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Faculty of Information Technology
Computer Systems Engineering Department

Digital Lab ENCS 211 EXP. No. 4

Digital Circuit Implementations Using Breadboard

4.1 OBJECTIVES

The objective of this laboratory experiment is to introduce you to simple digital devices and their operations. You will also be introduced to the process of building digital circuits using a digital design kit.

4.2 EQUIPMENT REQUIRED

1. KL-22001 Basic Electricity Circuit Lab
2. Breadboard
3. IC 7404 (inverter), IC 7408 (2-input AND), IC 7432 (2-input OR), IC 7400(2-input NAND) and IC 7486 (2-input XOR)

4.3 PRE-LAB

1. Design and Implement a Full Adder using the gates on the chips.
2. Design and Implement a 4x1 multiplexer using the gates on the chips.
3. Design and Implement a 2-4 "active-low" decoder using the gates on the chips

4.3 DIGITAL GATES IN IC PACKAGES

Figure 4.1 shows some digital gates with identification numbers and pin assignment.
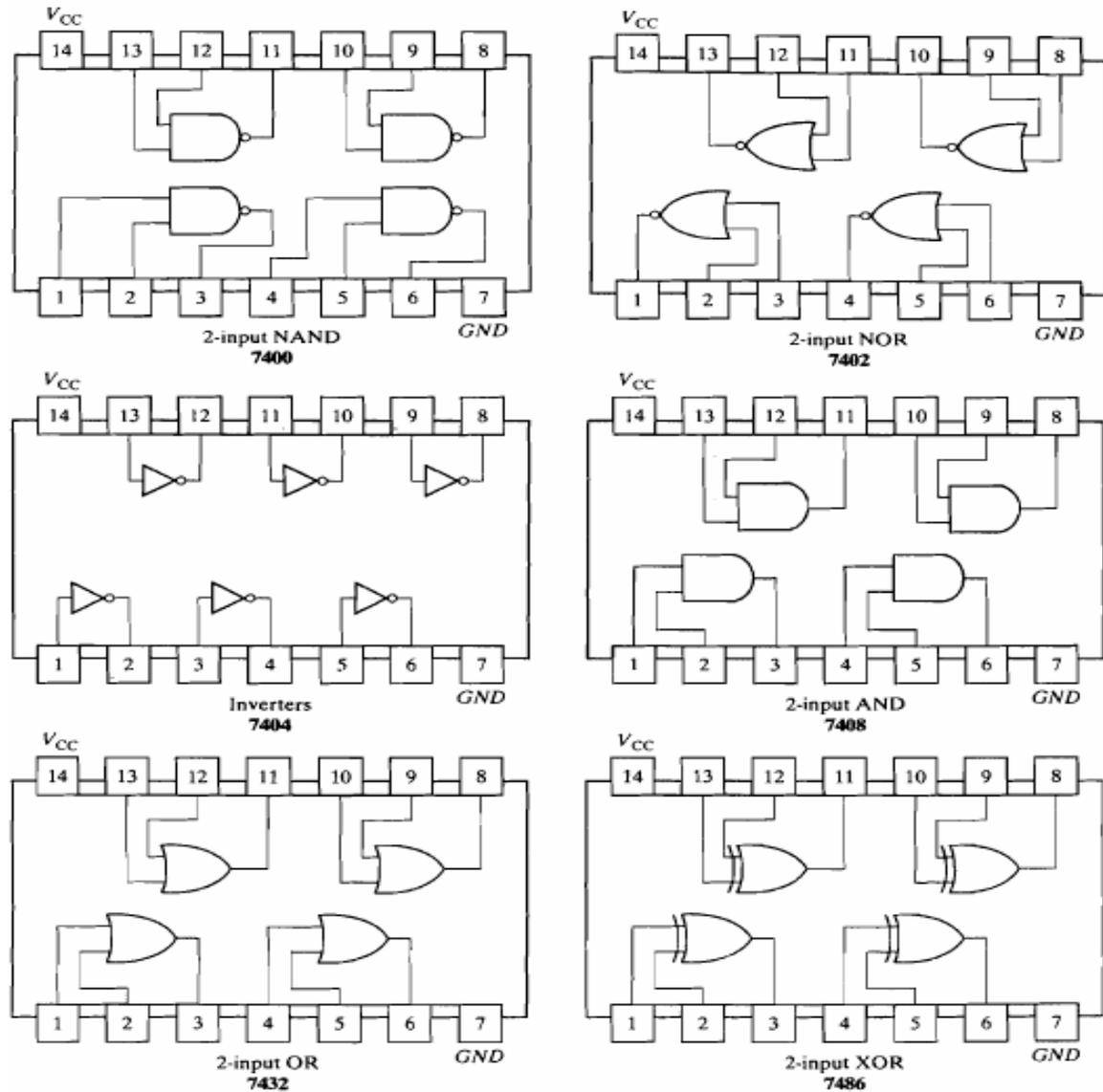

Figure 4.1

4.3 PROCEDURE

4.3.1 Verification of basic logic gates

In this task you are to verify the operations of some of the IC chips. This can easily be done using the proto-board:

1. Place each chip shown in Figure 4.1 chip under test on one of the breadboards in such a way that its pins are not short-circuited. (Make sure power is off)
2. Connect GND and +5V for each chip you want to check

3. Refer to the handout diagrams (or TTL data book) to determine the input and output pins for each gate in the chip.

4. Connect the gate inputs to the dip switches and the gate output to any LED.

5. Determine the output for each possible input combination and fill-out the Truth Tables of Figure 4.2.

Verify your 7404 chip.

Input	output
N.C	

Verify your 7408 chip.

Input1	Input2	output
N.C	N.C	

Verify your 7432 chip.

Input1	Input2	output
N.C	N.C	

Verify your 7400 chip.

Input1	Input2	output
N.C	N.C	

Verify your 7486 chip.

Input1	Input2	output
N.C	N.C	

Figure 4.2

4.3.2 Full-Adder and Multiplexer Implementations

Use any needed gates shown in figure 4.1 to implement the full adder, the 4x1 multiplexer, and the decoder that you designed in the pre-lab.