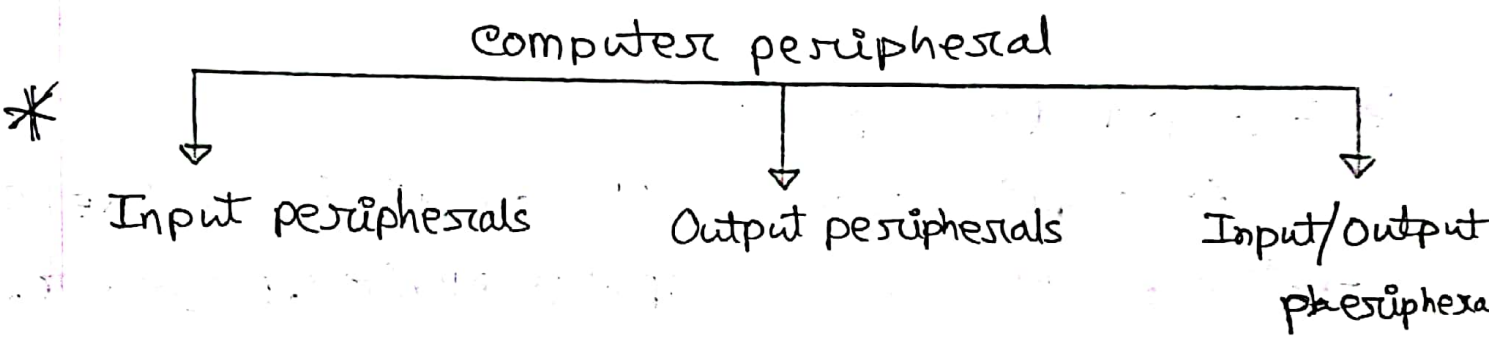
Anowar

peripheral

Computer peripheral :

Computer peripherals are any computer components that expand system functionality and are not necessary for basic operation. such as, mouse, webcam, flash drive etc. are considered as computer peripherals.



peripheral Device :

peripheral device is a device that is connected to a computer but it is not part of the core computer architecture. Example : Mouse, keyboard, printer, flash drive etc.

Three categories of peripheral devices exist based on their relationship with the computer :—

(1) Input device
(2) Output device
(3) Input/output device

* (1) Input device :

An input device sends data or instructions to the computer, such as a mouse, keyboard, image scanner, barcode reader, digital camera, webcam, etc.

* (2) Output device :

An output device provides output from the com-puter, such as a computer monitor, projector, printer, computer speaker etc.

* (3) Input/output device :

An Input/Output device performs both input and output functions, such as memory device, disk drive, flash drive, tape drive, touchscreen, etc.

Question:

* What do you mean by computer peripheral? Describe the role of different types of computer peripherals.
* Describe the categories of computer peripherals based on

Printer:

Printer is a peripheral device that accepts text files or images from a computer and transfers them to a medium such as paper. Printer is an output device that is directly connected to the computer or indirectly via a network.

There are two main types of ~~computer~~ printer:

(1) Impact printer

(2) Non-impact printer.

* (1) Impact printer:

An impact printer makes contact with the paper. It prints the text or image by pressing an inked ribbon against the paper using a hammer or pins.

Some examples of impact printers are:-

(i) Dot matrix printer
(ii) Daisy wheel printer
(iii) Line printer
(iv) Drum printer
(v) chain printer
(vi) Band printer, etc

* (2) Non-impact printers:

Non-impact printers print characters and images without direct physical contact between the printing mechanism and the paper. It is more faster and quieter than impact printers.

Some examples of non impact printers are :-

(i) Laser printer
(ii) Inkjet printer
(iii) Electrostatic printer
(iv) Thermal printer.

Dot Matrix printer:

↳ Dot matrix printer is a common type of impact printer.

↳ It creates an image on paper by striking pins against an inked ribbon.

↳ It uses patterns of dots to make letters or image.

↳ In the dot matrix printers, it have some print head.

↳ Some print heads have 9 pins and some have 24 pin.

↳ The speed is usually 30-550 character-per-second (cps).

Working principle of Dot matrix printer:

↳ A dot matrix printer's print head contains a clusters of pins. The printer can push the pins as the pattern of printing image or character.

↳ The pins pressed an inked ribbon against the papers and then creating a dot.

↳ The permanent magnetic field holds the hammer spring ~~in stressed to strike position~~ to fix the position.

↳ The drivers sends electric current to hammer coil, then creates an electromagnetic field opposite to the permanent magnetic field.

↳ When the electromagnetic field equilizes the magnetic field, then the spring is released to shoot the hammer and prints a dot in the paper.

The printing mechanism of dot matrix printer is shown in below figure :-

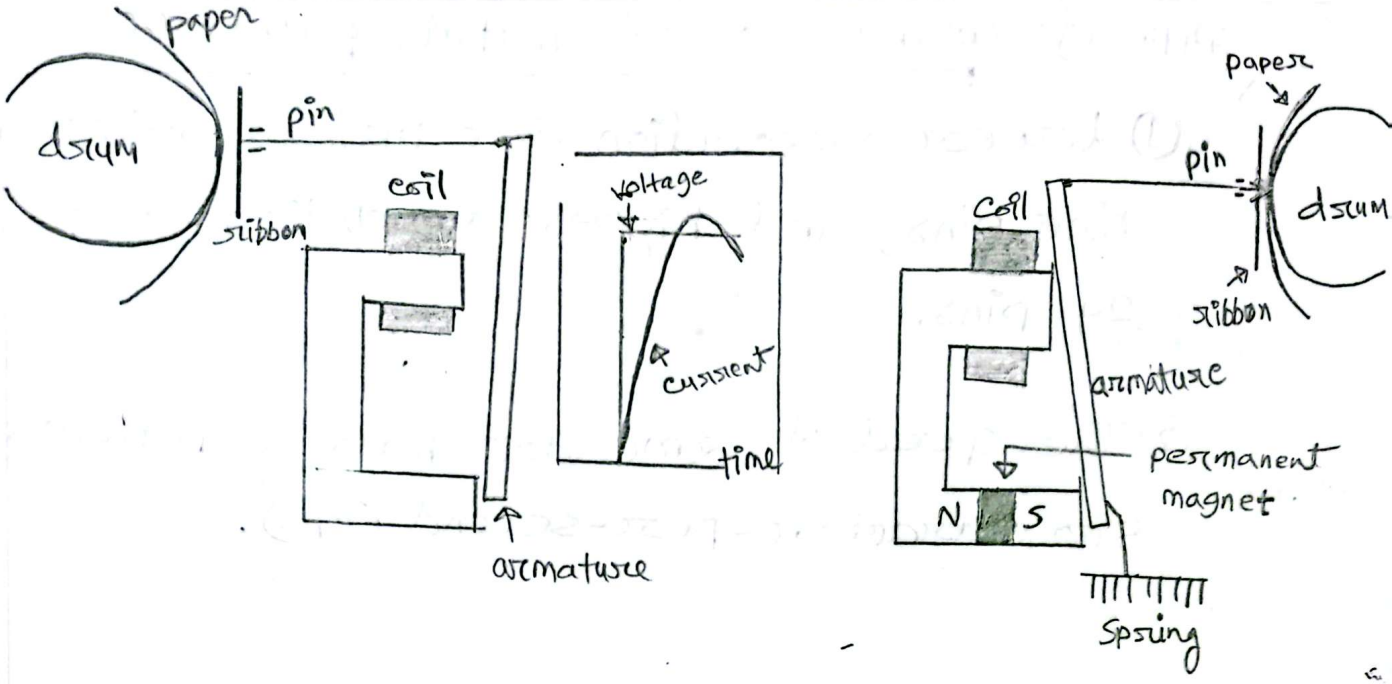


Fig: printing mechanism of dot matrix printer.

Performance of dot matrix printer:

(1) lower resolution dot matrix printers use nine pins, and higher resolution models have 24 pins.

(2) The speed of some dot matrix printers is 500 character-per-second (cps).

Advantages of Dot Matrix printer:

(1) These printers are cheap to run/operate.

(2) They are relatively fast.

(3) They are useful for low quality carbon copy printing.

(4) Low purchase cost & Low repair cost.

(5) Other language characters can be printed.

