

Q6

Q:- What is word in memory? Word size, nibble.

Ans:- In Computer Architecture, a word is an ordered set of bytes or bits that is the normal unit in which information may be stored, transmitted or operated on within a given computer.

So a word is a unit of data of a defined bit length that can be addressed and moved between storage and the computer processor. It can contain a computer instruction, a storage address or application data that is to be manipulated.

Word size refers to the number of bits processed by a computer's CPU in one go typically 32 bits or 64 bits.

A group of 4 bits is called a nibble and 8 bits make a byte. 1 byte is equivalent to 0.1 character.

64 bits refers to the number of bits (the smallest unit of information on a machine) that can be processed or transmitted in parallel or the number of bits used for single element in a data format. The term 'word' is used to describe the number of bits processed at a time by a program or OS. So in a 16 bit CPU, the word length is 16 bits, in a 32 bit CPU the word length is 32 bits. A byte is eight bits, a word is 2 bytes (16 bits).

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Comp Sc Sem II

Memory Cell

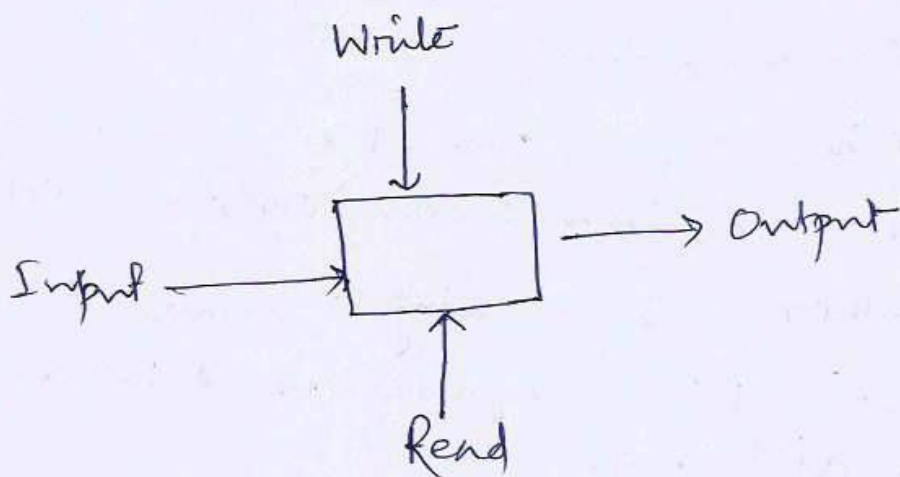
A memory cell may be defined as a device which can store a symbol selected from a set of symbols and may be characterized by the following properties.

- (i) The number of stable states in which it can be placed.
- (ii) Whether a cell can store a symbol indefinitely even when power is turned off.
- (iii) Whether, after reading a symbol from a cell, the stored symbol is retained in the cell or disturbed.
- (iv) The time taken to read a symbol from a cell and the time to write a new symbol in it.
- (v) Whether a symbol, once written, can ~~be~~ only be read and not changed.

