

## AIM

To design the Random Access Memory(RAM) of 1 bit

## Apparatus Required

1. Kit
2. IC 7474(D flip flop)
3. IC 7408(AND Gate)
4. IC 7404(NOT Gate)
5. Wires

## Theory

### Introduction

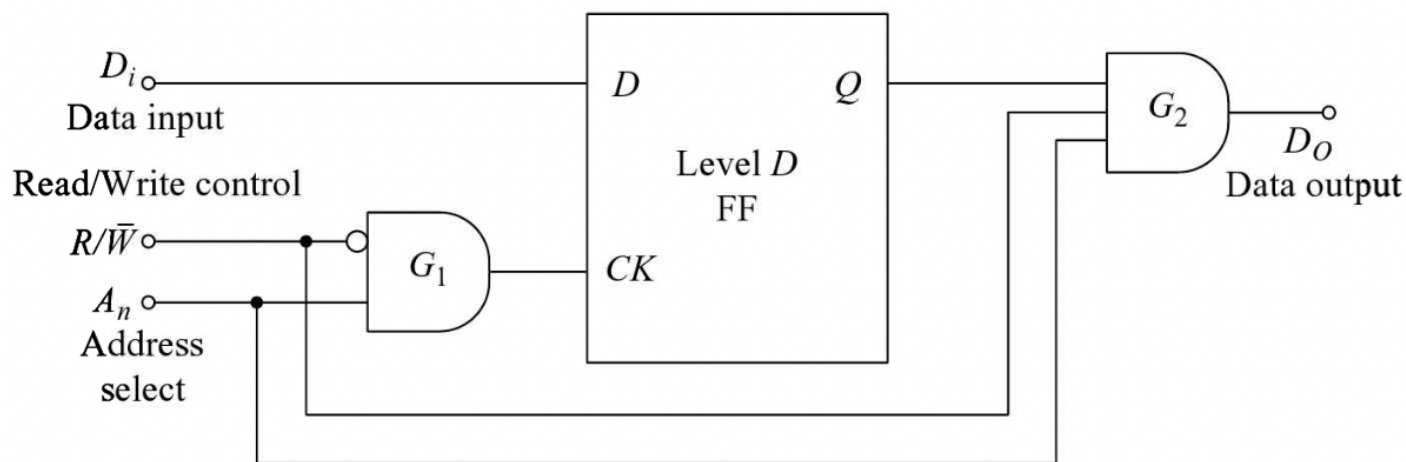
Random-access memory (RAM) is a form of computer memory that can be read and changed in any order, typically used to store working data and machine code. A random-access memory device allows data items to be read or written in almost the same amount of time irrespective of the physical location of data inside the memory, in contrast with other direct-access data storage media (such as hard disks, CD-RWs, DVD-RWs, and the older magnetic tapes and drum memory), where the time required to read and write data items varies significantly depending on their physical locations on the recording medium, due to mechanical limitations such as media rotation speeds and arm movement.

### RAM Using D flip flop

FLIP-FLOPs can be used for making memories in which data can be stored for any desired length of time and then read out whenever required. In such a memory, data can be put into (writing into the memory) or retrieved from (reading from the memory) the memory in a random fashion which is known as random-access memory.

A 1-bit read/write memory is shown below which is the basic memory element and memory ICs are built around a system of basic 1-bit cells.

In this memory cell, a level D FLIP-FLOP is used which has Q output that follows the D input as long as the CK terminal is at logic 1. The moment the CK input changes to logic 0, the Q output does not change and it retains the D input level that existed just before the transition from 1 to 0 at input CK. This input is used to select the memory cell. In the 1-bit cell shown, there are three inputs -  $D_i$  (data input),  $A_i$  (address select) and R/W (read/write control) and one output  $D_o$  (data output),  $A_n = 1$  enables the cell for reading or writing operation, R/W at logic 1 is for reading from the cell and logic 0 for writing into the cell. As long as  $A_n = 0$ , all input and output activities are blocked, and the cell is in the hold mode where its stored output is protected.



***A 1-bit Read/Write Memory Cell***

The complete function of this cell can be understood from the function table of given below. The read operation is non-destructive, that is, the stored bit can be read out any number of times without disturbing it. The stored bit will be protected as long as power is on. Therefore, this type of memory is known as volatile memory.

***Function Table of 1-bit Memory Cell***

Inputs			Mode
$A_n$	$R/\overline{W}$	$D_i$	
0	$\times$	$\times$	Hold, $D_0 = 0$
1	0	0	Write 0 into memory, $D_0 = 0$
1	0	1	Write 1 into memory, $D_0 = 0$
1	1	$\times$	Read, $D_0 = \text{stored } D_i \text{ bit.}$

As far as writing into the cell is concerned, it is not required to be cleared before entering the new bit. Whenever a new bit is entered the earlier one gets destroyed automatically.