Disadvantage of Dot Matrix printer:

(1) Noisy

(2) Low resolution

(3) Slow

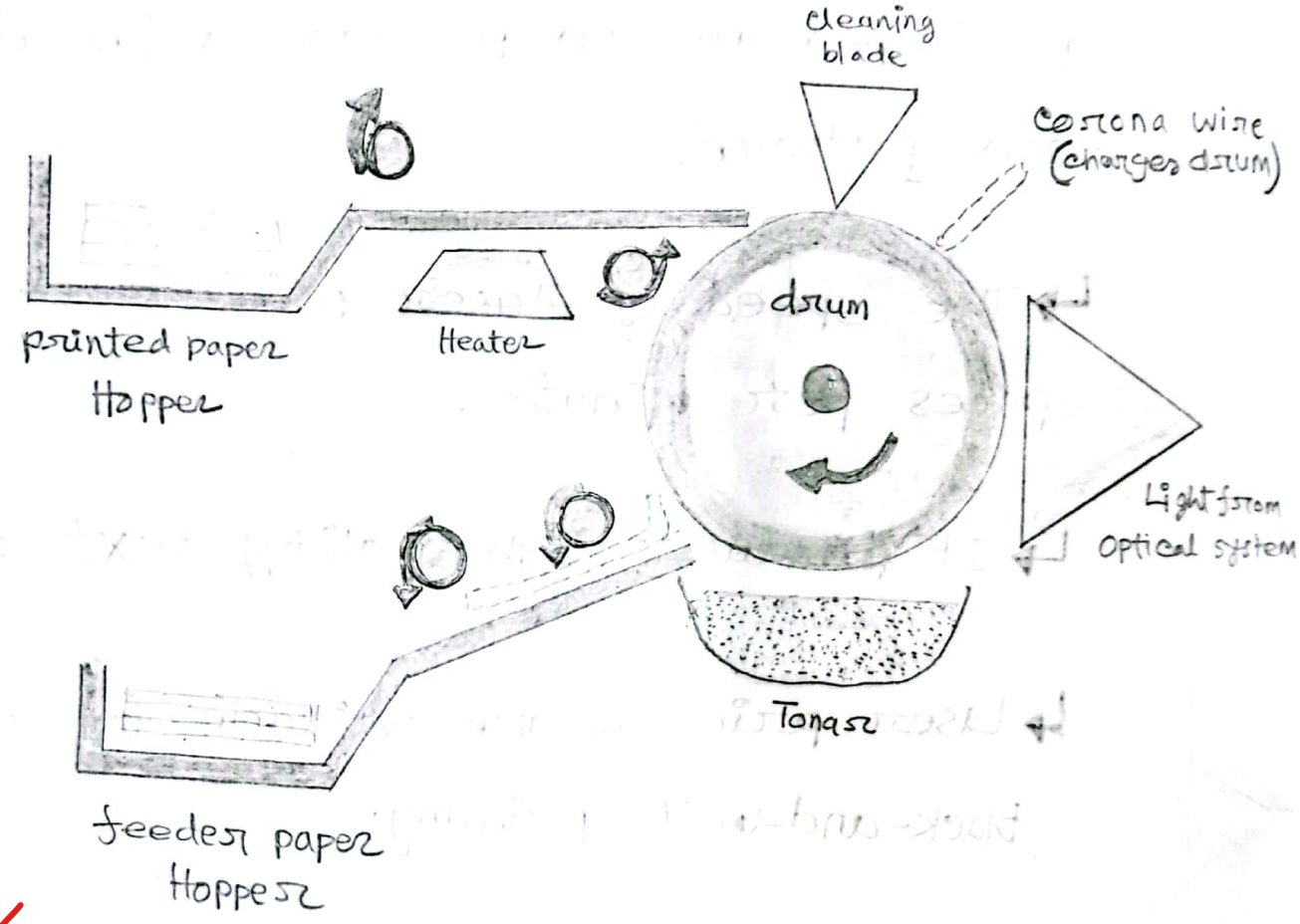
(4) Difficult to clear. (5) Poor quality.

Laser printer :

- Laser printer is a type of non-impact printer.
- Laser printers use a laser beam and dry powdered ink to produce a fine dot matrix pattern.
- The speed of laser printer is 4-100 pages per minute.
- It produces high quality ~~text~~ and image
- Laser printers are available for color & black-and-white printing.

* ## Working principle of laser printer:

The printing mechanism of laser printer is shown in below figure:-



(1) Firstly, the electronic circuit activates the corona wire.

(2) Then the corona wire charges up the photo-receptor drum & the drum gains positive charge.

(3) At the same time, the circuit activates the laser to make it draw the image of the page onto the drum. Where the laser beam hits the drum, it erases the positive charge and creates an area of negative charge instead. Now an image builds up on the drum: where the page should be white at the positive charge and where the page should be black at the negative charge.

(4) Then the tonar touches the drum. The tonar has positive electric charge. So ink is attracted to the part of the ~~tonar~~ drum that has ~~positive~~ Nega charge.

(5) Now a sheet of paper that is charged with positive electrical charge, passes through the drum. The positiely charged paper attracts the negatively charged tonar particle.

(6) Finally, a heater fixes the tonar onto the paper.

Performance of Laser printer:

(1) Laser printer provide resolution from 300-1200 dpi (Dot per inch)

(2) Block & white laser printers usually produce 4-16 page per minute.

(3) Laser printer produce higher-quality print but more expensive.

Advantage of Laser printer:-

(1) The main advantage of Laser printer is its speed & efficiency.

(2) Laser printer produce high quality output compared to other printers.

(3) Laser printers are quite and does not produce disturbing sounds.

(4) They are also capable to produce color prints.

(5) printing cost is low.

✓ ④ Disadvantage of Laser printer :

(1) Laser printers are costly compared to other printers.

(2) The maintenance, repair & servicing charges are also high of these printers.

(3) It has health hazards.

(4) Not easily portable.

Difference Between Dot matrix printer and Laser printer:

Dot Matrix printer	Laser printer
① It prints characters or image by striking print hammer against inked ribbon.	① It prints character and images without striking the papers.
② Speed is slowest.	② speed is faster.
③ printing quality is lower.	③ printing quality is higher.
④ It generates noise during printing.	④ It does not generate noise during printing.
⑤ It is less expensive.	⑤ It is more expensive.
⑥ It uses inked ribbon for printing.	⑥ It uses toner for printing.
⑦ It normally uses continuous paper sheet.	⑦ It normally uses individual paper sheet.

Impact
resolution low

Non impact
— high

HSNC
quality speed
noise, cost

Barcode

Barcode:

A Barcode is a machine readable representation of information in a visual format on a surface.

A barcode consists of a series of parallel, adjacent bars and spaces.

Why we use Barcode in product?

(I) Minimize the labour cost.
(II) Reduce the employee training time.
(III) Inexpensive to design and print.
(IV) Differentiate the product from one to another
(V) Provide better data.
(VI) Extremely versatile.
(VII) Highly secured and reliable.
(VIII) Eliminate the human error.
(IX) Access product information easily.
(X) Promote better decision making.

component

Elements or major contents of standard Barcode:

(I) Quiet zone: A large space with no bar (clear space)

(II) Start code: Indicates the start of barcode.

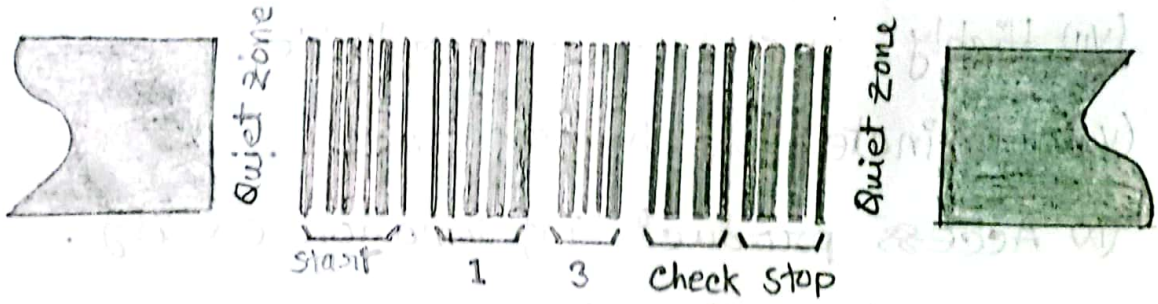
(III) Data: The actual data the barcode stores with a check digit.

(IV) Stop code: Indicates the end of barcode.

(V) Trailing Quiet zone: Another clear space with no bar.

(VI) Interpretation Line: Human readable character.

Structure of Barcode:



Why Quiet zone is necessary in barcode?

The Quit zone of a barcode is a clear space. It helps ~~the~~ to stop the reading barcode while scanning. It also helps to detect the start and end character of the barcode.

Barcode symbologies :

1) UPC-A
2) EAN-13
3) EAN-8
4) CODE 39
5) CODE 25
6) PDF47
7) ISBN
8) ISSN
9) CODE 128

* Characteristics of UPC-A :

I) Universal product code (UPC)

II) Used in United state of America in 1973.

III) It encodes 12 digit number.

IV) First one number : system characteristics.

