UTM UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

# SECR1013 DIGITAL LOGIC

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## Lab 1 Combinational Logic

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Section 08


Prepared by: Group 5

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Submission Date: 21 DEC 2020

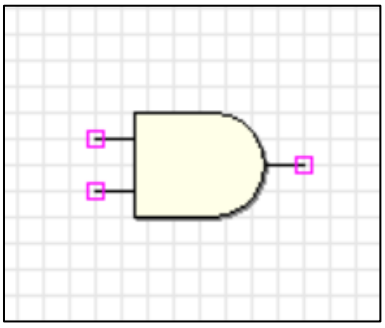
## Lab 1 Combination Logic

**D . Preiminary Work**

### Question 1

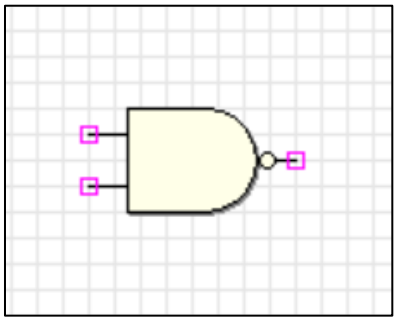
Draw a symbol, determine the IC number and produce a truth table for the following gate.

AND



IC Number: 7408

NAND



IC Number: 7400

Truth Table 1

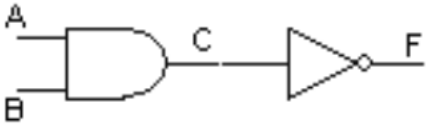
| Input | | Output |
|---|---|---|
| A | B | F |
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

Truth Table 2

| Input | | Output |
|---|---|---|
| A | B | F |
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

### Question 2

Complete the truth table for the following circuit.

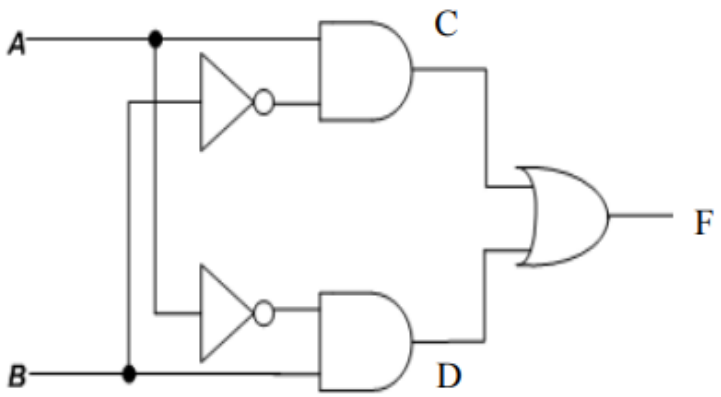



Truth Table 3

| A | B | C | F |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 |

**Question 3**

Write the Boolean expression for output C, D and F for the following circuit.




C = $A\overline{B}$
D = $\overline{A}B$
F = $A\overline{B}+\overline{A}B$

**Question 4**

Complete the truth table for the circuit in (3) based on the Boolean expression produced for C, D and F.

Truth Table 4

| A | B | C | D | F |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 0 | 0 | 0 |

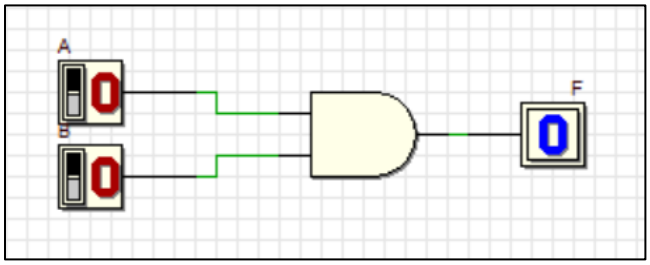
**E. Laboratory work**

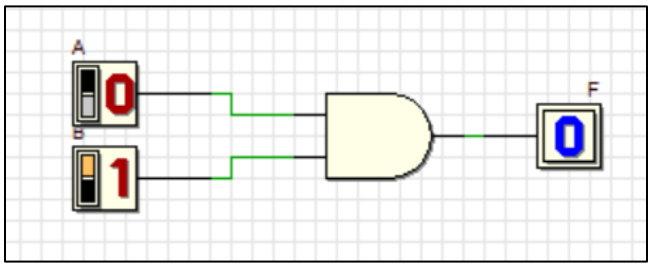
**Part 1**

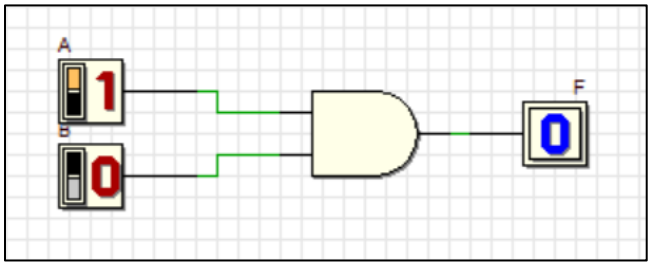
1. Construct Circuit 1 on the breadboard. Connect all inputs (A, B) to a switches and output F to LEDs.