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MEMORY ORGANIZATION

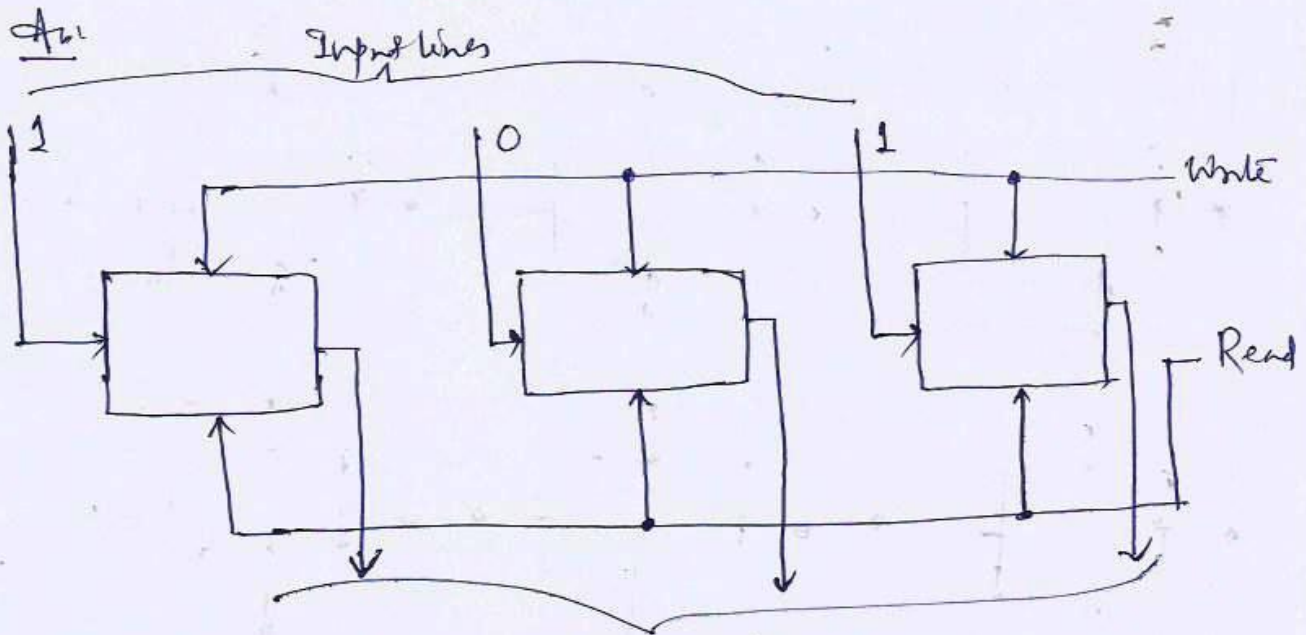
Memory cells fabricated using current - technology can be placed in one out of two stable states. Binary cells can store a binary digit. One of the two stable states is used to represent the binary 0 & 1.



Picture 1:- Memory Cell

In the above picture of Memory cell, the cell has an input data line on which the symbol to be written is sent to the cell. In order to write this symbol in the cell, a write-control signal is sent to the cell via its write-line. If the content of a cell is to be read, a read-control signal is sent on the read-line and the content of the cell may be sensed on the output-data line.