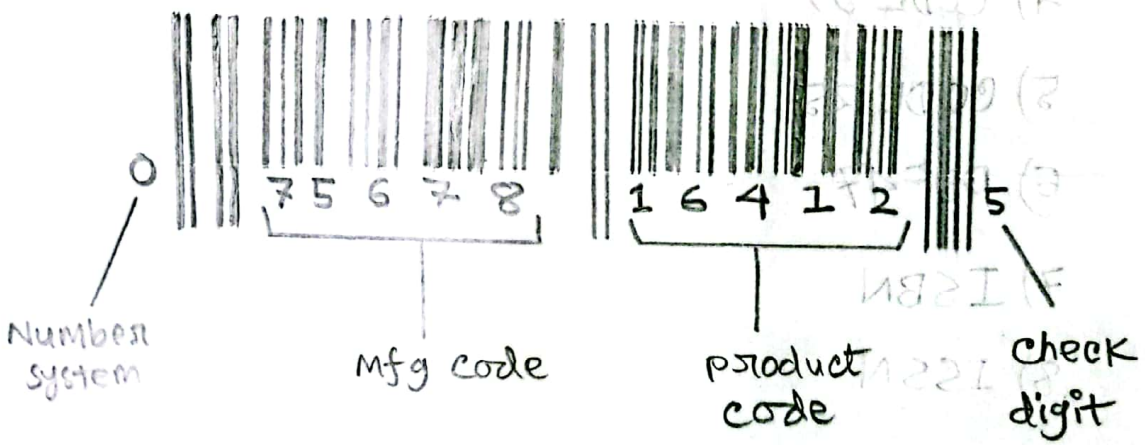
Example: 0 - grocery

3 - pharmaceuticales

V) Next five number : manufacturer number.

VI) Next five number : product number.

VII) Last number : check digit.



* Characteristics of EAN-13 :

i) European Article Number (EAN).

ii) Used in Europe in 1977.

iii) It encodes 13 digit number.

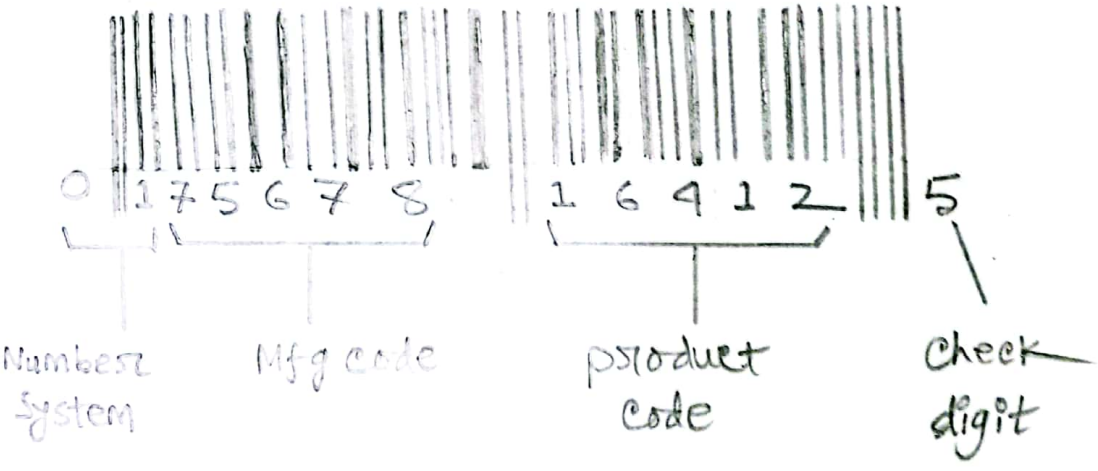
iv) First two number : system characteristics.

Example : 97 - publisher

v) Next five number : Manufacturer number.

vi) Next five number : product number.

vii) Last number :- Check digit.



Check Digit

Check Digit :

Check digit is the single digit that is located on the far right side of a barcode.

Check digit is a form of redundancy that is used for error detection.

Why we use check digit used in barcode ?

Check digit is used to verify the information of barcode that has been entered correctly. It is used to error detection.

Check Digit calculation of UPC-A :

I) Add the values of the digits in odd positions from left to right.

II) Multiply this result by 3

III) Add the values of the digits in even positions from left to ~~wright~~ right.

IV) Sum the results of steps (II) and (III).

V) Take the remainder of the result divided by 10 and subtract this from 10 to derive the check digit.

In mathematically, For 12-digit UPC-A :

$$R = 10 - ((3x_1 + x_2 + 3x_3 + x_4 + \cdots + x_{10} + 3x_{11}) \bmod 10)$$

then,

$$x_{12} = \begin{cases} R & ; R < 10 \\ 0 & ; R = 10 \end{cases}$$

Example :

The UPC-A check digit 0 3 6 0 0 0 2 9 1 4 5 ? (positions 1 2 3 4 5 6 7 8 9 10 11 12)
is calculated as follows:

$$\text{Sum} = (3\times 0)+(3)+(3\times 6)+(0)+(3\times 0)+0+(3\times 2)+9$$
$$+(3\times 1)+4+(3\times 5)$$
$$= 0+3+18+0+0+0+6+9+3+4+15$$
$$= 58$$

∴ Remainder $= 58 \% 10 = 8$

∴ check digit $= 10 - 8 = 2$

∴ The encoded data is : 0 3 6 0 0 0 2 9 1 4 5 **2**

Check Digit Calculation of EAN-8 and EAN 13 :

i) Add the values of the digits in odd positions from right to left.

ii) Multiply this result by 3.

iii) Add the values of the digits in even positions from right to left.

iv) Sum the results of step (ii) and (iii).

v) Take the reminder of the result divided by 10 and subtract this from 10 to derive the check digit.

* In mathematically, for 8-digit EAN-8 :

$$R = 10 - ((3x_7 + x_6 + 3x_5 + x_4 + \cdots + x_2 + 3x_1) \bmod 10)$$

then,

$$x_8 = \begin{cases} R & ; R < 10 \\ 0 & ; R = 0 \end{cases}$$

* In mathematically, for 13 digit EAN-13 :

$$R = 10 - ((3x_{12} + x_{11} + \cdots + x_2 + 3x_1) \bmod 10)$$

then,

$$x_{13} = \begin{cases} R & ; R < 10 \\ 0 & ; R = 10 \end{cases}$$

Example:

The EAN-8 check digit $\overset{7}{7}\overset{6}{3}\overset{5}{5}\overset{4}{1}\overset{3}{3}\overset{2}{5}\overset{1}{3}X$ is calculated as follows:

$$\text{sum} = (3\times 7) + 3 + (3\times 5) + 1 + (3\times 3) + 5 + (3\times 3)$$

$$= 21 + 3 + 15 + 1 + 9 + 5 + 9$$

$$= 63$$

$\therefore$ Reminder $= 63 \% 10 = 3$

$\therefore$ check digit $= 10 - 3 = 7$

So, the encoded data is: 73513537

Example:

2015 3(e) (G-20)

The EAN-13 check digit $\overset{12}{1}\overset{11}{2}\overset{10}{3}\overset{9}{4}\overset{8}{5}\overset{7}{6}\overset{6}{7}\overset{5}{8}\overset{4}{9}\overset{3}{0}\overset{2}{1}\overset{1}{2}$ is calculated as follows:-

$$\text{sum} = 1 + (3\times 2) + 3 + (3\times 4) + 5 + (3\times 6) + 7 + (3\times 8) + 9 + (3\times 0)$$
$$+ (3\times 1) + (2\times 3)$$

$$= 1 + 6 + 3 + 12 + 5 + 18 + 7 + 24 + 9 + 0 + 1 + 6$$

$$= 92$$

$\therefore$ Reminder $= (92 \% 10) = 2$

$\therefore$ check digit $= 10 - 2 = 8$

So, the encoded data is: 1234567890128

OMR, OCR, MICR

OMR :

OMR stands for Optical Mark Reader or Optical Mark Recognition.

OMR is the process of capturing human-marked data from documents forms such as surveys and tests. It detects the absense or present of the mark.

They are used to read questionnaires, multiple choice examination paper.

OCR :

OCR stands for Optical character Recognition.

OCR is a type of computer software that is designed to translate images of handwritten or typewritten text into machine-editable text.

OCR is used to process checks and credit card slips, and sort the mail, magazines, letters by OCR machines.

Major Components of OCR system :-

The major components of an OCR system is given below :-

(i) A scanner.

Encoder (ii) Recognition component (pdf files, images etc)

(iii) OCR software (such as FineReader 8.0)

(iv) Encoder

Why OCR is necessary ?

If we wanted to digitize a magazine article or printed document, it could spend many time for retyping and correcting misprints. But by using OCR, we complete this task in several minutes. For this reason, OCR is necessary.

Operation of OCR:

(i) In OCR processing, the scanned image is analyzed for light and dark areas in order to identify each alphabetic letter or numeric digit.

(ii) Character is recognized using OCR software.

(iii) Then it is converted into an ASCII code for further edit.

MICR :

MICR stands for Magnetic Ink character Recognition. MICR is a character recognition system that uses special ink and characters.

When a document that contains this ink needs to be read, it passes through a machine, which magnetizes the ink and then translates the magnetic information into characters.

MICR technology is use in the banks.

How does MICR read information from bank check?

(i) Each check is printed with a series of characters on the bottom of the document.

(ii) These characters are printed with a special type of ink that has additional magnetic resonance characteristics to absorb and emit a magnetic signal.

(iii) When the check enters the scan path, then the magnetic ink passes over a magnet to charge the ink before it passes over the MICR read head.

(iv) The MICR read head reads the magnetic signal emitted by the MICR ink characters on the check.

