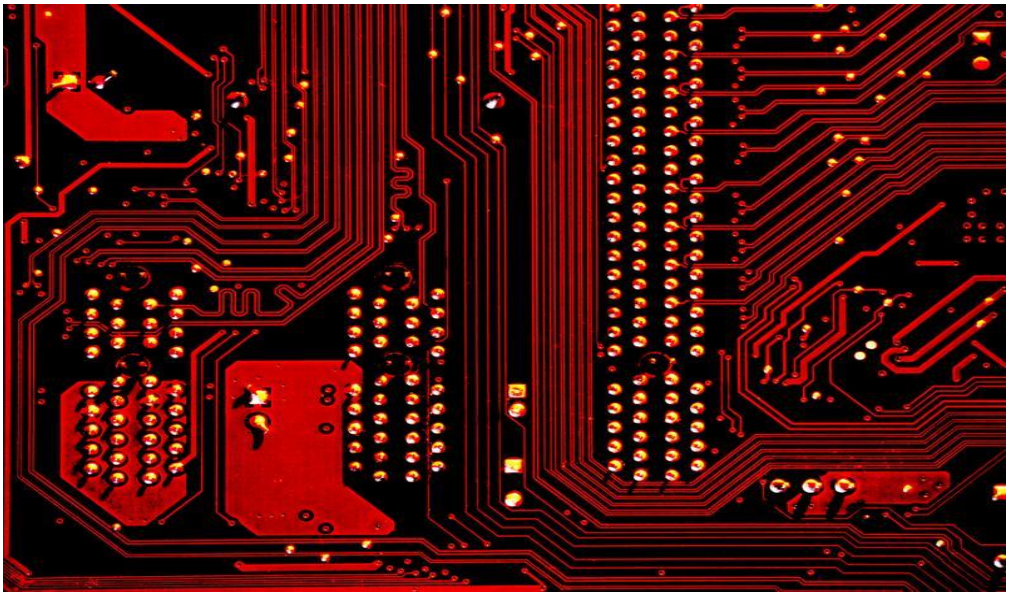
DIGITAL LOGIC DESIGN



Lab Manual – 04

Topic:

1. Multiple input logic gates
2. Simplification of Boolean expressions
    a. By using algebraic identities
    b. By using Karnaugh maps

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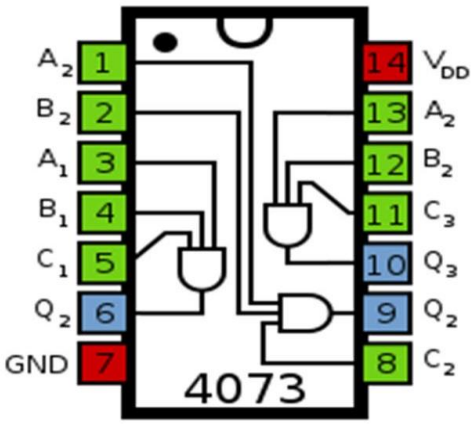
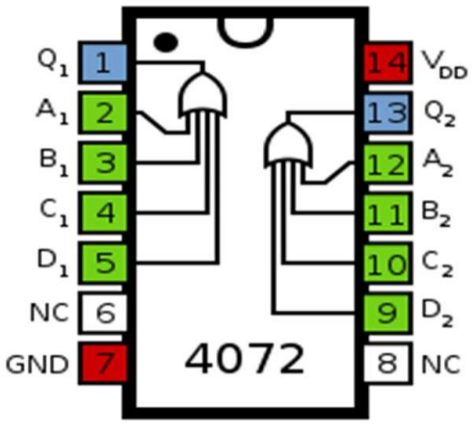
Some Basic Boolean Identities:

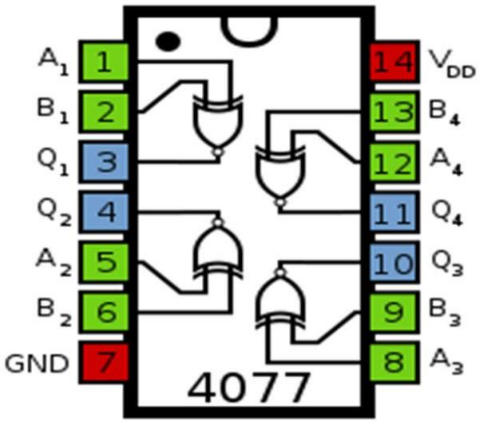
1.	B • 1 = B | B • 0 = 0 | B • B' = 0	B + 0 = B | B + 1 = 1 | B + B' =1
2.	B • C = C • B	B + C = C + B
3.	(B • C) • D = B • (C • D)	(B + C)+ D = B + (C + D)
4.	(B • C) + (B • D) = B • (C + D)	(B + C) • (B + D) = B + (C • D)
5.	B • (B + C) = B	B + (B • C) = B
6.	(B • C) + (B • C') = B	(B + C) • (B + C') = B
7.	(B • C) + (B' • D) + (C • D) = B • C + B' • D	(B + C) • (B' + D) • (C + D) = (B + C) • (B' + D)

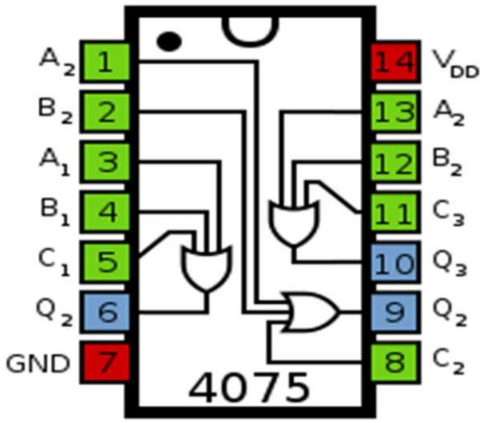
1) Understanding Multi input ICs:

- Following ICs are also available in lab in addition to all ICs we have used in previous labs.









2) Simplifying Boolean Functions:

a. By Using Algebraic Identities

Lab Task:

Simplify the following Boolean function and prove that the original and obtained functions are equivalent by truth tables and implementing circuits.

- F (A, B) = (A . B) + A' (A+B)

Home Task:

Simplify the following Boolean function and prove that the original and obtained functions are equivalent by truth tables. Also make circuit diagrams.

- F (A, B, C) = (A+C') + C (C.A' + (B.A) +C)

b. By using Karnaugh maps

Lab Task:

Simplify the following Boolean function using Karnaugh maps and prove that the original and obtained functions are equivalent by truth tables and implementing circuits.

- F (A, B, C) = AB'C'+ A'B'C'+ A'BC'+ A'B'C

Home Task:

Simplify the following Boolean functions using Karnaugh maps and prove that the original and obtained functions are equivalent by truth tables. Also make its circuit diagrams.

- F (A, B, C, D) = A'C'D' + A'B'C'D + A'B'C + ABCD + AC'

➔ Note: Use multi-input ICs to implement big functions. This will help you reducing complications in your circuits.

Instructions:

- **Show your work:** Make sure you have shown your work to respective TA in the lab before leaving it.
- **Clean Up Workspace:** Ensure your workstation is clean and organized. Clear away any papers, or materials used during the lab session.
- **Turn Off Equipment:** Power down all equipment.
- **Secure Components:** Place all physical components such as wires, ICs at their designated places. Do not leave components lying around on the workbench.
- **Return Borrowed Equipment:** Return the ICs and other equipment taken from server room.
- **Save Work:** Follow the instruction given in the lab regarding saving your work.
- **Dispose of Waste:** Dispose of any non-recyclable items, in the designated waste bins. Recycle any recyclable materials according to lab guidelines.
- Follow any additional instructions provided by the lab instructor or TAs regarding lab cleanup and departure procedure.
- Do the home task on sheets, make a and submit it in the Google Classroom. The name of your file must be YourRollNumber_HTLab04.pdf. (i.e. BCSF23M5XX_HTLab04.pdf/ BSDSF23XXXX_HTLab04.pdf).