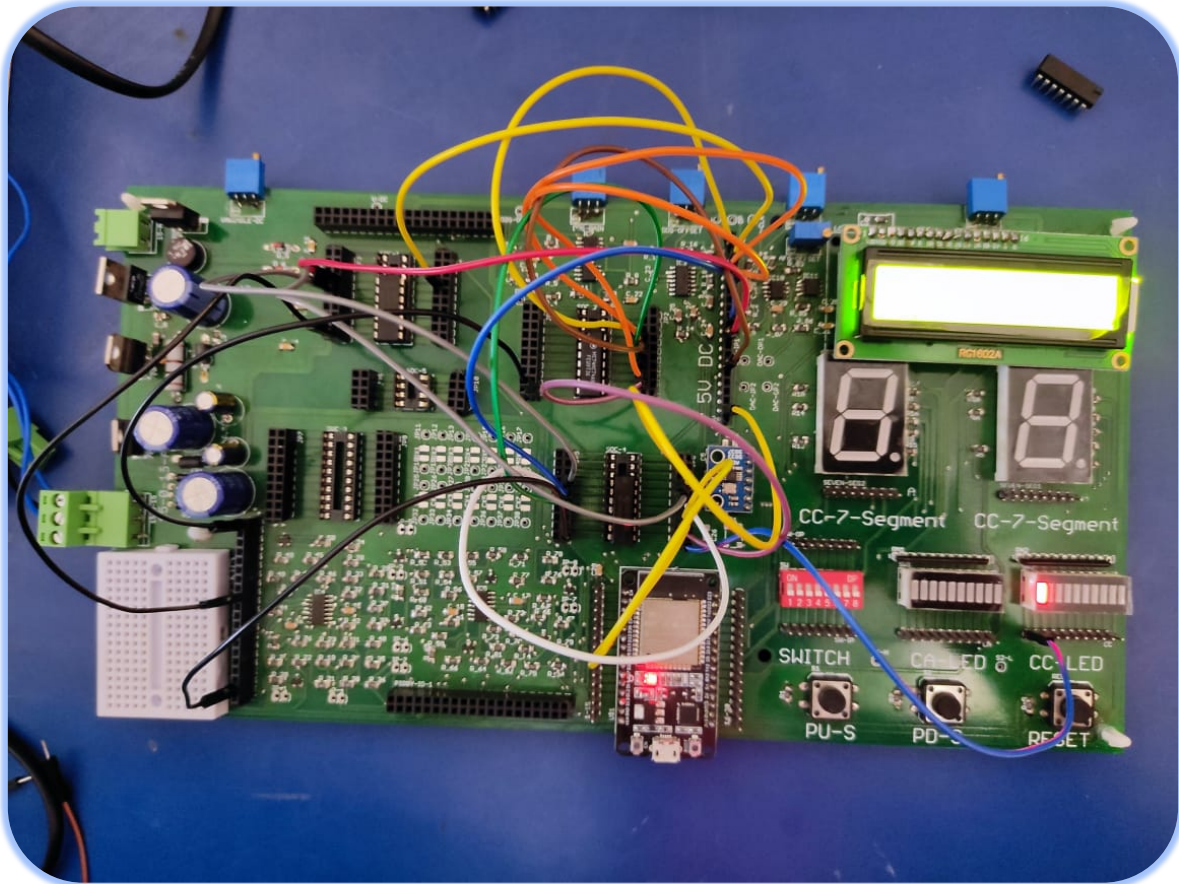
## Procedure

- 1) Open the Kit
- 2) Place the required IC in slots
- 3) Connect VCC and Ground to respected pin in IC using wire
- 4) Make connection to respective pins in IC.
- 5) If there is a clock ,Connect the clock with clock pin in IC.
- 6) Connect the output wires to CC-LED.
- 7) Turn on the kit
- 8) Check if the output received is equal to the desired output.

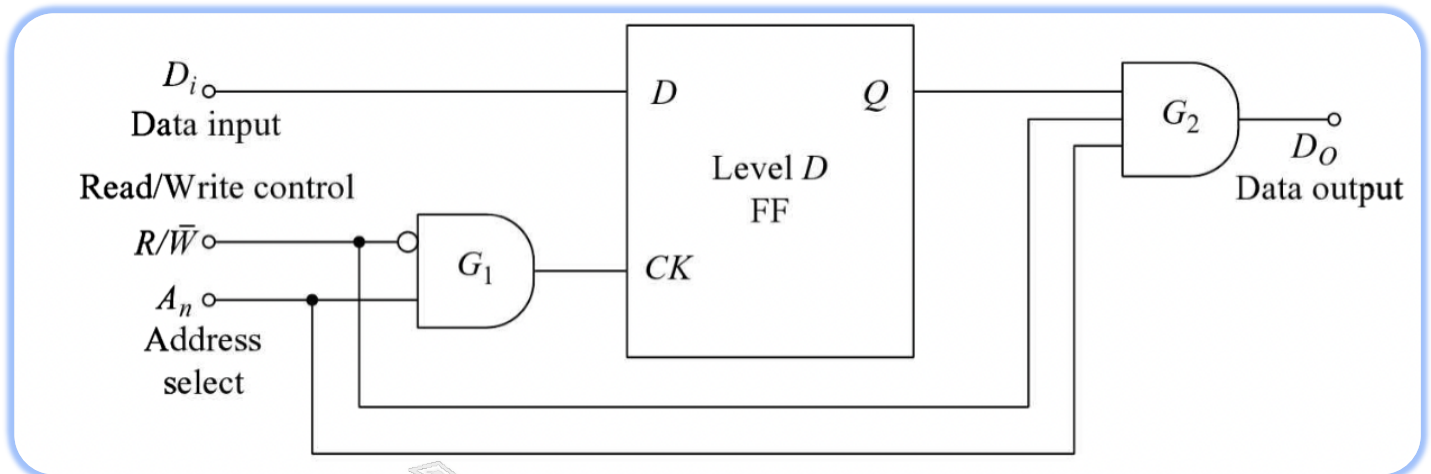
## Results and Observations

### ❖ RAM Using D flip flop

#### ○ Picture of Circuit



#### ○ Diagram of Circuit



## Conclusion

We concluded that RAM can be created using d-flip flop, AND Gate and NOT Gate. This RAM will be of 1 Bit.