(v) Then each character produces a unique waveform which is read and translated by the MICR read head.

Keyboard

Keyboard:

Keyboard is an external input device that is used to input text, characters and other command into a computer or similar device.

Most keyboard have keys in five groups:

i) Alphanumeric keys
ii) Numeric keypad
iii) Function keys
iv) Modifier keys
v) Cursor movement keys.

Keyboard Layout:

The keyboard layout is the arrangement of the keys on a computer keyboard.

Standard keyboard layout:

1) A standard computer keyboard has about 100 keys.

ii) The most common keyboard layout are:

(a) DVORAK

(b) QWERTY

iii) A standard keyboard has five group of keys:

(a) Alphanumeric keys

(b) Numeric keys

(c) Function keys

(d) Modifier keys

(e) Cursor movement keys.

* DVORAK keyboard:

i) This keyboard designed for speed typing.

ii) There are two types of DVORAK keyboard: left-handed and right-handed keyboard.

iii) Most commonly used letters are in the middle row of this keyboard.

* QWERTY keyboard :

i) QWERTY is the most common modern-day keyboard layout.

ii) It takes its name from the first six letters from the keyboards first row.

iii) This layout has a separate numeric keypad.

iv) There are 12 function keys across the top of the keyboard.

* AZERTY keyboard

i) AZERTY keyboard layout is used in France, Belgium and other countries.

ii) It differs from QWERTY Layout as:

- A and Q are swapped.
- Z and W are swapped.
- M is moved to the right of L
- Caps lock replaced by shift lock, etc.

How a keyboard works:

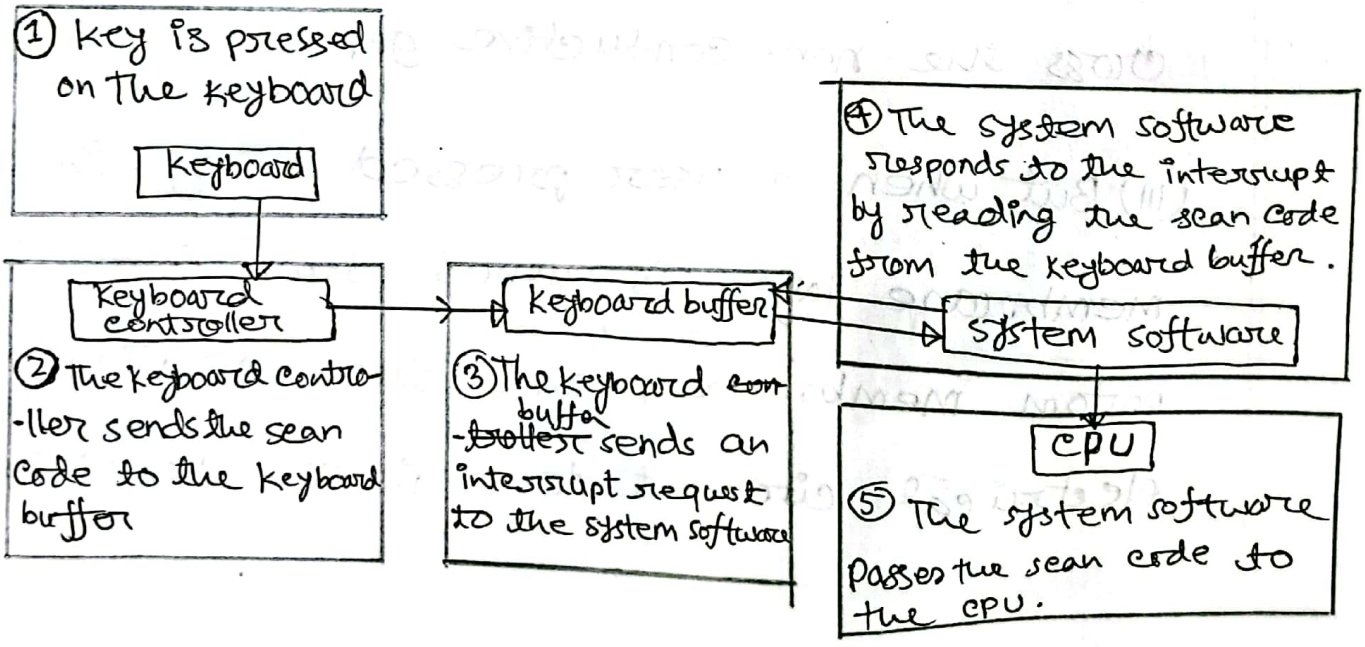
I) Key is pressed on the keyboard.

II) The keyboard controller sends the scan code to the keyboard buffer.

III) The keyboard controller sends an interrupt request to the system software.

IV) The system software responds to the interrupt by reading the scan code from the keyboard buffer.

V) The system software passes the scan code to the CPU.



Membrane keyboard :

Membrane keyboard is a keyboard, where the keys are not separated and covered by a soft plastic.

* Working principle of membrane keyboard :

(I) There are three layers of membrane key-board : Top membrane layer, bottom membrane layer and holes layer.

(II) In normal state, the electrical circuit is broken, because the current can not cross the non-conductive gap.

(III) But when a user pressed a key, the top membrane layer is pushed down into the bottom membrane, and then creating an electrical circuit to register the press.

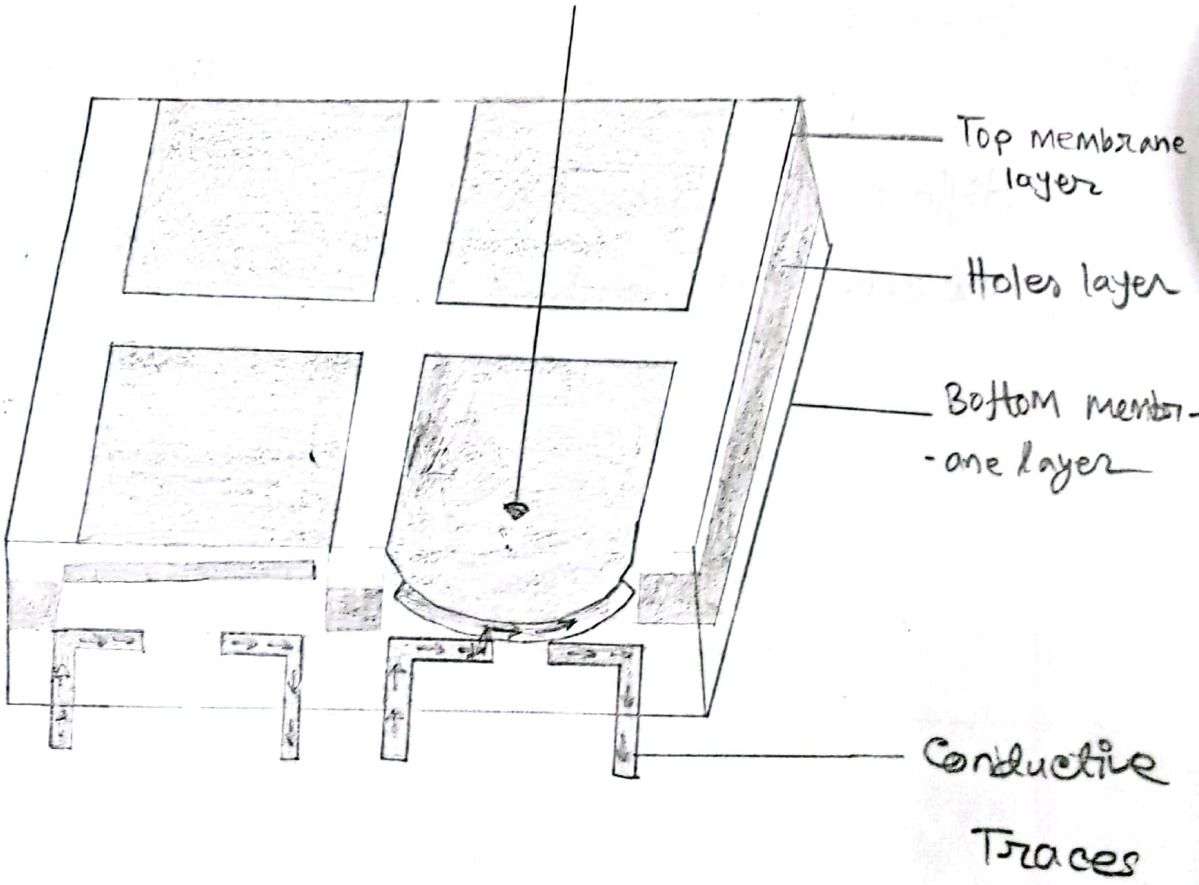
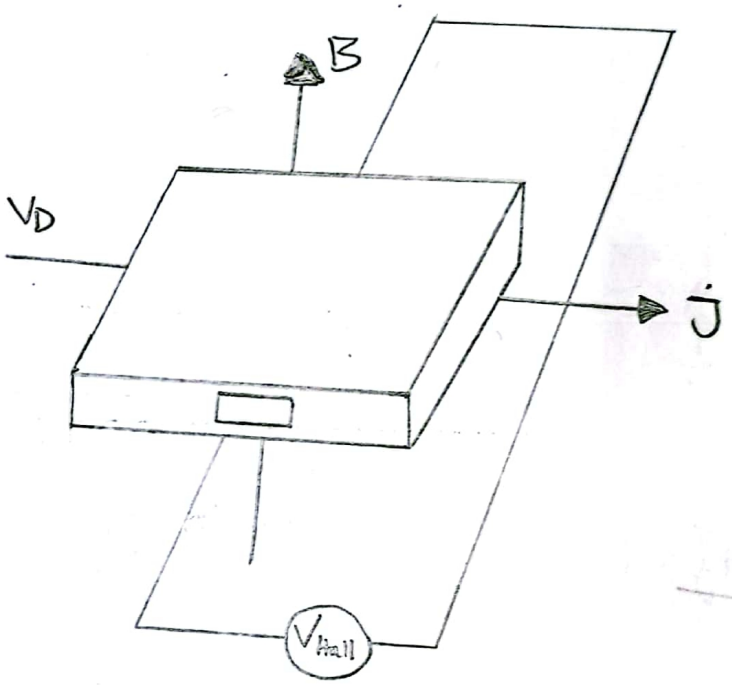


Fig: Membrane keyboard.

