



Department of Computer Science
Faculty of Computing
UNIVERSITI TEKNOLOGI MALAYSIA

SUBJECT : SCSR1013 DIGITAL LOGIC

SESSION/SEM : 1/2020/2021

LAB 1 : **COMBINATIONAL LOGIC**

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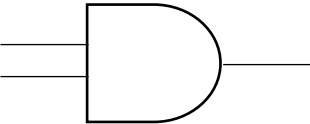
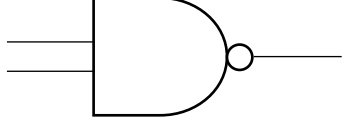
DATE : 16/12/2020

REMARKS :

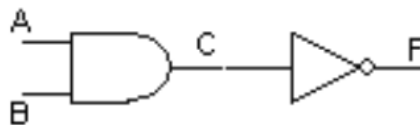
MARKS:

D. Preliminary Work

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

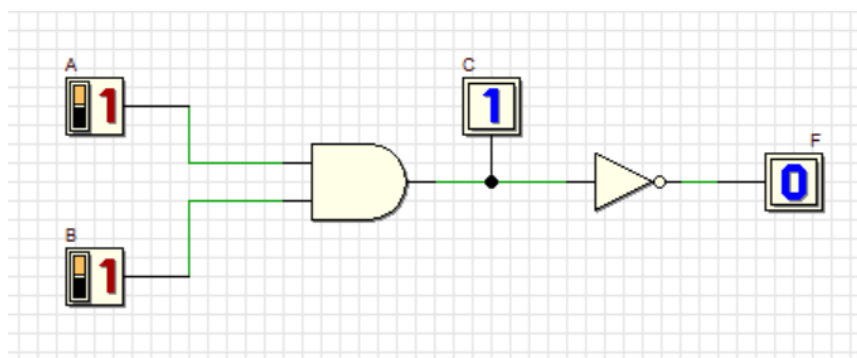
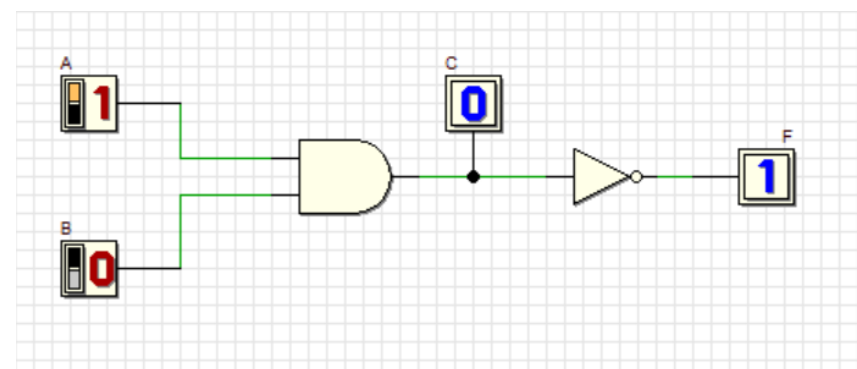
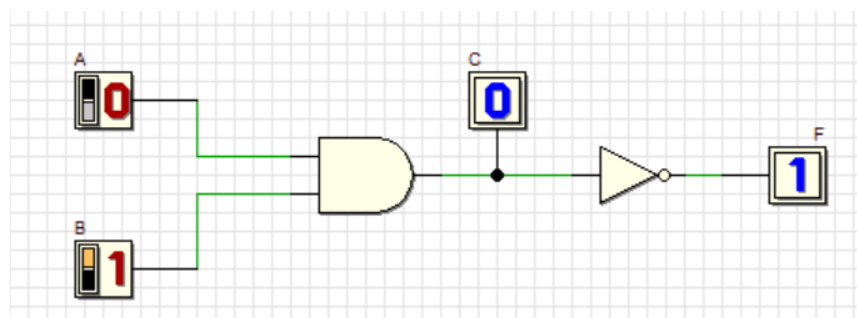
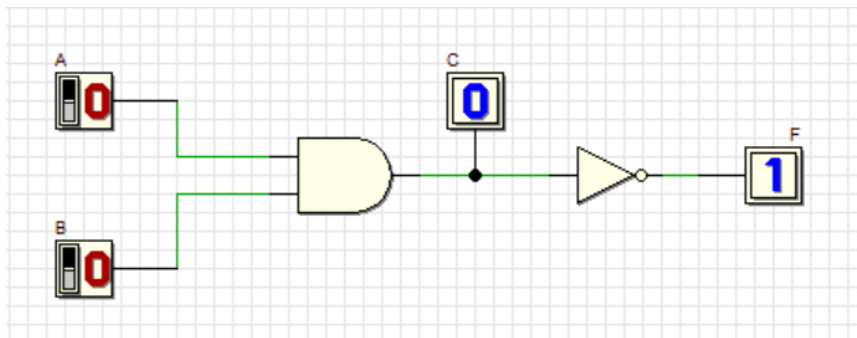
<u>AND</u>	<u>NAND</u>																																				
Symbol: 	Symbol: 																																				
IC Number:7408.....	IC Number:7400.....																																				
Truth Table 1	Truth Table 2																																				
<table border="1" style="border-collapse: collapse; margin: auto;"><thead><tr><th colspan="2" style="background-color: #cccccc;">Input</th><th style="background-color: #cccccc;">Output</th></tr><tr><th style="width: 30px;">A</th><th style="width: 30px;">B</th><th style="width: 30px;">F</th></tr></thead><tbody><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></tbody></table>	Input		Output	A	B	F	0	0	0	0	1	0	1	0	0	1	1	1	<table border="1" style="border-collapse: collapse; margin: auto;"><thead><tr><th colspan="2" style="background-color: #cccccc;">Input</th><th style="background-color: #cccccc;">Output</th></tr><tr><th style="width: 30px;">A</th><th style="width: 30px;">B</th><th style="width: 30px;">F</th></tr></thead><tbody><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></tbody></table>	Input		Output	A	B	F	0	0	1	0	1	1	1	0	1	1	1	0
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2. Complete the truth table for the following circuit.

