Experiment-6 **Digital Circuits** **2022**

To be implemented on Circuitverse

PART: A

This part will consist of designing, assembling and testing a circuit for implementing the task. An encrypted communication system sends decimal digits encoded by a 4-bit binary code $C_3C_2C_1C_0$ according to the following scheme, where N denotes the value of the digit:

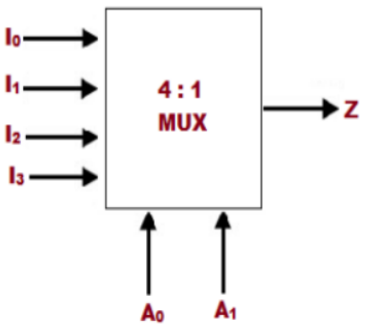
For 4>=N>=0, $C_3C_2C_1C_0$ = 13 – N (in decimal), and
for 9>=N>=5, $C_3C_2C_1C_0$ = N – 3 (in decimal).

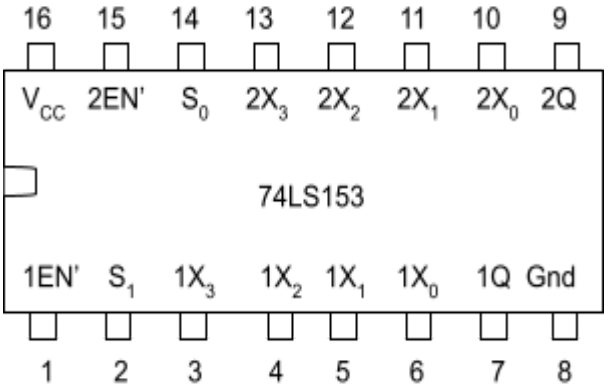
Design a decoder for recovering the normal BCD representation (DCBA) of a decimal digit from its $C_3C_2C_1C_0$ representation.

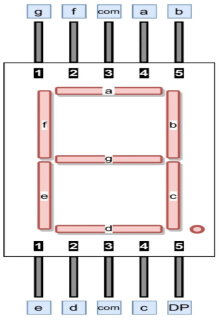
1. Draw the K-maps and construct the Input tables of four 4-input Multiplexers available for generating the four output variables as the MUX outputs, using C_1 and C_0 as the MUX select inputs.

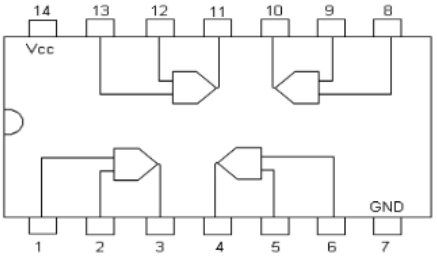
2. Generate the required inputs from C_3 and C_2 using the given NAND/NOR gates.

3. Connect the output DCBA to the four input points of one of the 7-segment displays. Apply $C_3C_2C_1C_0$ from four Input Switches and verify the operation of the circuit.









CD4001/4011

PART: B

1. Design a combinational circuit for dividing a 2-bit number $\mathbf{N_1\ N_0}$ by another 2-bit number $\mathbf{D_1\ D_0}$ and **($D_1\ D_0$ is not equal to 0)** to generate a 2-bit quotient $\mathbf{Q_1\ Q_0}$ and a 2-bit remainder $\mathbf{R_1\ R_0}$.
2. Make sure to clearly define the truth table for it.
3. Need to use a 4x1 MUX for each output with N_1, N_0 as the select lines

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Deliverables & Rubrics (Total-10 marks)

The Circuitverse link has to be shared with your lab TAs and your respective lab evaluator (mentioned on the shared sheet). Keep the circuit as private and add them as the collaborators.

Follow the below sequence for both the parts. All of them are mandatory. Each part is of 5 marks.

1) Aim
2) Components/ICs Used
3) Circuit verse links (1.5 marks)
4) Neat Circuit Diagram (Screenshot of Circuit workspace) (0.5 mark)
5) K-Maps (1 mark)
5) Truth Table/boolean expression (1 mark)
6) Observations/Results
7) Application (at least 1 with brief description) (1 mark)

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Penalties

1) Circuitverse link not accessible :- 0 grade
2) Faulty circuit :- 0 grade
3) Circuit is public :- 5 marks
4) Not labelled :- 2 marks
5) Late submission
    a) 0-10 min: No penalty
    b) 10-30 min: 2 marks
    c) More than 30 min: 5 marks
6) Plagiarized submission :- 0 grade

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