Key switching mechanism:

Hall Effect switch:

Hall effect is the production of voltage difference across an electrical semiconductor and current and a magnetic field.



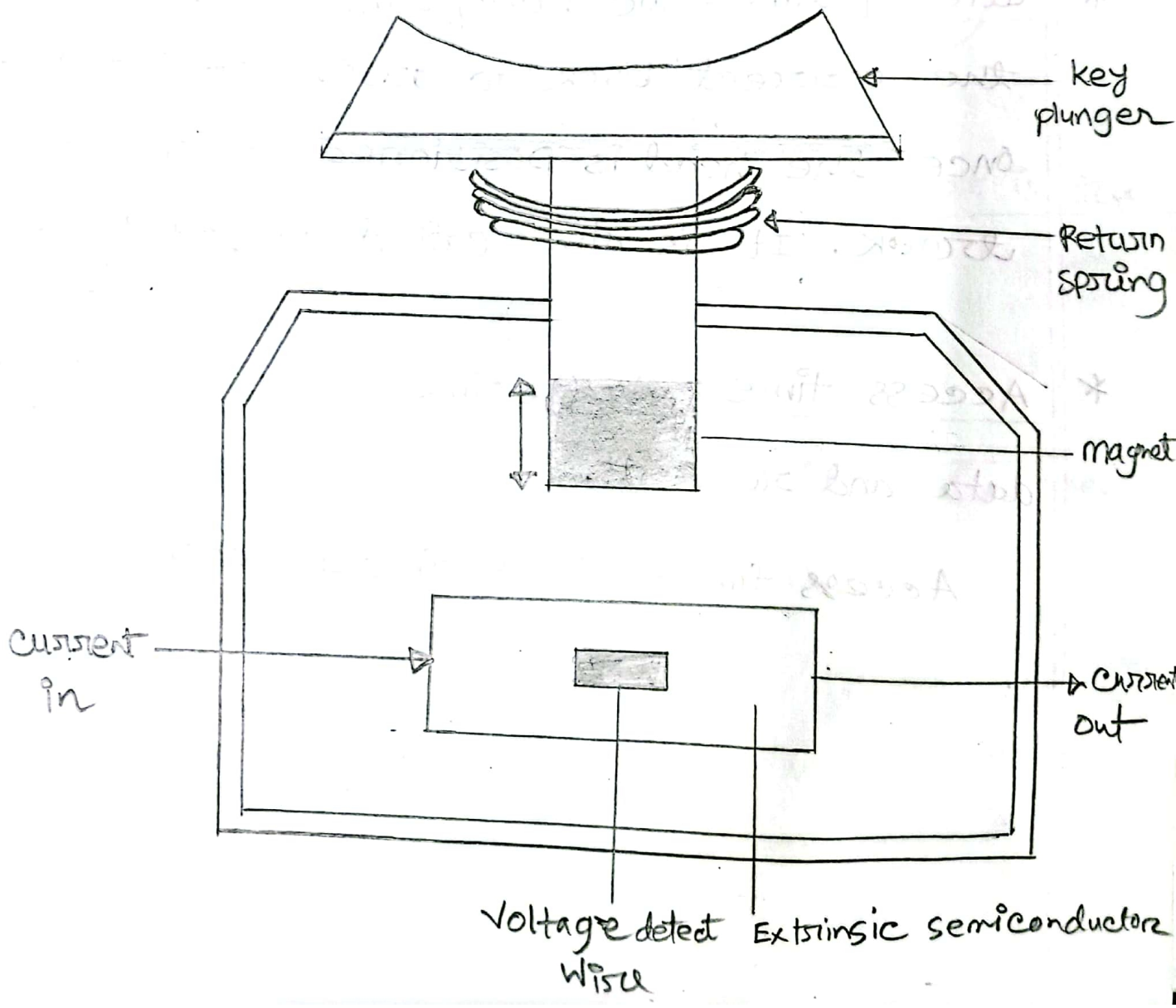
Working principle of Hall Effect keyboard switch:

I) When a key is pressed, a magnetic field is produced.

II) And an electric field is also produced, because electric field is perpendicular to the magnetic field and current is produced.

iii) When magnet is touched the voltage detect wire, then the circuit is closed and the current flow is shorted.

iv) When the key is released then circuit is opened and back to the initial condition.



Anowar

Storage Device

Define seek time, Latency time, and access time.

* **Seek time:** The seek time is the time to locate a particular piece of information on a storage device.

* **Latency time:** The latency time is the time for the correct block to arrive at the head. Once the head is positioned at the correct track. It is also called as rotational delay.

* **Access time:** Access time is the time to locate data and read it.

Access time = seek time + latency time.

⊞ Transfer rate: Amount of data moved per second.

* Transfer rate = Rotational speed * sector per track
* Transfer time = 1/Transfer rate.
* Average Latency time = $\frac{1}{2} * \left(\frac{1}{\text{rotational speed}}\right)$
* Total time to access a disk block = (Avg. seek time + avg. latency time + avg. transfer time)

⊞ A hard disk rotate at 3600 rpm, what is the average latency?

Answer:

We know, average latency = $\frac{1}{2} * \frac{1}{\text{rotational speed}}$

$= \frac{1}{2} * \frac{1}{3600}$ minutes

$= 0.0001389$ minutes

$= (0.0001389 \times 60)$ seconds

$= 0.00833$ seconds

$= 8.33$ ms (Ans.)

Determine the transfer rate, in Mbytes/s, for a hard disk drive given,

Rotational speed = 7200 rpm

Sectors per track = 30

Data per sector = 512 bytes.

Answer:

Here, data per sector = 512 bytes

= 0.5 Kbytes

We know, Transfer rate = rotational speed * sector per track

$= (7200 \times 30)$ sectors/min

$= 216{,}000$ sectors/min

$= (216{,}000 \times 0.5)$ Kbytes/min

$= (108{,}000)$ Kbytes/min

$= (108000/60)$ Kbytes/sec

$= 1800$ Kbytes/s

$= \left(\frac{1800}{1024}\right)$ Mbytes/s

$= 1.76$ Mbytes/s (Ans.)

* Determine the transfer rate, in Mbytes/s, for a hard disk drive given,

Rotational speed = 7000 rpm

Sectors per track = 32

Data per sector = 1024 bytes.

Answer:

Here, data per sector = 1024 bytes

= 1 Kbytes

We know, Transfer rate = rotational speed * sector per track

= (7000 x 32) sectors/min

= 224000 sectors/min

= (224000 x 1) Kbytes/min

= (224000/60) Kbytes/sec

= 3733.33 Kbytes/s

$= \left(\frac{3733.33}{1024}\right)$ Mbytes/s

= 3.65 Mbytes/s (Ans.)

Answer

Interfacing

24-07-2018

* What do you mean by computer Interface? Write down the properties of computer interface?

Solution:

Interface: The circuitry or devices are needed to connect the bus to a device is called inter-face. For example, "Bus control logic" is the interface for the CPU.

RS232
Recommended Standard 232 for
→ Serial communication → it is used to connect computer & peripheral devices to exchange data bit by bit.

Properties: /(characteristics)

(1) Interface must be consist of a logic circuit (address decoder) to decode the address.

(2) It must be consist of a buffer.

(3) It has circuitry for read and write operation.

(4) I/O device capable to communicate with DMA(Direct Memory Access) controller.

