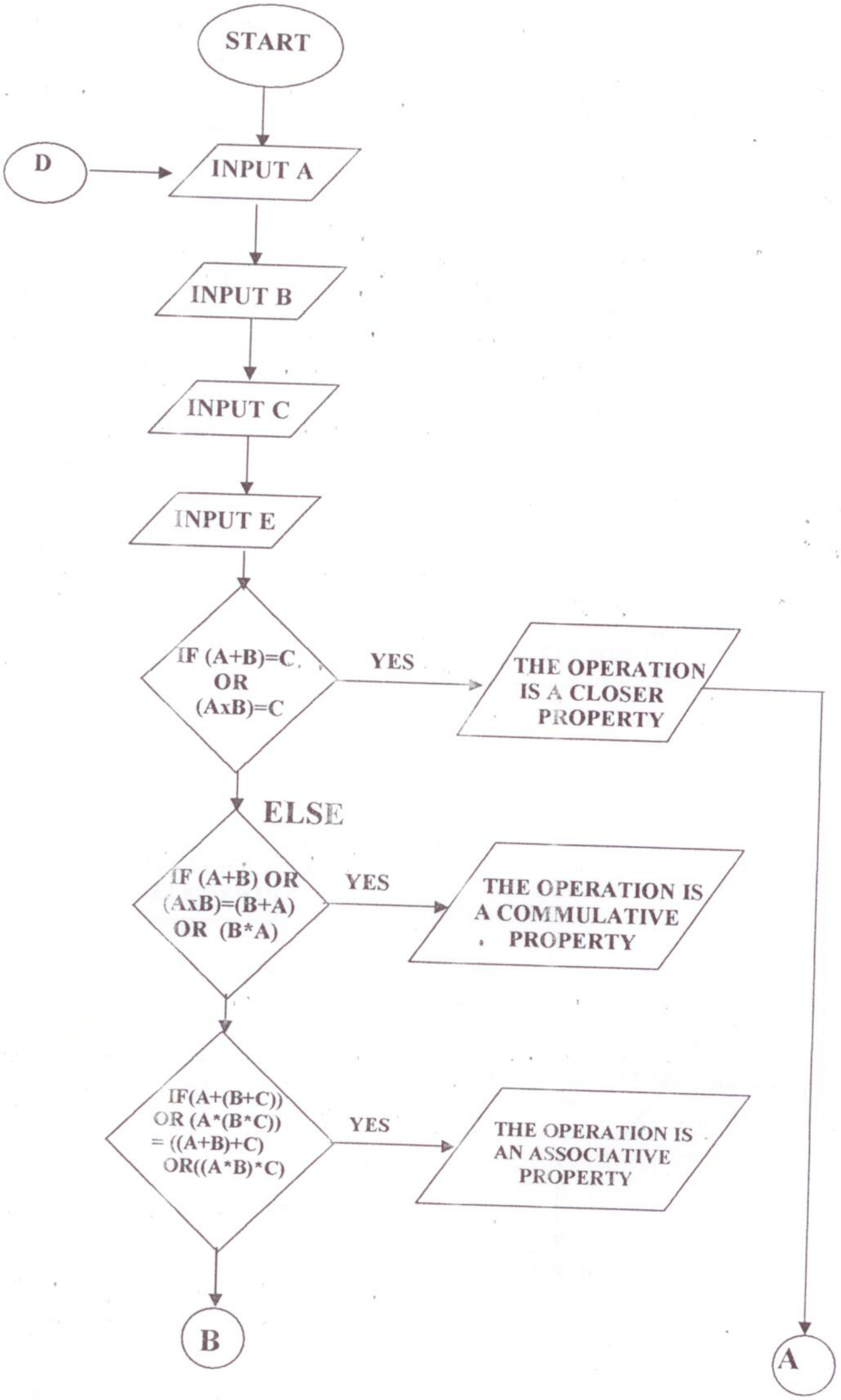
1. Enter three variable say A, B, C as the Set elements'
2. Setup the first condition to determine the closure property and print The result else,
3. Set the third condition to determine the commutative Property, and print the result else.
4. Set the third condition to determine and print the result of the Associative property else,

