

Memory is used to store data or information in the binary form or binary words.

→ Memory which store data is called Data memory and memory which store program is called Program memory.

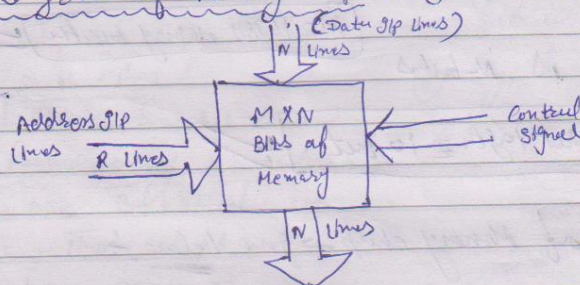
→ Memory is made up with storage elements, and each storage element store one bit of data. This storage element is called Memory cell.

Memory chip \Rightarrow are available in various size and generally the size of memory chip is specified from the total number of bits it can store in its memory.

→ The size of memory chip is given by two number M and N bits.

The number M specifies the number of location available in memory, and N specifies the number of bits at each location.

Block Diagram of memory chip is given as:



Block Diagram of memory chip.

\Rightarrow Total Capacity of memory is given by $M \times N$, here R address lines are used, so $M = 2^R$

\Rightarrow So Total Capacity of memory can also be defined by $2^R \times N$ bits.

$$\text{chip size} = 2^R \times N \text{ bits}$$

Table show the memory capacity and number of address lines required for memory interfacing

No of Address lines Required	Memory location	Memory Capacity	
10 Address lines, 2^{10}	1024	1K	
11 " 2^{11}	2048	2K	
12 " 2^{12}	4096	4K	
13 " 2^{13}	8192	8K	
14 " 2^{14}	16384	16K	
15 " 2^{15}	32768	32K	
16 " 2^{16}	65536	64K	
17 " 2^{17}	131072	128K	
18 " 2^{18}	262144	256K	

Q. If a memory is having 14 address lines and 10 data lines, then calculate the number of memory location and word length.

Ans: Memory location is given by $\Rightarrow M = 2^N$, ($N=14$)

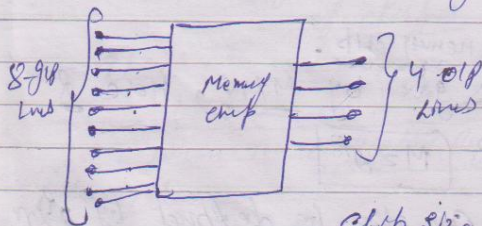
$$M = 2^{14} = 16384 \text{ Memory location}$$

$$M = 16384 \text{ Memory location}$$

and word length is N-bits

$$\text{so } \boxed{\text{word length} = 10 \text{ bits}}$$

Q. Calculate the size of memory chip \rightarrow given below:



Ans: No of Address lines = 8
No of data lines = 4

$$\text{chip size is given by} = 2^N \times N$$

$$= 2^8 \times 4 \text{ bits}$$

$$= 256 \times 4 \text{ bits} = 1024 \text{ bits}$$