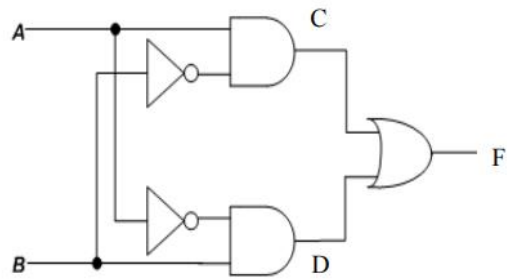


Truth Table 3

A	B	C	F
0	0	0	1
0	1	0	1
1	0	0	1
1	1	1	0



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



$$C = A \cdot \bar{B}$$

$$= A\bar{B}$$

$$D = \bar{A} \cdot B$$

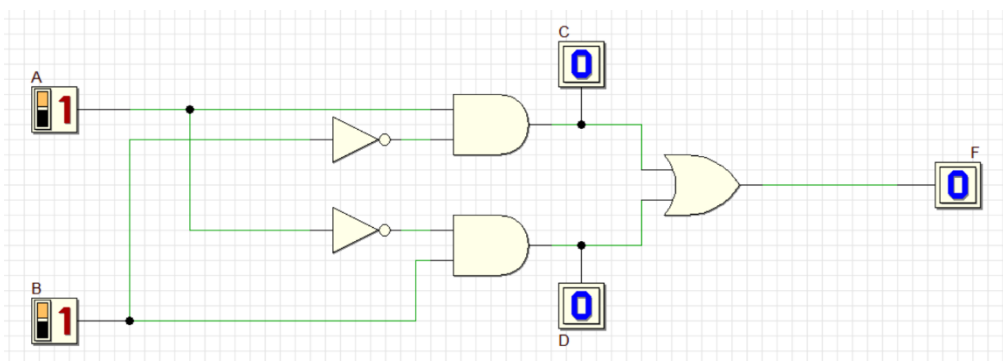
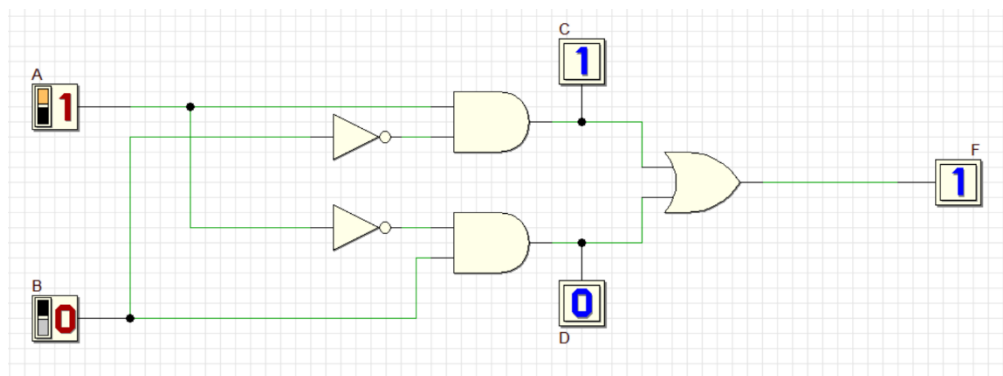
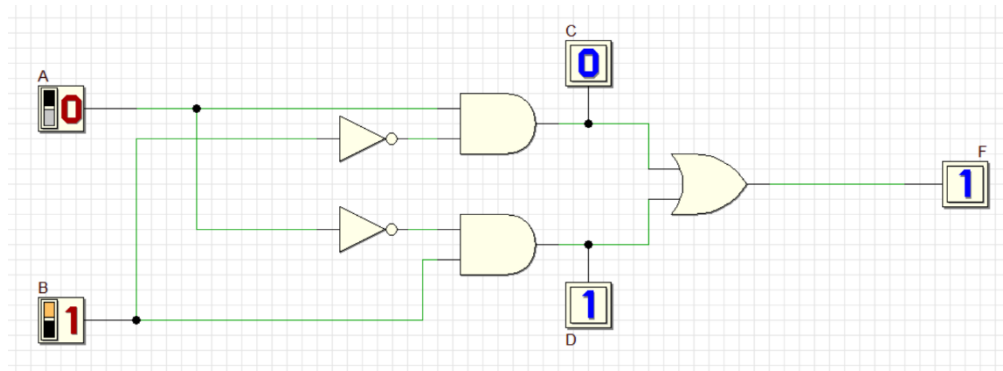
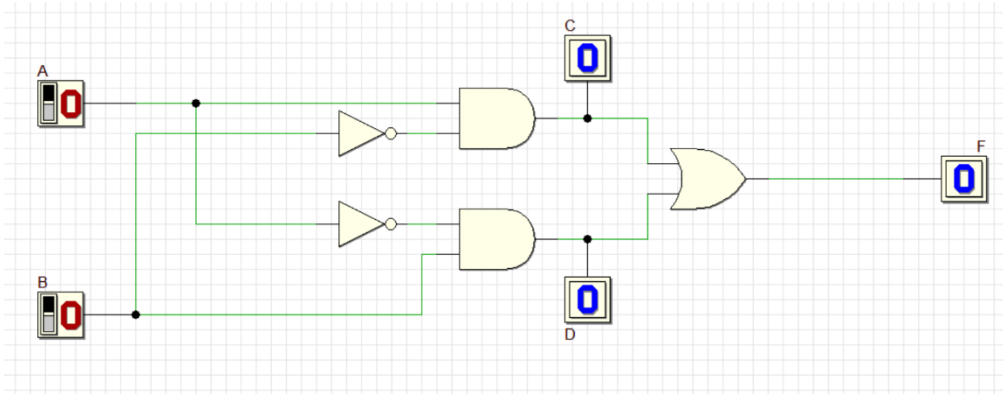
$$= \bar{A}B$$

$$F = A\bar{B} + \bar{A}B$$

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.

