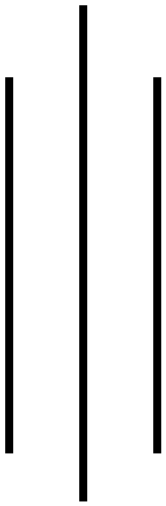
TRIBHUVAN UNIVERSITY

PATAN MULTIPLE CAMPUS

PATAN DHOKA, LALITPUR



DIGITAL LOGIC (BIT 103)

LAB 3

SUBMITTED BY

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CLASS: BIT – I / I

ROLL NO: 23

DATE: 2080/10/17

SUBMITTED TO

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CHECKED BY

TITLE: REALIZE NAND AND NOR GATES AS UNIVERSAL LOGIC GATES

1. NAND as Universal Logic Gates

A. NAND as NOT

a) OBJECTIVE

- To realize the NAND gate as NOT gate
- To practically use NAND gate as NOT gate.

b) REQUIREMENTS

i. Digital Learning Kit and Simulator
ii. 1 NAND gate
iii. Connecting wires
iv. Interactive / Sequence generator as input
v. LED as output

c) THEORY

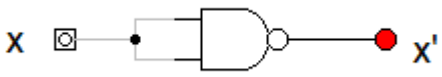
1. INTRODUCTION

NAND is a universal gate that can be used as any other gates. In this lab we are going to practically verify how we can use NAND gate as NOT gate. That means, the output is complement of the given input.

2. LOGIC EXPRESSION

$$F = X'$$

3. CIRCUIT DIAGRAM



4. TRUTH TABLE

X	OUTPUT (F1)
0	1
1	0

d) CONCLUSION

Hence, by doing this practical experiment, we have realized the NAND gate as NOT gate which gives complement of input as output.

B. NAND as OR

a) OBJECTIVES

- To realize the NAND gate as OR gate
- To practically use NAND gate as OR gate

b) REQUIREMENTS

i. Digital Learning Kit and Simulator
ii. 3 NAND gates
iii. Connecting wires
iv. Interactive / Sequence generator as input
v. LED as output

c) THRORY

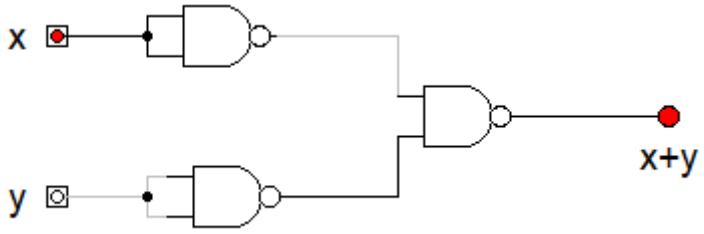
1. INTRODUCTION

NAND is a universal gate that can be used as any other gates. In this lab we are going to practically verify how we can use NAND gate as OR gate. That means, the output is high when any of inputs is high.

2. LOGIC EXPRESSION

$$F = X+Y$$

3. CIRCUIT DIAGRAM



4. TRUTH TABLE

X	Y	Output (X+Y)
0	0	0
0	1	1
1	0	1
1	1	1

d) CONCLUSION

Hence, by doing this practical experiment, we have realized the NAND gate as OR gate which gives high output when any of its inputs is high.

C. NAND as AND

a) OBJECTIVES

- To realize the NAND gate as AND gate
- To practically use NAND gate as AND gate

b) REQUIREMENTS

i. Digital Learning Kit and Simulator
ii. 2 NAND gate
iii. Connecting wires
iv. Interactive / Sequence generator as input
v. LED as output

c) THRORY

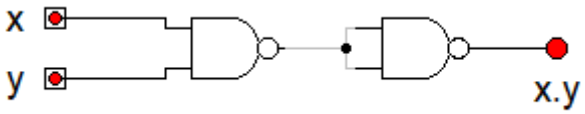
1. INTRODUCTION

NAND is a universal gate that can be used as any other gates. In this lab we are going to practically verify how we can use NAND gate as AND gate. That means, the output is high when all of inputs are high.

