**DIGITAL SYSTEM DESIGN**

**ECE-D**



**Project Title:** Arithmetic Logic Unit (ALU)

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**Arithmetic Logic Unit**

**Objective**

* Build an ALU inspired from the design of the 74181 ALU IC using logic gates which can Add, Subtract, Multiply, Logical AND, Logical OR and other relational functions.

**Block Diagram**



**Components Required**

* 7408 Two Input AND Gate IC X6\*4=24 correct
* 7411 Three Input AND Gate IC X5\*3=15 correct
* 7421 Four Input AND Gate IC X3\*2=6 correct
* 7404 NOT Gate IC X2\*6=12
* 7402 Two Input NOR Gate IC X2\*4=8
* 7427 Three Input NOR Gate IC X2\*3=6
* 7486 Two Input XOR Gate IC X1\*4=4
* 7432 Two Input OR Gate IC X0\*4=0
* 7400 Two input NAND Gate X1\*4=4
* Breadboards X2 and Wires

**Working Principle**

The 4-bit wide ALU can perform all the traditional add / subtract / decrement operations with or without carry, as well as AND / NAND, OR / NOR, XOR, and shift. Many variations of these basic functions are available, for a total of 16 arithmetic and 16 logical operations on two four-bit words. Multiply and divide functions are not provided but can be performed in multiple steps using the shift and add or subtract functions.

**Expected Output**

*TRUTH TABLE*



**Reference**

<https://en.wikipedia.org/wiki/74181>