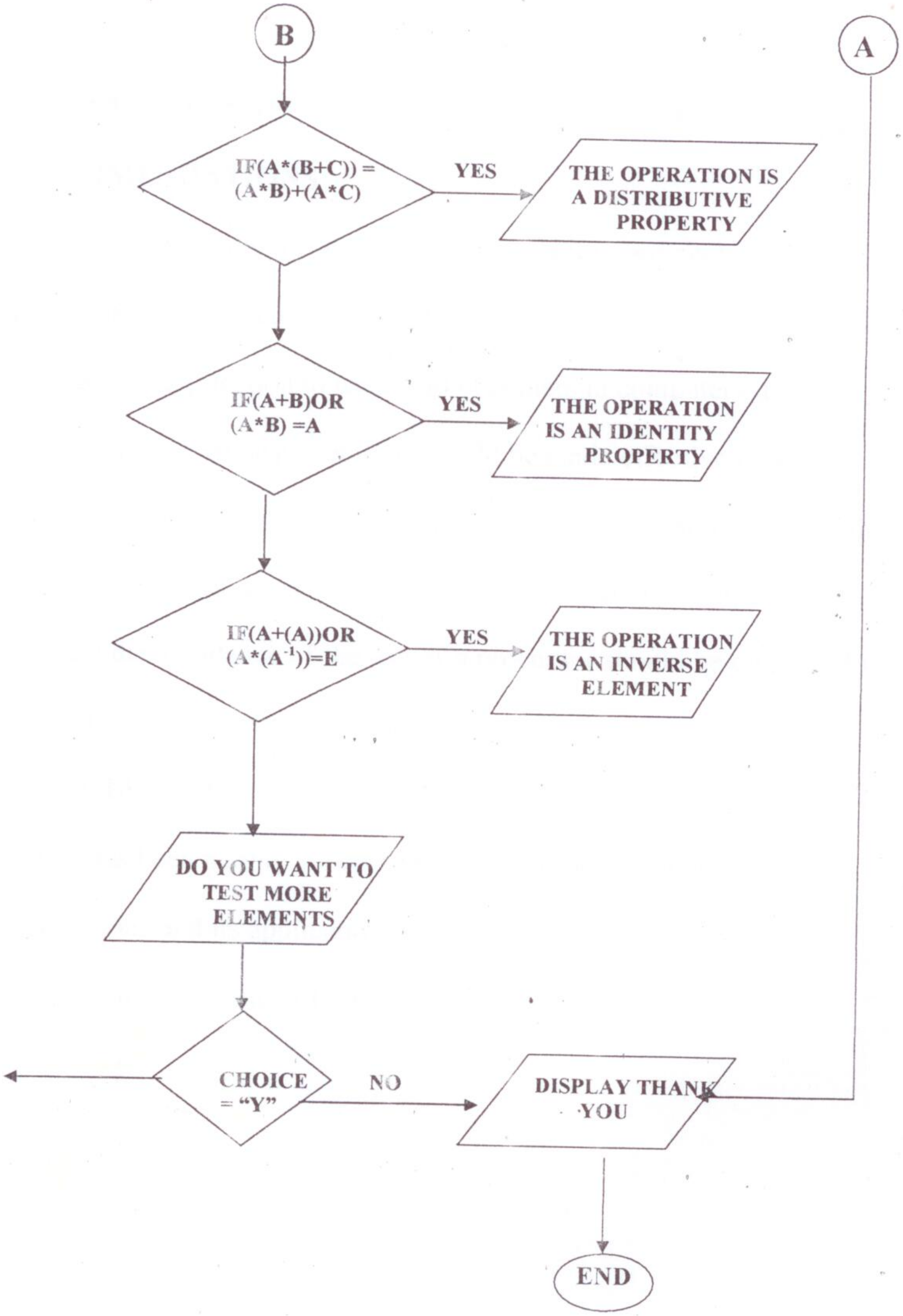
5. Set the fourth condition to pre-defined and print the result of the distributive property else

