0NOTE: Use of internet is permitted **only** to access software website, calculators are permitted, and your answers must include worked solutions. If you require extra sheet(s) please write your name and student number at the top of each additional sheet. <https://logic.ly/>

# Part A

## Objective

Understand various logic gates



|  |
| --- |
| Draw a labelled Gate Symbol, Functional Notation and truth table for the gates listed in the table below: |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Inputs** | |  | **Output(s) Truth Table** | | |  | | **A** | **B** | **AND** | **OR** | **XOR** | **NAND** | **NOR** | | **0** | **0** | 0 | 0 | 0 | 0 | 1 | | **0** | **1** | 0 | 1 |  | 1 | 0 | | **1** | **0** | 0 | 1 |  | 1 | 0 | | **1** | **1** | 1 | 0 |  | 0 | 1 | | **Gate Symbol** | |  |  |  |  |  | | **Functional**  **Notation** | |  |  |  |  |  | |

# Part B

## Objective

Construct a logic circuit

|  |
| --- |
| Construct the logic circuit below using Lab Logic and detail the functional notation and truth table for a two input **AND** gate.    Switches AND Gate LED Output |
| |  |  |  | | --- | --- | --- | | A | B | Output | | 0 | 0 | 0 | | 0 | 1 | 0 | | 1 | 0 | 0 | | 1 | 1 | 1 | |

# Part C

## Objective

Understand the construction of Logic Gates from various combinations of logic gates

|  |  |  |
| --- | --- | --- |
| Using Lab Software prove that combining and **AND** and a **NOT** constructs a **NAND** Gate | | |
| |  |  |  | | --- | --- | --- | | A | B | Output | | 0 | 0 | 1 | | 0 | 1 | 1 | | 1 | 0 | 1 | | 1 | 1 | 0 |       If you add a NOT gate to the AND gate it will take the output of AND and reverse it. Therefore creating a NAND gate. | | |
| Demonstrated to lecturer | YES | NO |
|  |  |

# Part D

## Objective

Understand the construction of Logic Circuits from various combinations of logic gates

|  |  |  |
| --- | --- | --- |
| Write a logic statement that corresponds to the following circuit | | |
| The lightbulb will only turn on if all the switches are turned on.  This is because the output of the first AND gate needs both switches on. And the output of the bottom OR gate is solely depended on the bottom switch, because if the second switch turns on, the NOT gate will not allow the signal to pass to the OR gate. | | |
| Demonstrated to lecturer | YES | NO |
|  |  |

# Part E

## Objective

Understand the construction of Logic Circuits from Logic Statements

|  |  |  |
| --- | --- | --- |
| Draw a logic circuit that represents the following logic statement    **X = 1**  ***if (A is NOT 1 AND B is 1) AND (A is NOT 1 AND C is NOT 1) OR (B is 1 AND C is 1)*** | | |
|  | | |
| Demonstrated to lecturer | YES | NO |
|  |  |

# Part F

## Objective

Understand Logic Circuits

|  |  |  |
| --- | --- | --- |
| Complete truth table for the logic circuit below | | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | **A** | **B** | **C** | Working Space | **X** | | **0** | **0** | **0** |  | **1** | | **1** | **0** | **0** |  | **0** | | **1** | **1** | **0** |  | **1** | | **1** | **0** | **1** |  | **1** | | **0** | **1** | **1** |  | **1** | | **0** | **0** | **1** |  | **1** | | **0** | **1** | **0** |  | **1** | | **1** | **1** | **1** |  | **1** | | | |
| Demonstrated to lecturer | YES | NO |
|  |  |

## Commit practical report at the end of session and ensure it has been checked

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Name** |  | **Student Number** |  |
| **Date** |  | **Checked** |  |
| **Group** | **A / B** |  |  |