

Digital Logic Design Practical (CS302P)

Assignment # 02

Spring 2023

Question Statement

You are provided with a 4-Bit Magnitude Comparator through a truth table:

1. Generate the **Boolean Expression** for the **OUTPUTS of a Comparator (A = B, A < B & A > B)**.
2. Draw the **AND-OR Based 4-Bit Magnitude Comparator Circuit** for all three (3) Outputs on a Workbench.

Solution:

Task 1: Boolean Expression

$$\mathbf{A = B: (A_3 \oplus B_3) (A_2 \oplus B_2) (A_1 \oplus B_1) (A_0 \oplus B_0)}$$

$$\mathbf{A > B: (A_3 B_3' + A_3' A_2 B_2' + A_3' A_2' A_1 B_1' + A_3' A_2' A_1' A_0 B_0')}$$

$$\mathbf{A < B: (A_3 B_3' + A_3 A_2 B_2' + A_3 A_2 A_1 B_1' + A_3 A_2 A_1 A_0 B_0')}$$

