

## ASSIGNMENT NO : 02

- i) Draw and explain I/O interface for input devices  
we know that every component or module of the computer has its distinct capabilities and processing speed.

The nature of peripheral devices is electromagnetic and electromechanical. The nature of CPU is electronic. There is a lot of difference in the mode of operation of both peripheral devices & CPU.

- There is also a ~~synchronization mechanism~~ because the data transfer rate of peripheral device are slow than CPU.
- In peripheral devices , data code and format are different from the format in the CPU and memory.

for example: The processing speed of the CPU is much higher than the other components of the computer such as keyboard , display , etc .

so, we need a mediator to make the computer communicate with the I/O modules. This mediator is referred as an interface circuit.

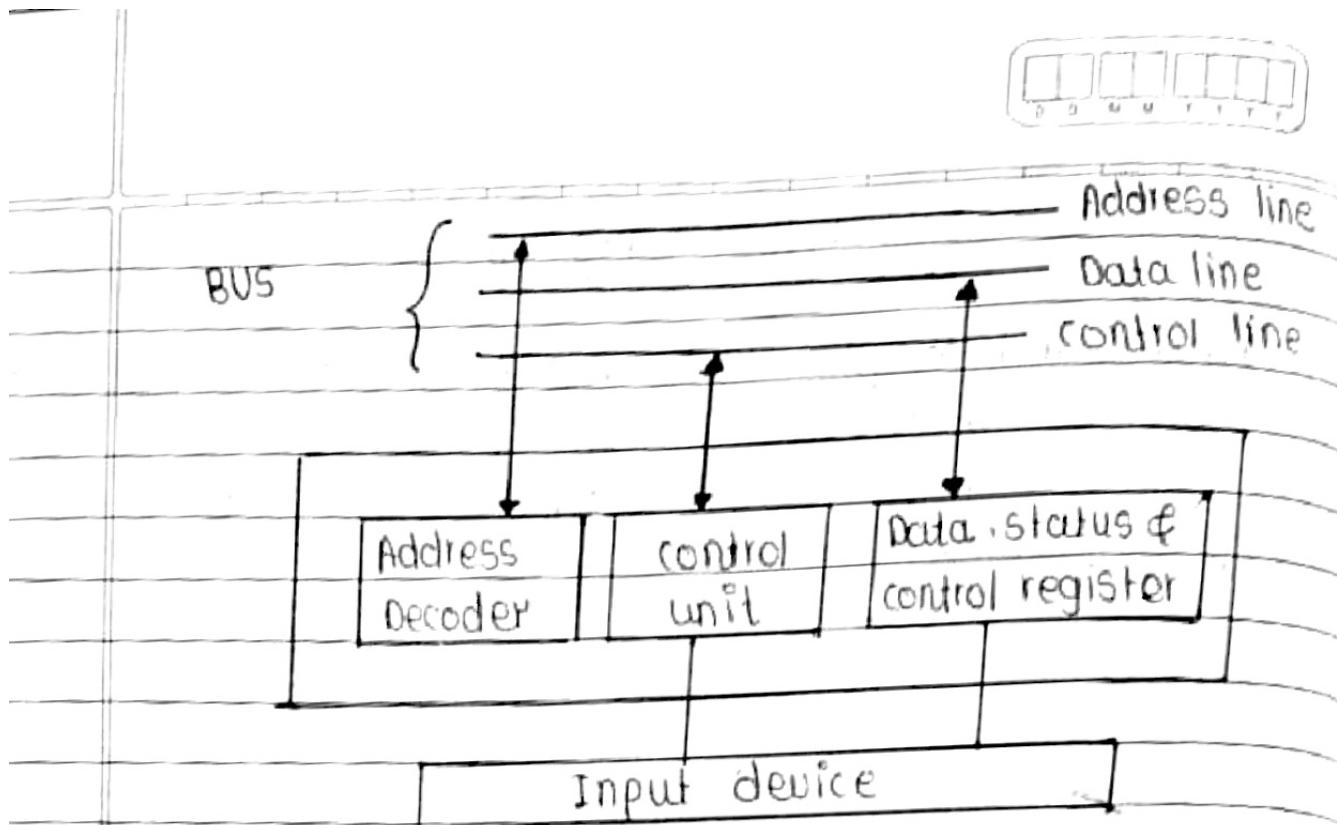


Fig: Bus structure for I/O interface of an input devices.

- The address line is decoded by the interface circuit to determine if the processor has addressed this particular I/O devices or not.
- The control line is decoded to identify which kind of operation is requested by the processor.
- The data line is used to transfer the <sup>data</sup> between I/O and the processor.
- The port of the I/O interface can be parallel port or serial port.
  - Features of the I/O interface circuit :
  - It has data register that stores the data temporarily while the data is being exchanged between I/O and processor.