Truth Table 5

Input		Output
A	B	F
0	0	0
0	1	0
1	0	0
1	1	1



Circuit 1

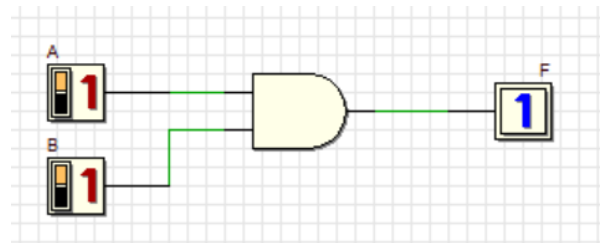
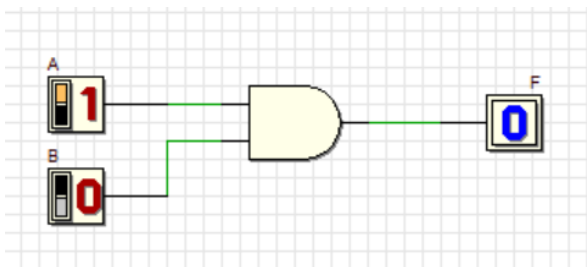
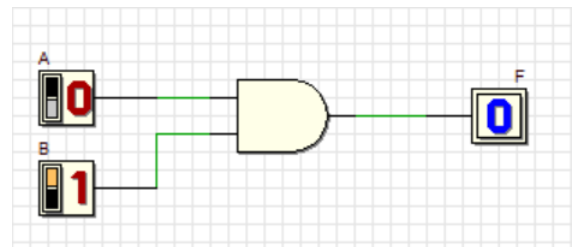
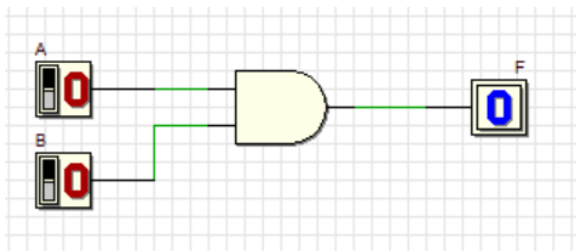
2. Test Circuit 1 and fill in Truth Table 5 for the circuit response to all possible input combinations. The Truth Table 5 should match the Truth Table 1 prepared in the Preliminary Work.



Fully Completed ☐

Partially Completed ☐

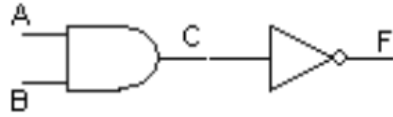
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Part 2

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

Truth Table 6



Circuit 2

A	B	C	F
0	0	0	1
0	1	0	1
1	0	0	1
1	1	1	0

4. Test Circuit 2; fill in Truth Table 6, for the circuit response to all possible input combinations.
5. Compare Truth Table 6 to Truth Table 2. What conclusion can you make?

