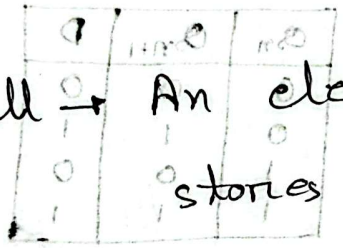
Lecture-10

MEMORY

Memory Unit → A collection of registers together

Binary Cell → a unit of computer storage
(can store 1 bit of info)
(2 stable state)



Memory cell → An electronic circuit that stores 1 bit of binary info

[A memory unit stores binary info in group of bits → Words called]

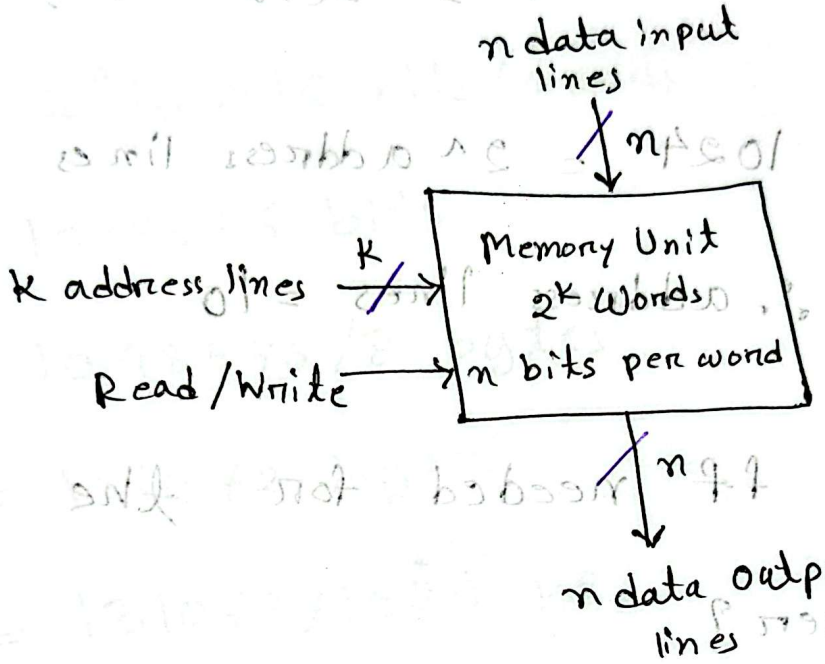
2 control → Read
Write

2 Registers → (MAR) Memory address Register
(for communicating with a memory word its address is transferred)

→ Memory buffer Register
(Before writing and after reading info's are kept here)
(MBR)

Random Access Memory (RAM)

Block diagram of a memory unit:



Formula:

Capacity = no of words × bit/word

NO. of word = 2^(address lines)

OR, Address lines = $\log_2$ (NO. of word)

* There is a memory unit of 1024 words with 8 bit/word (1024 x 8), which info can we get from this sentence?

Ans:

No. of word = 1024^{10} = $2^{\wedge}$ address lines

∴ address lines = 10

* What no of ff needed for the address register?

address lines == 10 FF will be needed

* No of ff needed for the buffer register

↳ 8 FF will be needed (bit/word)

* What is the total capacity of a $2^{16} * 16$ memory? Show the answer in KB.

bit → byte
*.8

byte → KB
*.1024

byte → MB
*.1024×1024

Ans: $2^{16} \times 16$ bits/words

$= 1048576$ bits

$= 1048576/8$ bytes

$= 131072$ bytes

$= 131072/1024$ KB

$= 128$ KB

* How many address line do we need for a 64 MB RAM with 32 bits words?