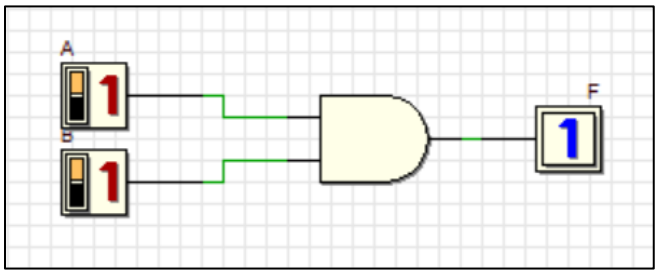

Circuit 1

Screenshots for result Circuit 1 by using Deeds-DcS:



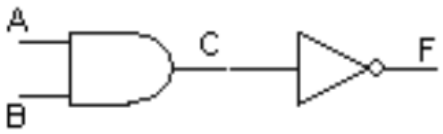
2. Test Circuit 1 and fill in Truth Table 5 for the circuit response to all possible input combinations. The Truth Table 5 should match the Truth Table 1 prepared in the Preliminary Work.

Truth Table 5

| Input | | Output |
|---|---|---|
| A | B | F |
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

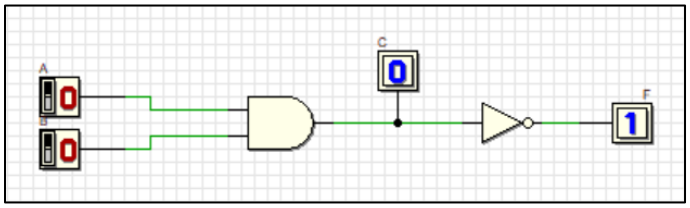
**Part 2**

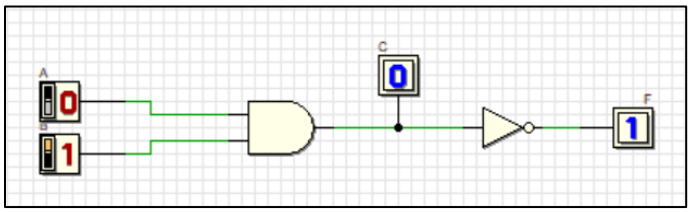
3. Construct Circuit 2 on the breadboard. Connect all inputs (A, B) to a switches and output C and F to LEDs

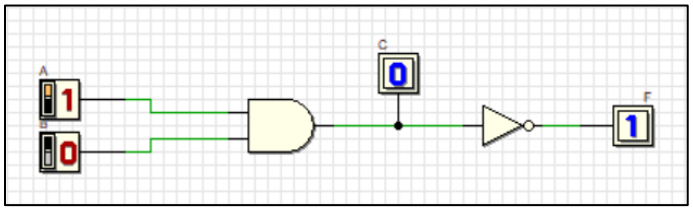


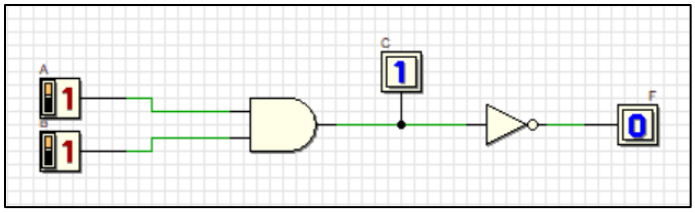

Circuit 2

Screenshots for result Circuit 2 by using Deeds-DcS:






4. Test Circuit 2, fill in Truth Table 6, for the circuit response to all possible input combinations.

Truth Table 6

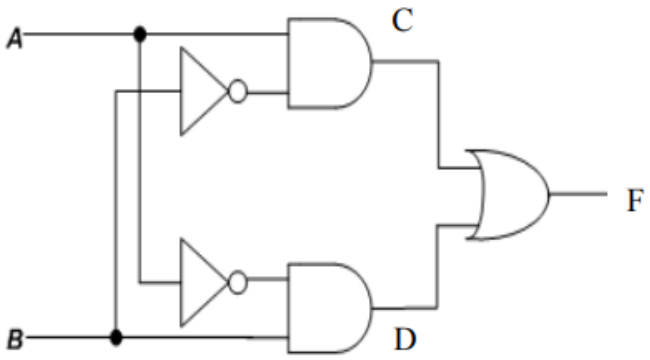
| A | B | C | F |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 |

5. Compare Truth Table 6 to Truth Table 2. What is the conclusion can you make?

The result of the truth table for both Truth Table 2 and Truth Table 6 are the same, the conclusion is circuit 2 represents NAND gate.