6. Set the fifth condition to predefined and print the result of identity element else

7. Set another condition to determine the inverse element and print the result else. End the operation and the program.

4.2 FLOW CHART




B
A
IF(A*(B+C)) = (A*B)+(A*C)
YES
THE OPERATION IS A DISTRIBUTIVE PROPERTY
IF(A+B)OR (A*B) =A
YES
THE OPERATION IS AN IDENTITY PROPERTY
IF(A+(A))OR (A*(A-1))=E
YES
THE OPERATION IS AN INVERSE ELEMENT
DO YOU WANT TO TEST MORE ELEMENTS
CHOICE = "Y"
NO
DISPLAY THANK YOU
END

CHAPTER FIVE

SUMMARYIRECOMMENADTION AND CONCLUSION

5.1 RECOMMENDATIONS

Base on the foregoing, the following recommendations are made with the hope that their implementation will help in quick notification of the Binary Operation and its application to users and beginners in computer education.

1. The lecture/on Binary operation should be made effective in schools.
2. Computer student should be taught about the functioning parts of the computers system eventually on how to build personal computer.
3. Finally the avoidance of the use of a processor should be employed in order for fast execution of instructions.

5.2 CONCLUSION

This project has been mainly concerned with the problems and protects Binary operations and its application, origin of digital circuit and finally a Program to ensure efficiency of the research project.

