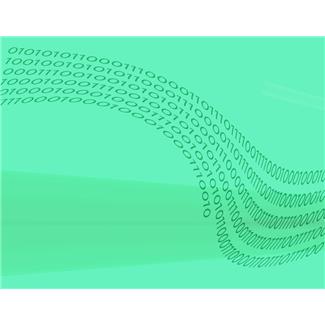
**Computer Science & Software Engineering**

**Basic Control Circuits**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_ Period \_\_\_\_\_

Technology Education Dept.

Pittsford Central Schools

1. Research and answer the following questions in your own words.
2. What are 4 components that every complete circuit should contain?
3. What are 3 measurable properties associated with circuits? List, define and give the unit for each.
4. What does a transistor do and why is it important?
5. Why are modern transistors so much better for building modern circuits than modern vacuum tubes?
6. Vacuum tubes are still commonly used in some devices today. Give an example.
7. Microprocessors are an example of a VLSI device. What does VLSI stand for and why does it affect how you live your life?
8. Complete the following truth tables **and** supply an image of each logic gate.

**INVERT Logic Gate – (1) input (1) output**

The output is opposite the input.

|  |  |
| --- | --- |
| INVERT | |
| Input A | Output |
| 0 |  |
| 1 |  |

**OR Logic Gate – (2) inputs (1) output**

The OR logic gate has a similar gate with the exact opposite logic called a NOR gate.

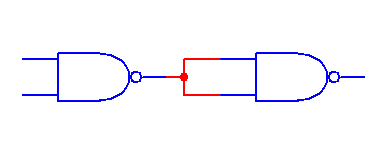
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | OR |  |  | NOR (Not OR) | | |
| Input | | Output | Input | | Output |
| A | B | A | B |
| 0 | 0 |  | 0 | 0 |  |
| 0 | 1 |  | 0 | 1 |  |
| 1 | 0 |  | 1 | 0 |  |
| 1 | 1 |  | 1 | 1 |  |

**AND Logic Gate – (2) inputs (1) output**

The AND logic gate has a similar gate with the exact opposite logic called a NAND gate.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | AND |  |  | NAND (Not AND) | | |
| Input | | Output | Input | | Output |
| A | B | A | B |
| 0 | 0 |  | 0 | 0 |  |
| 0 | 1 |  | 0 | 1 |  |
| 1 | 0 |  | 1 | 0 |  |
| 1 | 1 |  | 1 | 1 |  |

1. Take a digital picture of your working circuit for your engineering notebook or electronic portfolio as directed by your teacher.
2. Combining the inputs of a NAND Gate will cause it to function like what other type of Gate?



1. Use the push buttons to verify that this is a working AND circuit and check the result against the truth table.

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

1. Take a digital picture of your working circuit for your engineering notebook or electronic portfolio as directed by your teacher.
2. Create the circuit. Based on the circuit the motor provided in your kit is rated for 200 mA at 3V.
   1. What is the resistance due to the motor?
   2. Knowing this resistance, what then would be the current at 5V?
   3. This amount of current will not damage the motor, but if you wanted to protect this part of the circuit, what could you do?
3. Take a digital picture of your working circuit for your engineering notebook or electronic portfolio as directed by your teacher.