2. LOGIC EXPRESSION

$$F = X.Y$$

3. CIRCUIT DIAGRAM



4. TRUTH TABLE

X	Y	Output (X+Y)
0	0	0
0	1	0
1	0	0
1	1	1

d) CONCLUSION

Hence, by doing this practical experiment, we have realized the NAND gate as AND gate which gives high output when all of its inputs are high.

2. NOR as Universal Logic Gates

A. NOR as NOT

a) OBJECTIVE

- To realize the NOR gate as NOT gate
- To practically use NOR gate as NOT gate.

b) REQUIREMENTS

i. Digital Learning Kit and Simulator
ii. 1 NOR gate
iii. Connecting wires
iv. Interactive / Sequence generator as input
v. LED as output

c) THEORY

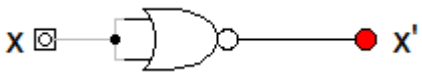
1. INTRODUCTION

NOR is a universal gate that can be used as any other gates. In this lab we are going to practically verify how we can use NOR gate as NOT gate. That means, the output is complement of the given input.

2. LOGIC EXPRESSION

$$F = X'$$

3. CIRCUIT DIAGRAM



4. TRUTH TABLE

X	OUTPUT (F1)
0	1
1	0

d) CONCLUSION

Hence, by doing this practical experiment, we have realized the NOR gate as NOT gate which gives complement of input as output.

B. NOR as OR

a) OBJECTIVES

- To realize the NOR gate as OR gate
- To practically use NOR gate as OR gate

b) REQUIREMENTS

i. Digital Learning Kit and Simulator
ii. 2 NOR gates
iii. Connecting wires
iv. Interactive / Sequence generator as input
v. LED as output

c) THRORY

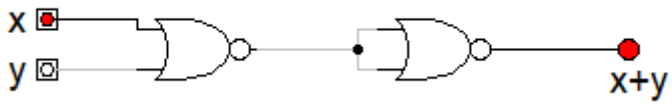
1. INTRODUCTION

NOR is a universal gate that can be used as any other gates. In this lab we are going to practically verify how we can use NOR gate as OR gate. That means, the output is high when any of inputs is high.

2. LOGIC EXPRESSION

$$F = X+Y$$

3. CIRCUIT DIAGRAM



4. TRUTH TABLE

X	Y	Output (X+Y)
0	0	0
0	1	1
1	0	1
1	1	1

e) CONCLUSION

Hence, by doing this practical experiment, we have realized the NOR gate as OR gate which gives high output when any of its inputs is high.

C. NOR as AND

a) OBJECTIVES

- To realize the NOR gate as AND gate
- To practically use NOR gate as AND gate

b) REQUIREMENTS

i. Digital Learning Kit and Simulator
ii. 3 NOR gate
iii. Connecting wires
iv. Interactive / Sequence generator as input
v. LED as output

c) THRORY

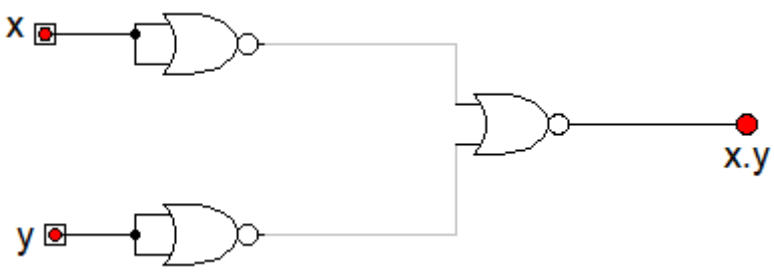
1. INTRODUCTION

NOR is a universal gate that can be used as any other gates. In this lab we are going to practically verify how we can use NOR gate as AND gate. That means, the output is high when all of inputs are high.

2. LOGIC EXPRESSION

$$F = X.Y$$

3. CIRCUIT DIAGRAM



4. TRUTH TABLE

X	Y	Output (X+Y)
0	0	0
0	1	0
1	0	0
1	1	1

d) CONCLUSION

Hence, by doing this practical experiment, we have realized the NOR gate as AND gate which gives high output when all of its inputs are high.