Block diagram of Interface:

*

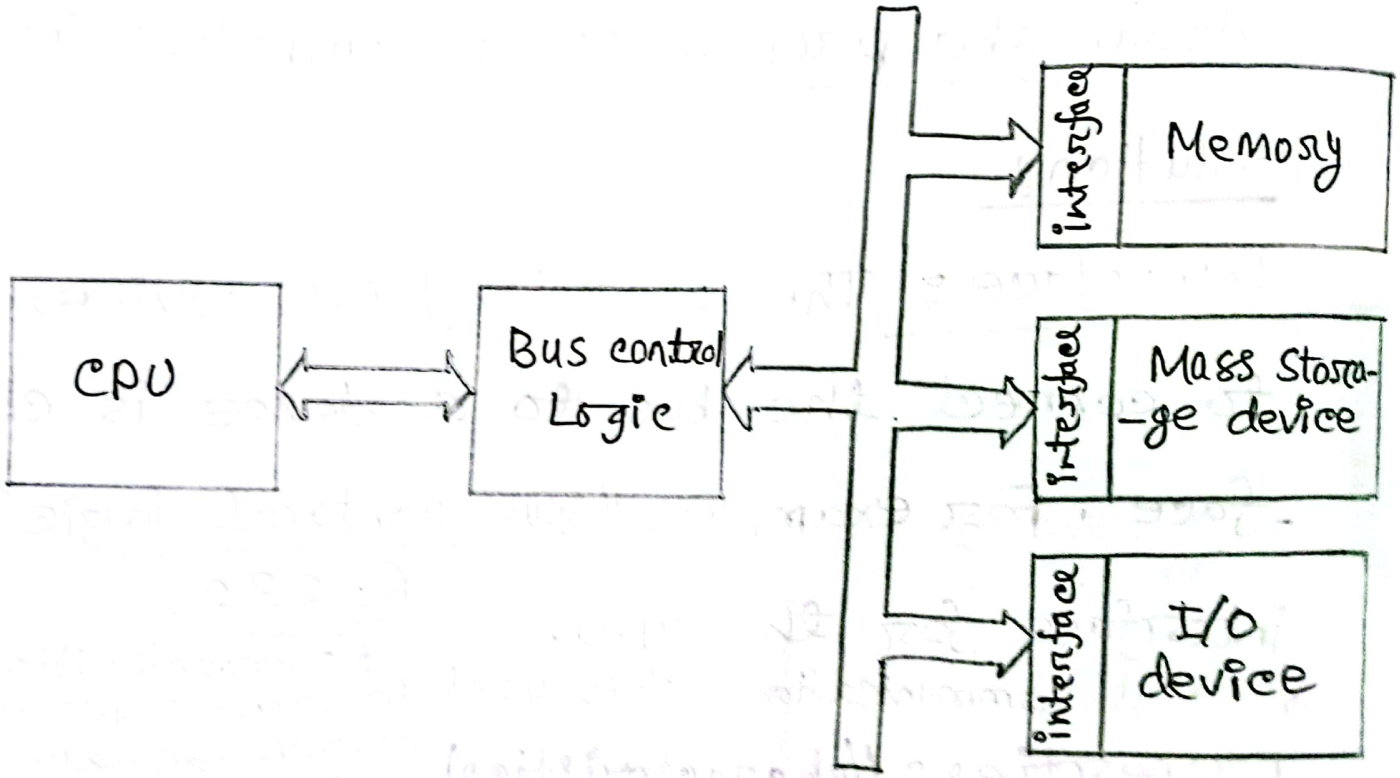


Fig: Block diagram of interface

Anowar
ICT, MBSTU

8255A

Intel-8255A programmable peripheral Interface:

The 8255A is a programmable I/O device that is designed to transfer the data from I/O to interrupt I/O under certain condition as required. // 8255A is designed to interface the CPU with its outside world such as ADC, DAC, keyboard etc

It can be used with almost any microprocessor. It has 40 pins.

ports of 8255A:

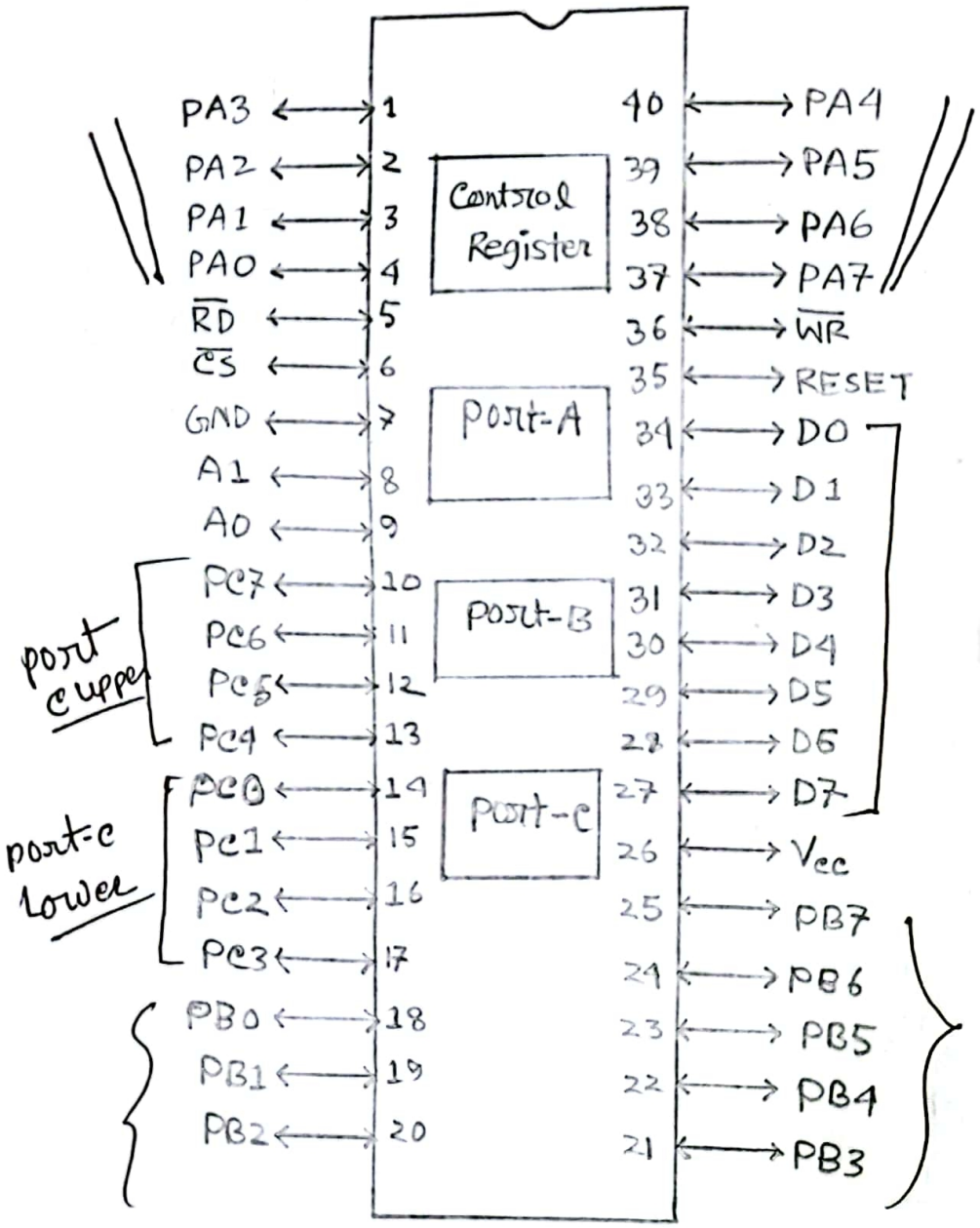
8255A has three ports: (i) port A
(ii) port B
(iii) port C

(i) port A: Contains one 8-bit output buffer and one 8-bit input buffer.

(ii) port B: Similar to port A.

(iii) port C: port C can be divided into two parts- port C lower (PC3 - PC0) and port C upper (PC7 - PC4) by the control word

* pin diagram of INTEL-8255A :



Description :

Pin (34 - 27) : Data pin ($D_0 - D_7$)

Register
- Port - A : 8 pin ($PA_0 - PA_7$) {(1-4), (37-40)}
- Port - B : 8 pin ($PB_0 - PB_7$) (18-25)
- Port - C : 8 pin ($PC_0 - PC_7$) (10-17)

A_0, A_1 : Address Bit (8, 9 pin)

RESET : 35 (Reset input)

$\overline{WR}$: 36 (Write input)

$\overline{RD}$: 5 (Read input)

$\overline{CS}$: 6 (chip select) → It determine whether 8255A active/not (It enable communication between µp & 8255A)

Vcc : 26 (Voltage common Collector) // GND = 7 (ground)

Intel - 8255A contain one Vcc and one GND pin.

* What is the specialty about port-C & RESET pin of 8255A?

port-C : port C can be used as an 8-bit I/O port or two 4-bit I/O ports or to produce the handshake signal for port-A and port-B.

RESET : It activates when it get high signal. It clears the control registers and set all the ports in the input mode.

Address bit A_0 and A_1 use to select which register will be used :

Selection

$\overline{CS}$	A_1	A_0	~~Register Used~~
0	0	0	port A
0	0	1	port B
0	1	0	port C
0	1	1	Control Register
1	X	X	No selection

Both read and write operation will be held in port-A, port-B and port-C but in control register only write operation to be held.