- It has a status register the bits in the status register indicates the processor sending the I/O devices is set for transmission or not.
- It has control register the bits in control register indicates the type of operation requested by the processor to the I/O Interface.
- It also generate the timing signals that synchronize the operation between the processor and the I/O devices.
- It also responsible for the format conversion that is essential for exchanging data b/w the processor and the I/O interface.

Q2] What is DMA? Explain role of it.

DMA stands for direct memory access.

- DMA controller is a hardware device that allows I/O devices to directly access memory with less participation of the processor.
- DMA controller needs the same old circuit of an interface to communicate with CPU and input/output devices.

• DMA controller register:

The DMA has the three registers as follows:

1) Address register:

It contains the address to specify the desired location in memory.

Q2] control register:

It specifies the transfer mode

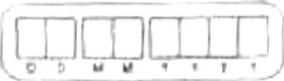
Q3] word count register:

It contains the number of words to be transferred.

- The data transfer from fast I/O devices to the memory or from the memory to I/O devices through the accumulator is a time consuming processor. In this situation the direct memory access (DMA) technique is preferred.
- In DMA data transfer scheme data is directly transferred from an I/O device to RAM or from RAM to an I/O device.
- Using a DMA controller, the device requests the CPU to hold its address data and control bus so the device can transfer data directly to / from the memory.

Q3] Differentiate between synchronous bus and asynchronous bus.

Synchronous	Asynchronous
Occurrence of event on the bus is determined by clock.	Occurrence of one event follows and depends on the occurrence of previous event.



## Synchronous

Include a clock in the control lines and has a fixed protocol for the communication that is relative to the clock.

Involves very little logic and can run very fast

Data is sent synchronous with a clock

The typical ~~MASTER/SLAVE~~ structure requires two control signals, one from the MASTER and one from SLAVE.

character is received at constant rate

Data transfer takes place in block.

start and stop bit are required to establish communication of each character.

## Asynchronous

It is not clocked, so requires a handshaking protocol and additional control lines (read req, Ack, data Rdy).

Asynchronous

Data is sent without a system clock.

Data transfer is a character oriented.

start and stop bit are required to establish communication of each character.

#### Q4] Explain Interface circuit

The I/O interface circuit is a mediator b/w the I/O device and the system to which this I/O has to be connected.

The I/O interface circuit is circuitry that is designed to link the I/O devices to the processor. Now the question is why do we require an interface circuit?

We know that every component or module of the computer has its distinct capabilities and processing speed. The processing speed of the CPU is much higher than the other components of the computer such as keyboard, display.

The part of the I/O interface can be a parallel port or a serial port.

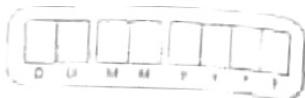
##### Serial port:

A serial port is an interface that connects serial lines to achieve serial communication. Serial communication is performed by a single wire, with a single data stream sent from one end to the other.

Serial port transmission speed is somewhat slow, as compared to parallel port transmission speed.

##### Parallel port:

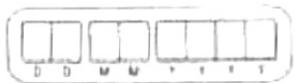
A parallel port can transfer eight bits simultaneously via 8 separate wires. To prevent cross talk and mistakes all bit streams in parallel communication must send data at same rate.



PCI has three location spaces. They are memory address space, I/O address space and design address space.

PCI Bridge gives a different virtual association with principle memory.

## ② SCSI (small computer system Interface) :



- The address line is decoded by the interface circuit to determine if the processor has addressed this particular I/O device or not.
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### 5] what are different standard I/O interfaces?

The standard I/O interface is expected to fit the I/O gadget with an interface circuit. The processor transport is the transport characterized by the signs on the processor chip itself. The gadgets that require an extremely rapid association with the processor.

The span circuit presents a little defer information move among processor and the gadgets generally utilized transport guideline are :-

- 1] PCI (Peripheral component inter connect)
- 2] SCSI (Small computer system Interface)
- 3] USB (Universal serial Bus)

#### ① Peripheral component inter connect (PCI)

PCI is created as a minimal expense transport that is really processor free. It uploads rapid plate, designs and video gadgets. PCI has fitting and play ability for associating I/O gadgets.

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- 2) SCSI (small computer system Interface)
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### 1) Peripheral component Inter connect (PCI):

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### 2) SCSI (small computer system Interface):

It alludes to a standard transport characterized by the american National Standard Institute (ANSI). The SCSI transport might be utilized to interface different gadgets to a PC.

SCSI transport might be associated straightforwardly to the processor transport or bound to another standard I/O transport like PCI through a SCSI regulator.

Information & orders are moved as multi-byte messages called bundles. To send orders or information to a gadgets, the processor gathers the data in the memory then at that point, teaches the

SCSI regulator to move it to the gadget.

### 3) Universal serial bus (USB):-

The universal serial bus is the most generally utilized interconnection standard. A huge assortment of gadgets are accessible with a USB connector, including mice, memory keys, circle drives, printers, cameras and some more.

The USB has been intended to meet a few key goals : give a basic, minimal expense, and simple to utilize interconnection framework.

