East West University
Department of Computer Science and Engineering

Course: CSE345 Digital Logic Design
Expt No.: 2
Title: Design and Implementation of a Combinational Circuit

Objectives:
1. To design a combinational circuit from descriptive problem specification.
2. To implement a combinational circuit using AND-OR and OR-AND logic.

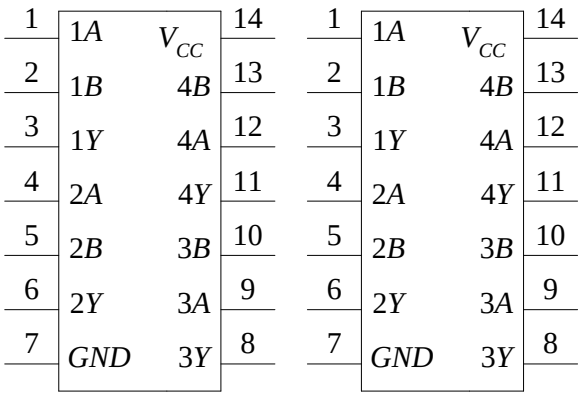
Theory:
The design procedure of a combinational circuit is discussed in Section 6.2 of Textbook 1. Students are advised to go through the above section of the Textbook 1 before preparing the pre-lab report.

Pre-Lab Report Questions:
Problem specification: In a combinational logic circuit, four input lines *A*, *B*, *C*, and *D* are being used to represent a 4-bit binary number with *A* as the MSB and *D* as the LSB. The circuit produces a high (logic 1) output only when the binary number is greater than 0101_2.

1. Prepare a truth table for the given combinational circuit. Represent the truth table in a 4-variable K-map.
2. Write simplified sum of products function from the K-map. Draw the AND-OR logic diagram for the simplified sum of products function.
3. Write simplified product of sums function from the K-map. Draw OR-AND logic diagram for the simplified product of sums function.

ICs Required:
7408 Quadruple 2-input AND gates
7432 Quadruple 2-input OR gates

Pin Diagram of the Required ICs:



7408 (4 2-In AND) **7432** (4 2-In OR)

Lab Procedure:

1. Construct two logic diagrams from your pre-lab report on a digital logic trainer individually. For each logic circuit, connect four inputs to four data switches and the output to a LED indicator. Construct truth table for each logic circuit.

Post-Lab Report Questions:

1. Verify that two truth tables obtained in your lab work agree with the truth table prepared in your pre-lab report.
2. Write structural Verilog code for two logic circuits from your pre-lab report and simulate them using Quartus II software.