$\overline{WR}$ and $\overline{RD}$ is used to Write and Read operation.

X RESET : It activates when it gets high signal. It clears the control registers and sets all ports in the input mode.

Start

* Write the addressing technique of "READ and WRITE" operation of Intel-8255A.

[Read = (port → Data bus)
Write = (Data bus → port)]

Answer:

Addressing technique of **READ** operation of 8255A:-

A1	A0	$\overline{RD}$	$\overline{WR}$	$\overline{CS}$	Function Input operation (Read)
0	0	0	1	0	port A → Data bus
0	1	0	1	0	port B → Data bus
1	0	0	1	0	port C → Data bus
1	1	0	1	0	Control Register → Data bus

Addressing technique of **WRITE** operation of 8255A :-

A1	A0	$\overline{RD}$	$\overline{WR}$	$\overline{CS}$	Function Output operation (write)
0	0	1	0	0	Data bus → port A
0	1	1	0	0	Data bus → port B
1	0	1	0	0	Data bus → port C
1	1	1	0	0	Data bus → Control Register

8255A operational Modes and Initialization:

Mode 0 :

When we want to use a port for simple input or output without handshaking, we initialize that port in mode 0.

If both port-A and port-B are initialized in mode 0, then the two halves of port-C can be used together as an 8-bit port.

The two halves of port C are independent, so, one can be initialized as input and another can be initialized as output.

* Mode 1 :

When we want to use port-A or port-B for a handshake input or output operation, we initialize that port in mode 1.

In this mode, some pins of port-C used as handshake lines. pins PC0, PC1, PC2 function as handshake lines for port B.

If port A is initialized as a handshake input port, then the pins PC3, PC4 and PC5 function as handshake signals and PC6 and PC7 are used as input or output lines.

If port A is initialized as a handshake output port, then the pins PC3, PC6 and PC7 function as handshake signals and PC4 and PC5 are used as input or output lines.

* Mode 2 :

Only port-A can be initialized in mode 2. Here port A can be used for bidirectional handshake data transfer.

If port A is initialized in mode 2, then pins PC3 through PC7 are used as handshake lines for port-A. The other three pins PC0 through PC2 can be used for I/O if port-B is in mode 0.

And the three pins will be used for port-B handshake lines if port-B is initialized in mode 1.

8255 A control register format :

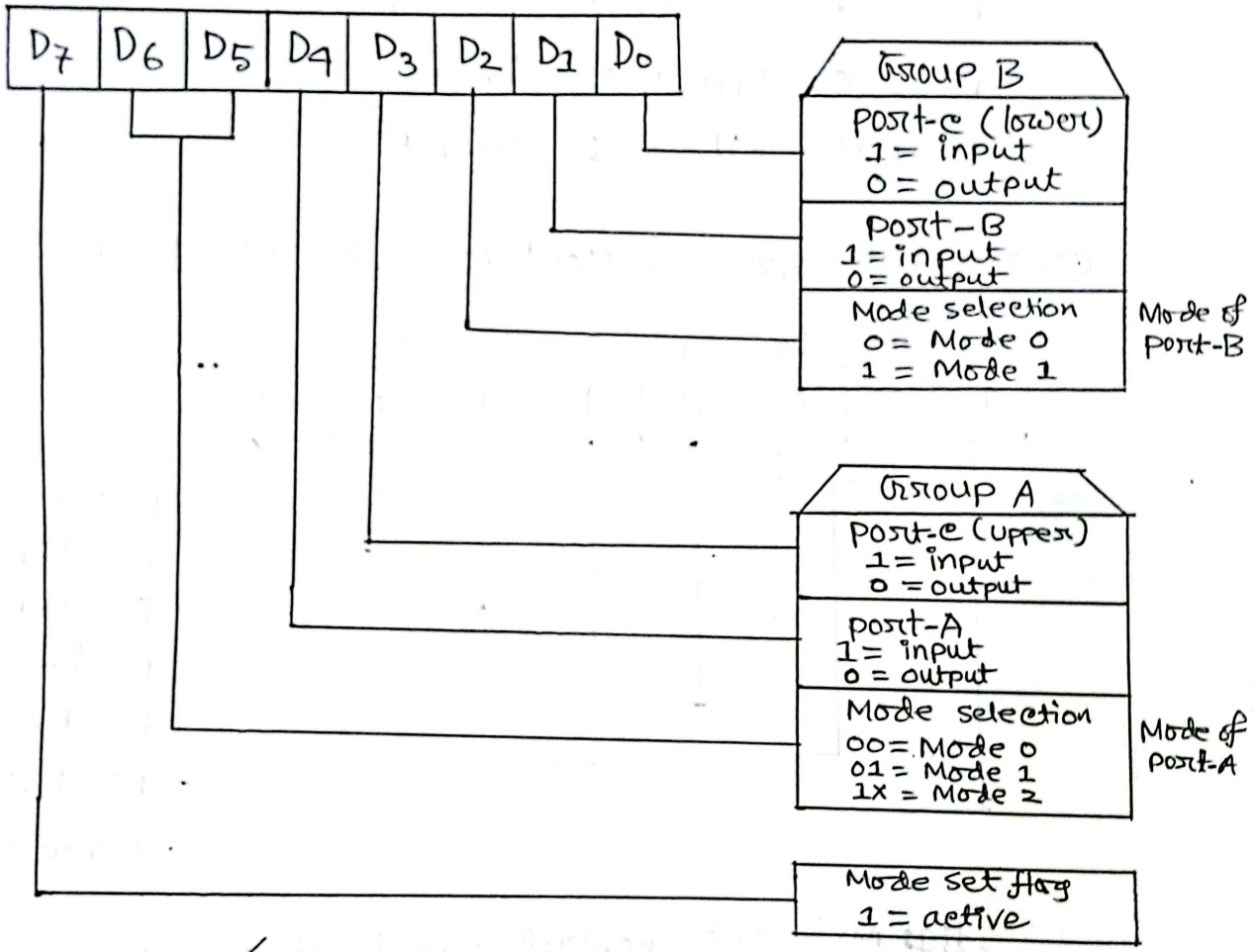


Fig: Mode-set control word Format

Example :

port B as mode 1 input
port A as mode 0 output
port C upper as input
port C bit 3 as output

