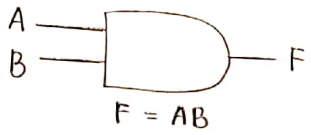
D. Preiminary Work

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

AND

Symbol:



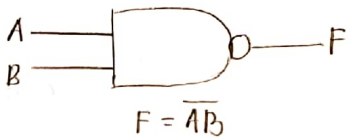
IC Number: .....7408.....

Truth Table 1

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

NAND

Symbol:

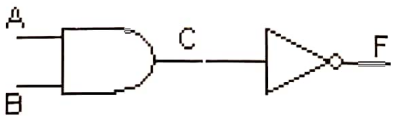


IC Number: .....7400.....

Truth Table 2

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

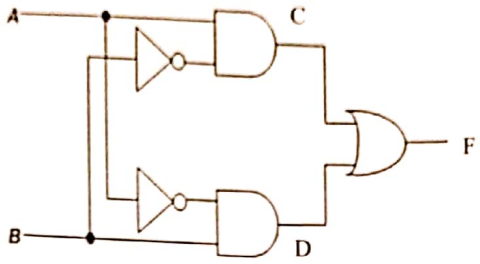
2. Complete the truth table for the following circuit.



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 and NOT B.

D = B and NOT A.

F = (A and NOT B) or (B and NOT A).

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

Truth Table 5

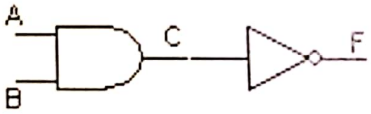
Input		Output
A	B	F
0	0	0
0	1	0
1	0	0
1	1	1

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* ☐ *Checked by:* _____

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

Truth Table 6

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.

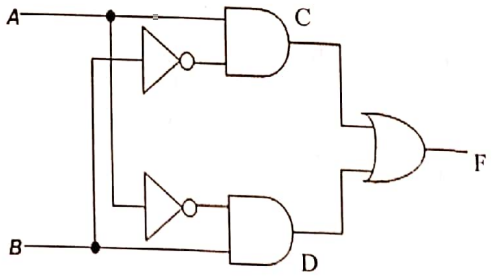
5. Compare Truth Table 6 to Truth Table 2. What conclusion can you make?

Table 2 invert the output in one way, but in Table 6 there are two output, which is before invert and after inverted.

Fully Completed ☐ *Partially Completed* ☐ *Checked by:* _____

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?

NAND gate.

Fully Completed ☑ *Partially Completed* ☐ *Checked by:* _____