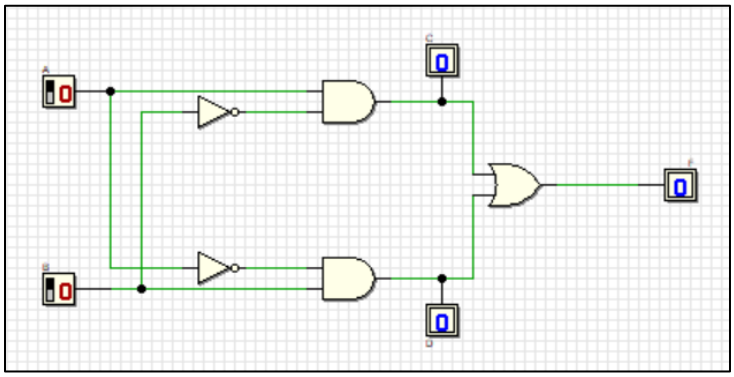
**Part 3**

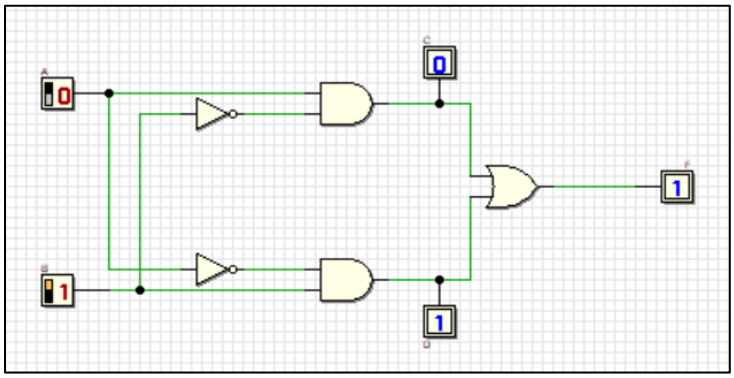
6. Construct circuit 3 on the breadboard. Connect all inputs (A, B) to a switches and output C, D and F to LEDs.

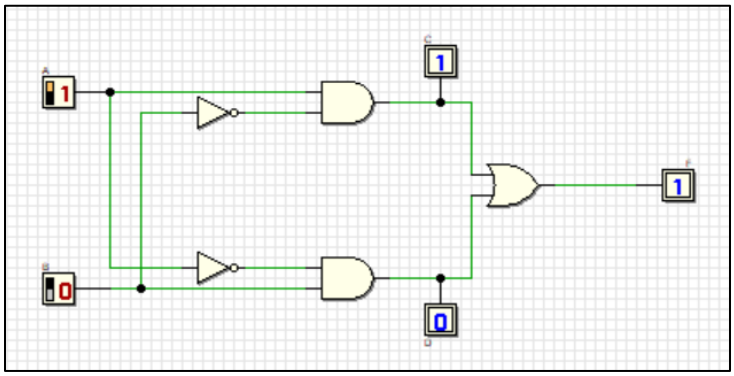


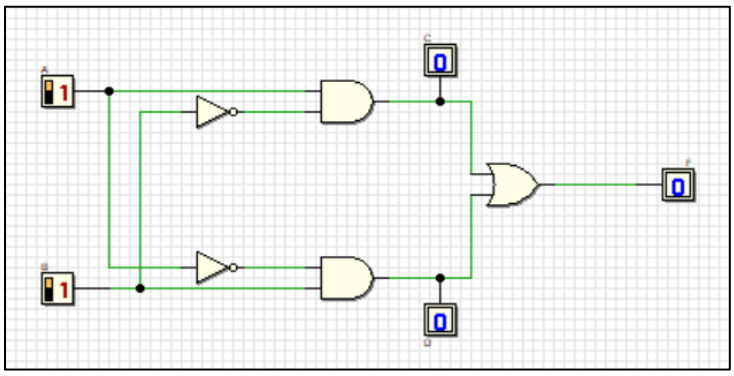

Circuit 3

Screenshots for result Circuit 3 by using Deeds-DcS:



7. Test Circuit 3; fill in Truth Table 7 for the circuit outputs (C, D, and F) for all possible input combinations.

Truth Table 7

| A | B | C | D | F |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 0 | 0 | 0 |

8. What single gate does Circuit 3 represent?

Circuit 3 represent XOR gate.