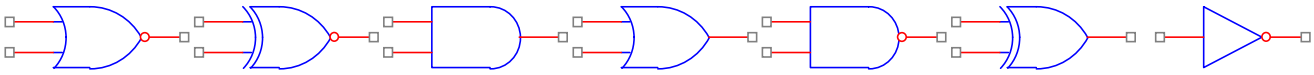
ICT Review Topics for Final

Digital Electronics

- LED is an acronym for _____
- RAM is an acronym for _____
- ROM is an acronym for _____

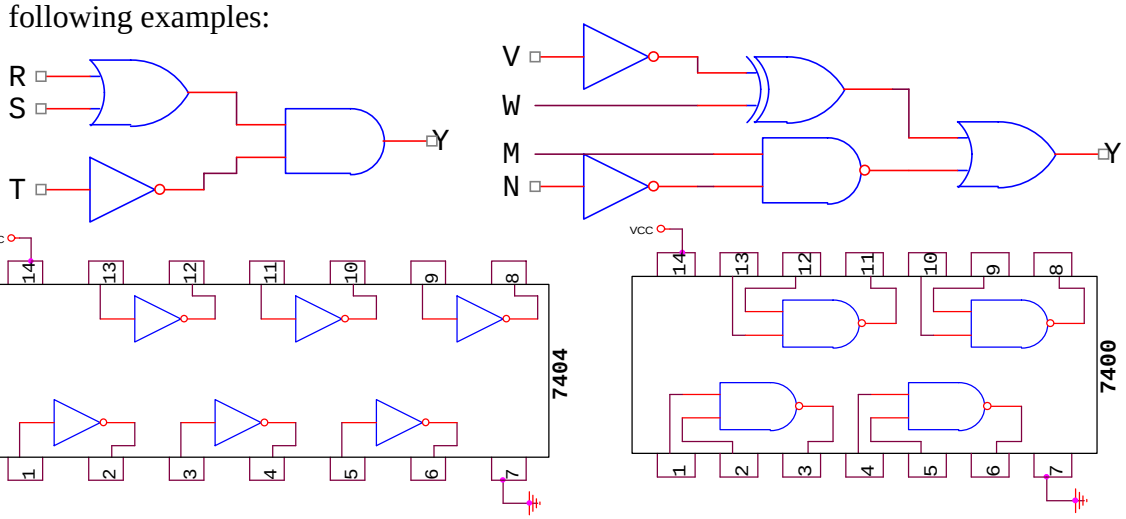
Numbering Systems

- convert back and forth between binary and decimal
- convert back and forth between binary and octal
- convert back and forth between binary and hex
- add binary numbers
- add octal numbers
- add hex numbers



Binary Logic Gates

- know the **logic symbol**, **logic/boolean equation**, and **truth table** for all seven logic gates (AND, OR, NOT, NOR, XOR, XNOR, NAND)
- Logic gates are used as the basic building blocks in _____ circuits.
- The universal gate is _____.
- Know how to create the **logic/boolean equation** for a given logic diagram. Consider the following examples:



- Identify the legs of an IC by number. Identify the type of chip (i.e., 2-input AND IC, 4-input XOR, etc.) for a schematic of the chip.
- ***Karnaugh Maps***: Create a K-map (we give the row and column headings) from a minterm expression and how to get the simplified minterm expression.
- Create a minterm expression from and truth table.
- Know how many lines are required in an *n-input* truth table.

Boolean Algebra (basic laws)

1. $1 + A =$ ___
2. $1 \bullet A =$ ___
3. $\overline{A} \bullet A =$ ___
4. $A \bullet A =$ ___
5. $AB + ABCD + BCD =$ ___
6. $0 + B =$ ___
7. $1 \bullet B =$ ___
8. $\overline{A} + A =$ ___
9. $B + B =$ ___

Know 3 steps of DeMorgan's Rule.

$A + \overline{B} =$

Encoding & Decoding

- what is ASCII code used for and why is it important (no need to memorize acronym)?
- convert back and forth between 8421 BCD and decimal
- know valid and invalid 8421 BCD numbers

Flip Flops

- Identify a flip-flop from its logic diagram
- Know the truth table given the logic diagram of a flip-flop
- Know the value of Q and $\overline{Q}$ for each of the flip-flops (set, reset, hold, prohibit, and toggle) modes.
- Know how to tell if a flip-flop is negative or positive edge triggered from a logic diagram
- Know what positive and negative edge triggering means
- Flip-flops are used as the basic building blocks in _____ circuits.
- Identify the asynchronous and synchronous inputs
- What values enable and disable asynchronous inputs

Counters

- A _____ flip-flop is used to wire counters.
- The required mode (and inputs) for the above flip-flop is _____.
- How many flip-flops are required to wire an n-bit counter?
- Know how to wire both up and down counters.
- Know how many numbers and the largest number in different mod counters.
- What is a decade counter?
- Know how to wire different mod counters.

Shift Registers

- Shift registers are constructed by wiring _____ together.
- From a wiring diagram be able to determine the output of a shift register given the necessary inputs (similar to the shift register test problems)
- Recognize a recirculating shift register from its diagram.

Arithmetic Circuits

- Create a truth table for both half and full adders
- How many half adders/subtractors are required to make full adders/subtractors?
- Adders and subtractors are made from _____ gates and therefore are _____ circuits.
- Binary multiplication
- How many of each circuit (half/full adder/subtractor) are required to build an
  1) n-bit parallel adder 2) n-bit parallel subtractor 3) n-bit parallel adder/subtractor
- Convert back and forth between 1's complement, binary, and decimal numbers
- Convert back and forth between 2's complement, binary, and decimal numbers
- When microprocessors process both positive and negative numbers, a _____ representation is used.
- In 2's complement, the MSB is called the _____.
- Add 2's complement numbers and give the result in 2's complement.
- Given the diagram of an n-bit parallel adder, be able to predict the output (similar to last test).
- Given the diagram of an n-bit parallel adder/subtractor be able to
  1) predict the output (similar to last test) 2) identify the value of the control switch
  3) know the function of the XOR gates