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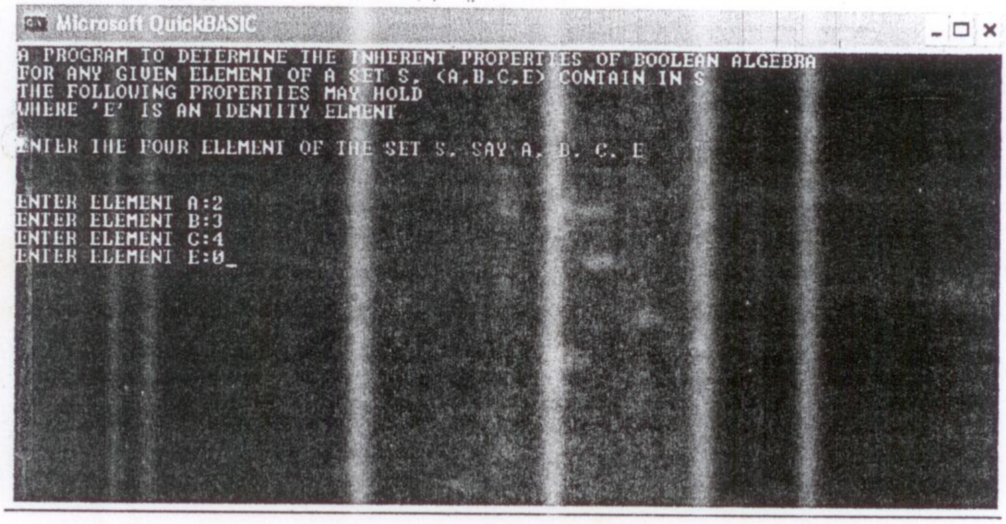
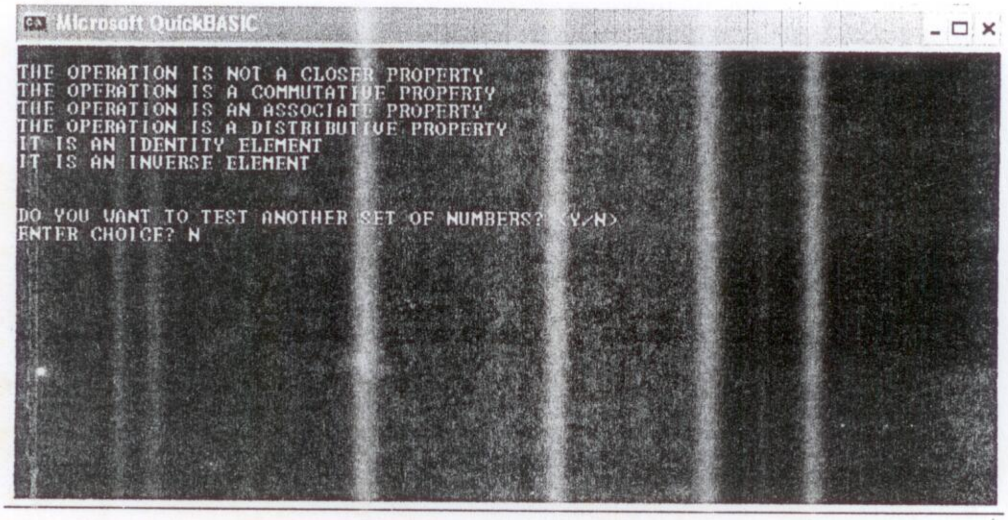
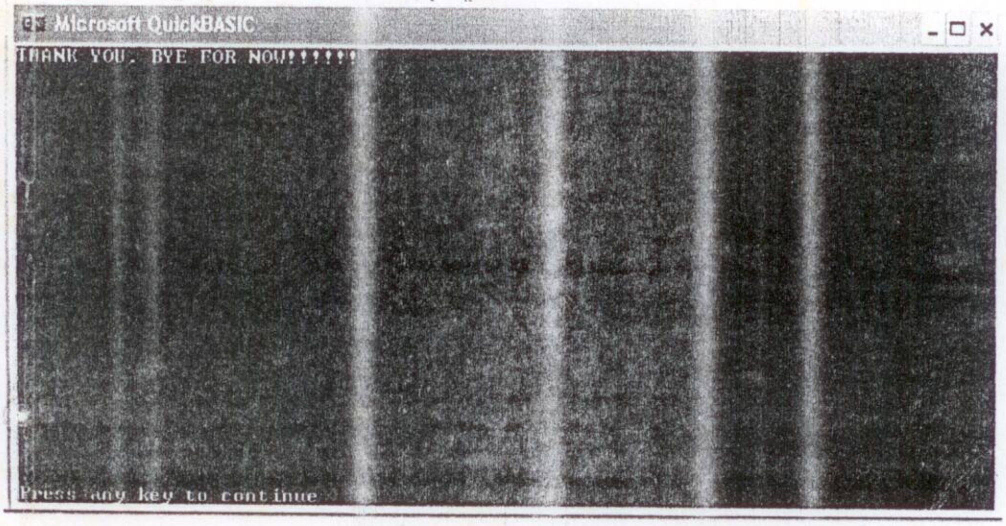
SCREENSHOT


Microsoft QuickBASIC
A PROGRAM TO DETERMINE THE INHERENT PROPERTIES OF BOOLEAN ALGEBRA
FOR ANY GIVEN ELEMENT OF A SET S, (A,B,C,E) CONTAIN IN S
THE FOLLOWING PROPERTIES MAY HOLD
WHERE 'E' IS AN IDENTITY ELMENT
ENTER THE FOUR ELEMENT OF THE SET S, SAY A, B, C, E
ENTER ELEMENT A:2
ENTER ELEMENT B:3
ENTER ELEMENT C:4
ENTER ELEMENT E:0


Microsoft QuickBASIC
THE OPERATION IS NOT A CLOSER PROPERTY
THE OPERATION IS A COMMUTATIVE PROPERTY
THE OPERATION IS AN ASSOCIATE PROPERTY
THE OPERATION IS A DISTRIBUTIVE PROPERTY
IT IS AN IDENTITY ELEMENT
IT IS AN INVERSE ELEMENT
DO YOU WANT TO TEST ANOTHER SET OF NUMBERS? (Y/N)
ENTER CHOICE? N


Microsoft QuickBASIC
THANK YOU, BYE FOR NOW!!!!!!!
Press any key to continue