Q6 Explain A 3-bit register

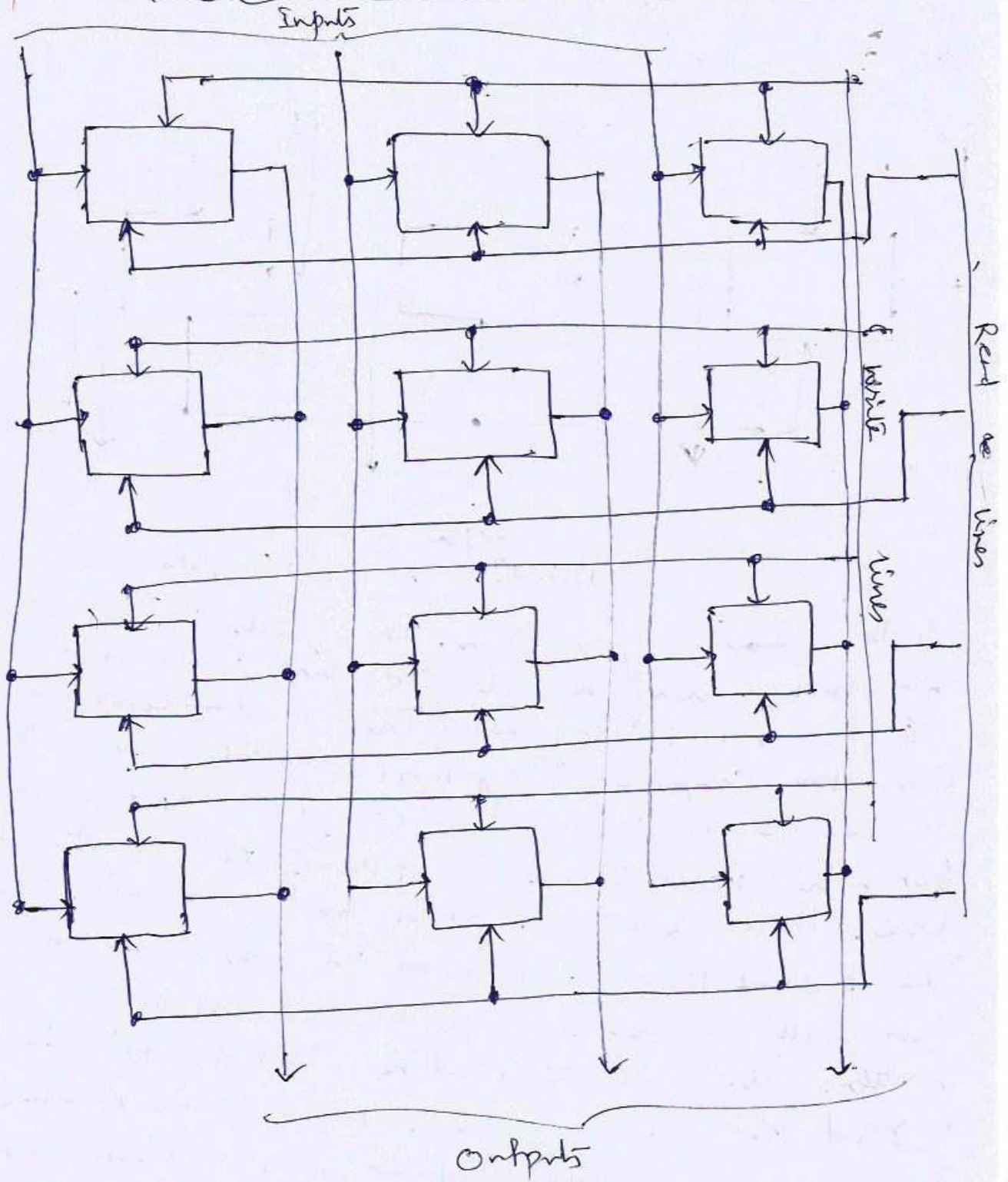


Output lines
 Picture 2: A 3 bit register

In this above organization, three cells are interconnected in such a way the write control lines of all the cells are connected together. The read control lines are also connected together. The bits to be written in each cell is fed to appropriate input data lines. When the write signal is applied to the write-control line, these bits are written in the individual cells. The present previous content in cells are automatically erased when the new information is written. In order to read the content of the cells, a read signal is applied to the common read line. The content of the cells appear on the respective output data lines. The content of the individual cells are not erased by the read operation as reading from these cells is assumed to be non-destructive. This interconnection of cells is called a register. This register stores 3 bits.

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A 3-bit per word 4 word memory



Picture - 3

A 3-bit per word 4 word memory

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In picture 3, each pair of read/write lines correspondingly to a register are identified by binary code 00, 01, 10 & 11. The identification code of each register correspondingly to a word in the memory is known as its address. If a memory has eight words, the binary codes 000, 001, 010, 011, 100, 101, 110 & 111 will uniquely address these lines. In general with n bits we can address 2^n words of a memory. In order to select an appropriate word in a memory, for each reading or writing, it is necessary to specify the address of the word. This address is usually specified as a binary number and placed in a register called MAR (Memory Address Register).

The data ~~are~~ read from the memory or that to be written in the memory is placed in a register called a MDR (Memory Data Register). This register receives the outputs of memory cells during read operation.

~~***~~ A number of cells, with each cell storing a bit, constitute a word. A word is a group of bits which are stored and retrieved as a unit. The main memory system of a computer is organized to store a number of words. A word may store one or more bytes. The length of a word may be specified as " n bits per word". A storage capacity of a memory is specified as number of bytes it can store.