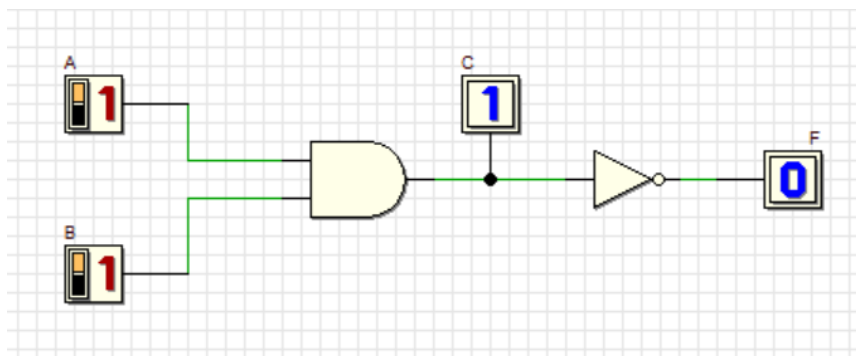
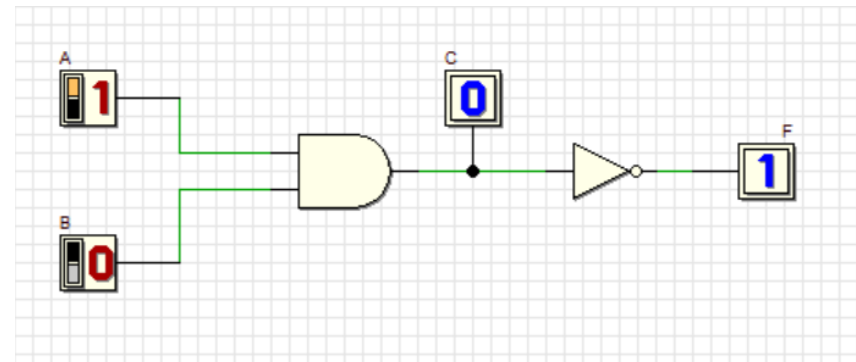
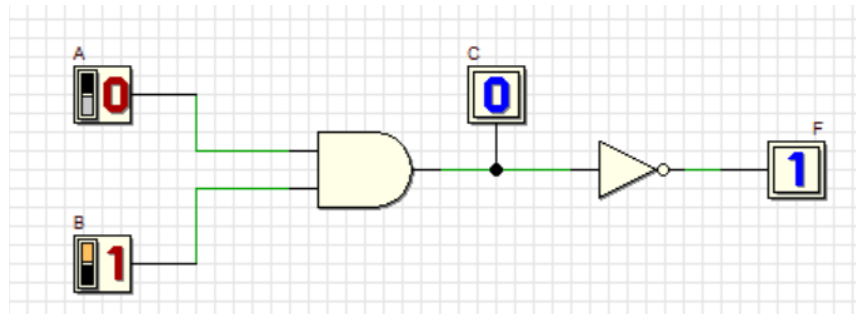
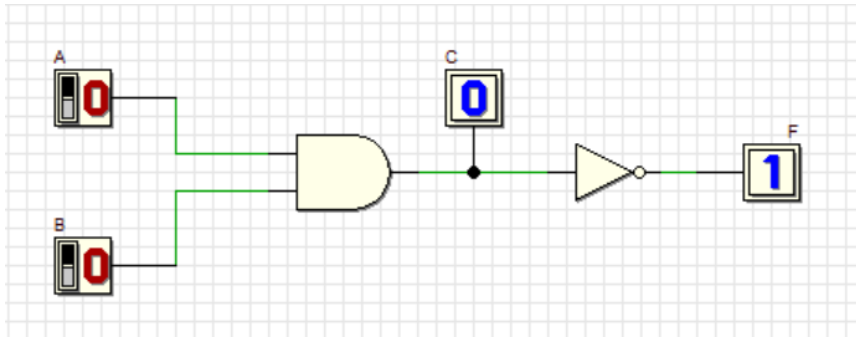
NAND gate is the combination of AND gate and inverter.



Fully
Completed ☐

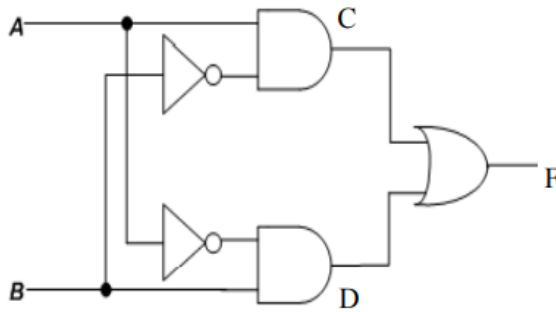
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Part 3

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

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

7. Test Circuit 3; fill in Truth Table 7 for the circuit outputs (C, D, and F) for all possible input combinations.
8. What single gate does Circuit 3 represent?
XOR Gate

