Title: Construction of MOSFET Logic Gates (Part I)

Introduction:

We learned how construction of MOSFET logic gates works. It signifies that the MOSFET can be powered by the logic IC does not have enough output current capabilities. With a simple example of a Diode-Resistor Logic (DRL) AND gate and a Diode-Transistor Logic (DTL) NAND gate, simple digital logic gates can be built by combining transistors, diodes and resistors.

Theory and Methodology:

MOSFET:

MAWS-feht is the correct pronunciation. Metal Oxide semiconductor field-effect transistor is an acronym. These are utilized in a variety of situations when voltage conversion is required.

To create CPU, memory, and AGP voltage, for example, on your motherboard. Mosfets are typically employed in group of two. Three-phase power is indicated by the presence of six mosfets around the CPU socket.

CMOS:

CMOS (complementary mutal-onide-semiconducto is an integrated circuit fabrication method. Microprocessors, microcontrollers, static RAM, and other digital logic circuit all utilise CMOS technology. CMOS technology is also used for several analog circuit such as image sensors (CMOS sensor), data converters, and highly integrated transceivers for many type of communication. In 1963, Frank Wanlass received a patent on CMOS (US patent 3,356,858). Complementary-symmetry metal-oxide

semiconductor is another name for CMOS (or COS-MOS). The term "complementary-symmetry" refers to how CMOS logic functions are often implemented using complementary and symmetrical pairing of p-type and n-type metal oxide semiconductor field effect transistors (MOSFETs).

High noise immunity and low static power consumption are two significant properties of CMOS electronics. Because one of the pair's transistors is permanently off, the series

combination only drains substantial power while transitioning between on and off states. As a result, CMOS devices produce less waste heat than other types of logic, such as transistor-transistor logic (TTL) or NMOS logic, which typically have some standing current even when not in use. In addition, CMOS enables for a high density of logic functions on a single chip. It was primarily for this reason that CMOS became the most widely utilized technology for VLSI chips.

Here some of the advantages of CMOS over TTL are:

1. Because MOSFET's are voltage-controlled rather than current-controlled semiconductor CMOS gate inputs significantly less current than TTL inputs.

2. CMOS gates can operate over a far larger range of voltages than TTL gates: typically 3 to 15 volts against 4.75 to 5.25 volts for TTL gates.

3. CMOS transistor are smaller than NMOS transistors and have lower power dissipation.

Discussion:

In this experiment, we have used NI Multisim software for the simulations. We faced some problems while finding the components in the software that's why it took a much extra time. The overall outcome was excellent for finding the answer using the application, and implementing the circuit was quite difficult for beginners. At first we had to learn about construction of MOSFET Logic Gates (mosfet, cmosfet, nmosfet). After that we can get ready to work with multisim software. Then we successfully assembled all of the components on the multisim bread board without any faults. Sucessfully we have confirmed to build the connection between the

&

circuit works without any faults. At last our truth table was varified by simulation result and they also matched with each other.

Reference(s):

1. Tomas L. Floyd, Digital Fundamentals, 9th Edition, 2006, Prentice Hall.

2. Link: http://www.techpowerup.com/articles/overclocking/voltmods/21.