Ans

Capacity = 64 MB RAM

$\Rightarrow$ no. of word × bit/word = 64 MB RAM

$\Rightarrow$ $w = \frac{64 \text{ MB RAM}}{32 \text{ bits}}$

$= \frac{64 \times 1024 \times 1024 \times 8}{32}$ bits

$= 16777216$ bits $= 2^{24}$ bits

∴ no of address lines = 24

Random Access Memory (RAM)

Logic construction of a 4×3 RAM (with decoder and OR gates):

4 → num of word

3 → bit per word

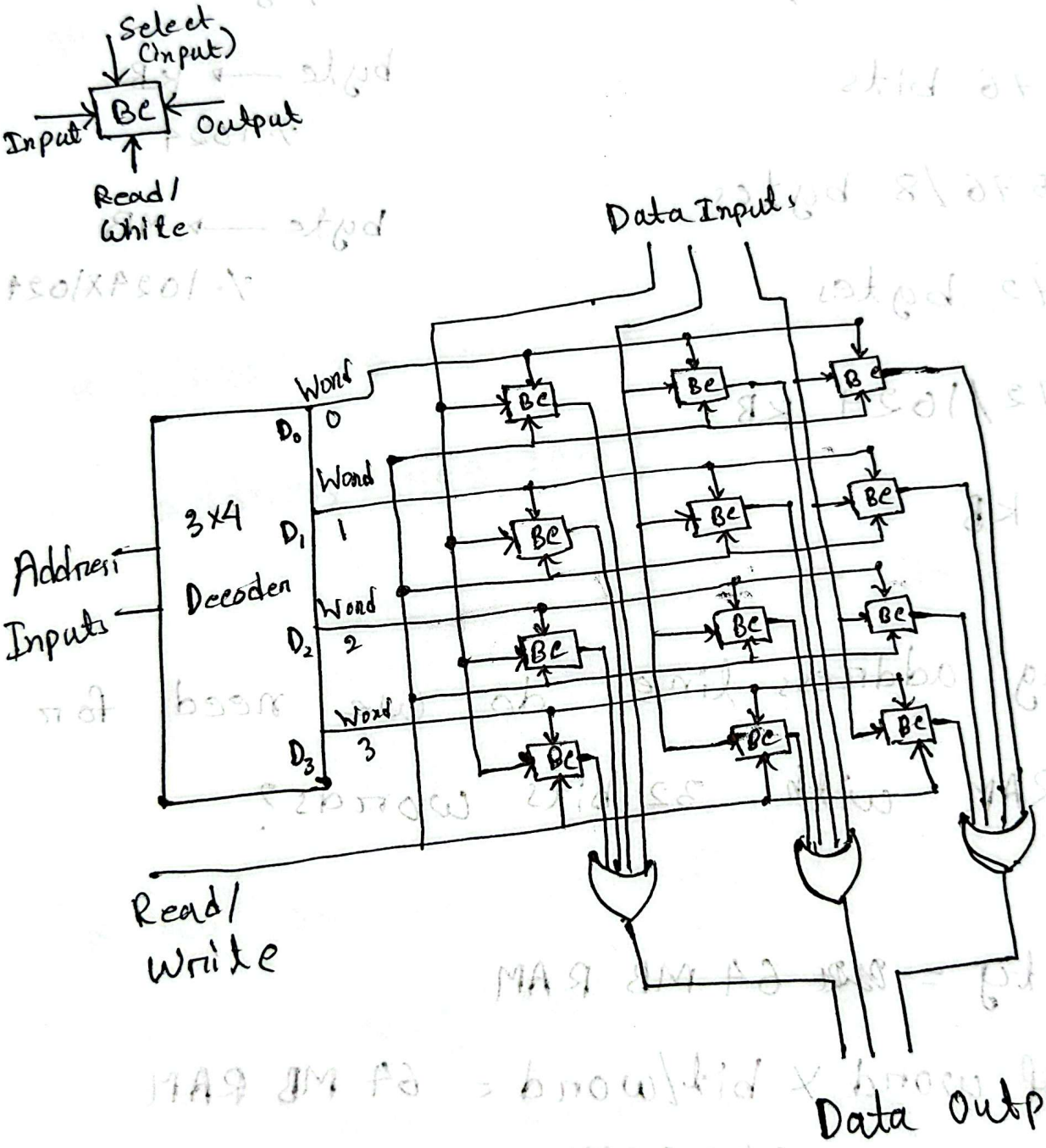


Figure: 4×3 RAM