Construct 8255A control word format :-

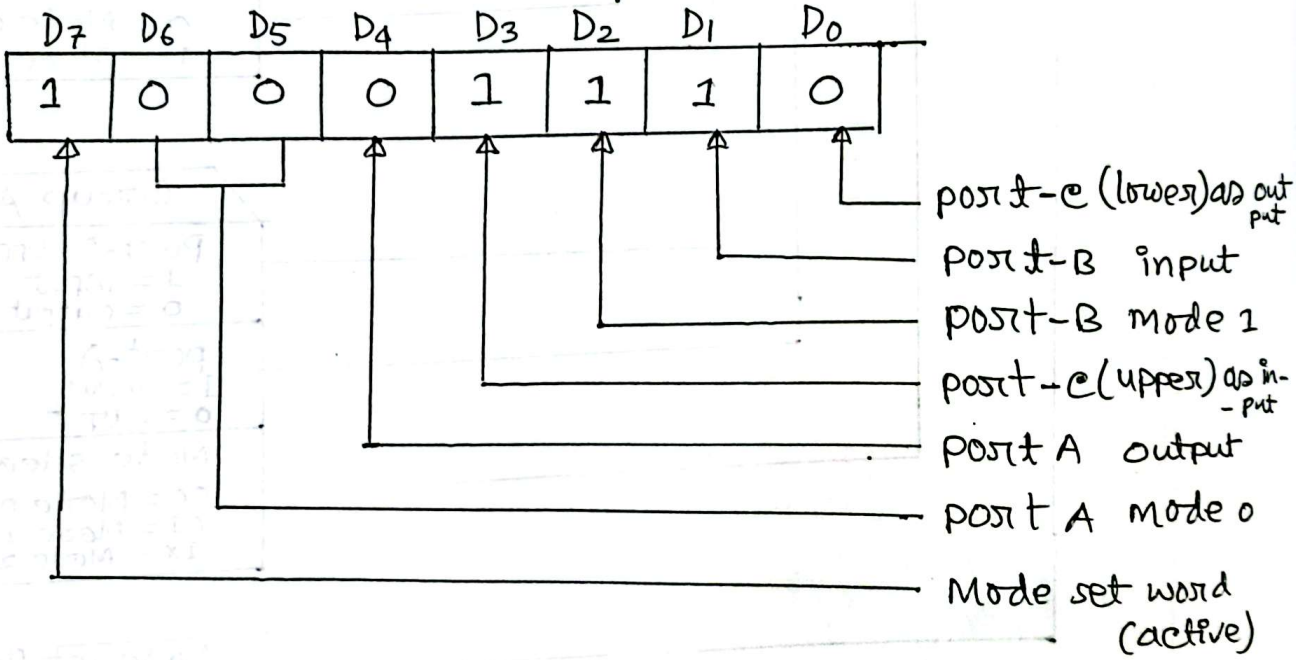


Fig: Mode set control word of 8255A

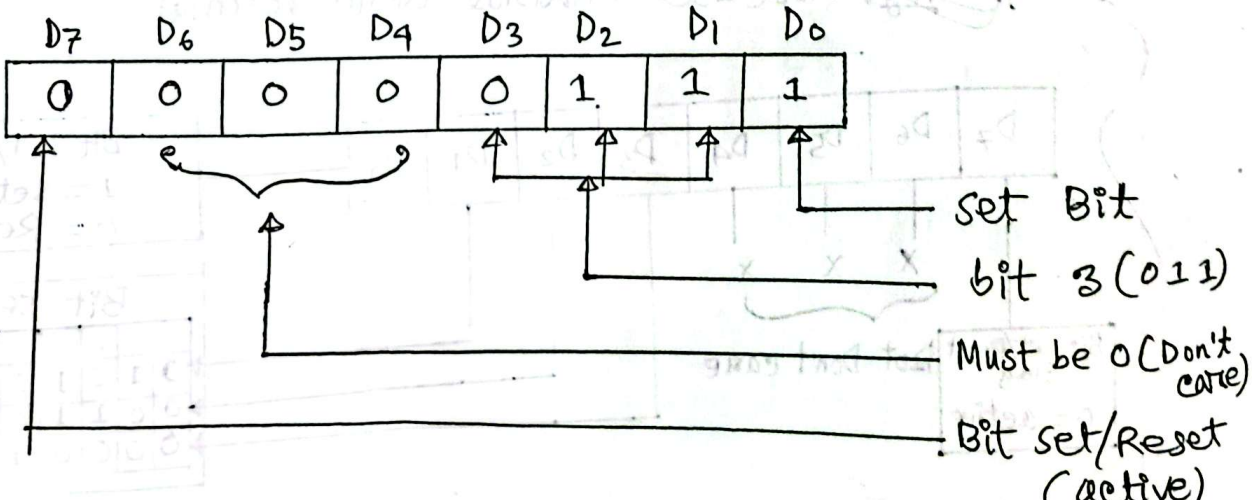
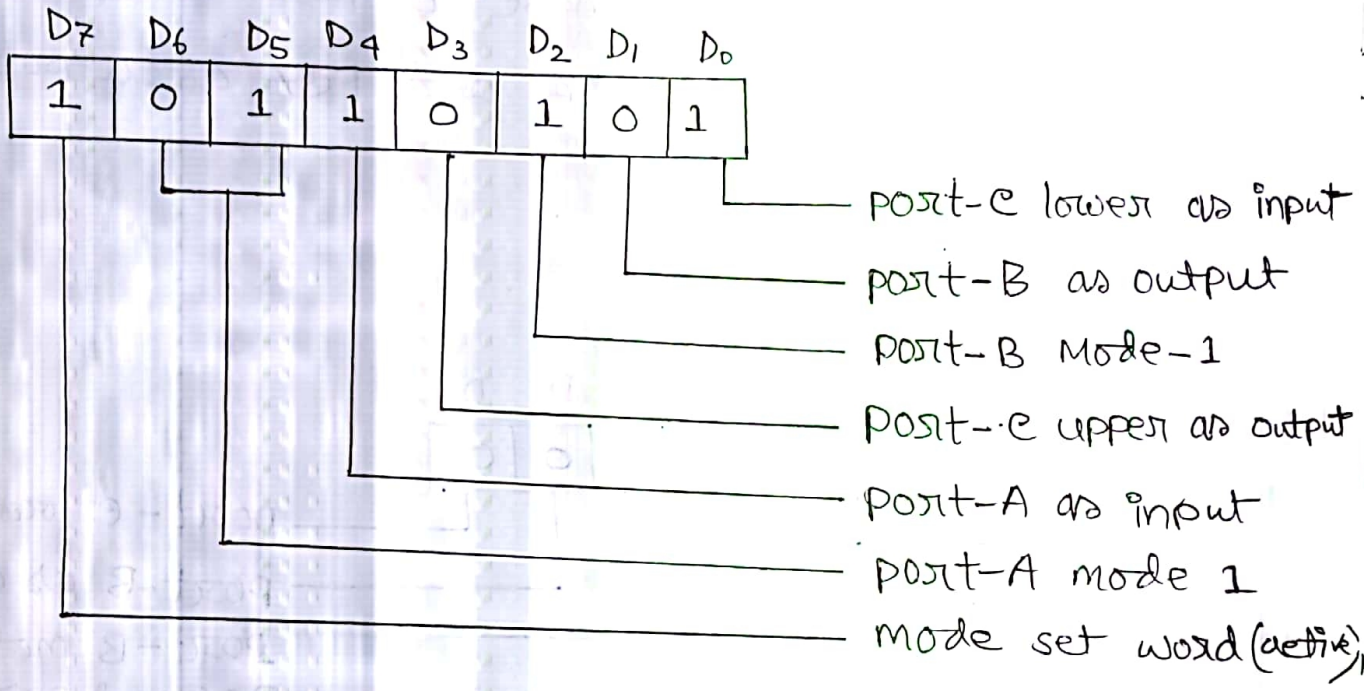


Fig: port-C bit set/Reset control word to set bit 3.

If control register of Intel-8255A contain 10110101 value. What does it mean? explain it.

Answer:



So, we can write that,

port-B as mode 1 output

port-A as mode 1 input

port-C upper as output

port-C lower as input.

(end)

* Write down the mode set control word needed to initialize an intel-8255A as follows:

(i) port A - handshake input

(ii) port B - handshake output

(iii) port C - bits PC6 and PC7 as outputs.

Answer:

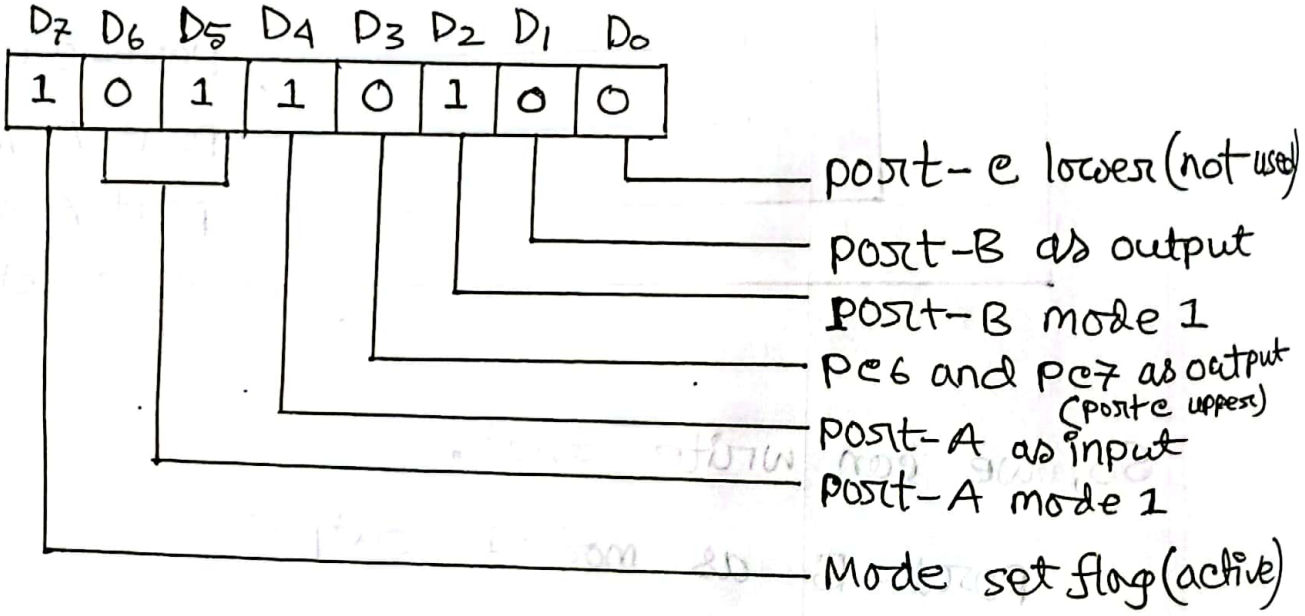


Fig: Mode set control word of 8255A

So, we get the control word is $(10110100)_2$

$= (B4)_{16}$.

Anowar

8259 A

Interrupt:

The interrupt is not an operation, it is a condition. When an interrupt is triggered, then the processor pauses the current task, does something and then return and continue the anothest task.

Types of Interrupt:

i) Type 0 (Divide by zero interrupt)
ii) Type 1 (Single step interrupt)
iii) Type 2 (Non-maskable interrupt)
iv) Type 3 (Break point interrupt)
v) Type 4 (Overflow interrupt)

priority of 8086 interrupt:

If two or more interrupt occur at the same time, then the highest priority interrupt will be serviced first and then the next highest priority will be serviced.

Interrupt	priority
Divide Error, INTn, INTO	Highest
NMI	↓
INTR	
Single-step	Lowest

Why is priority Interrupt controller necessary?

At a time, microprocessor executes any one interrupt and only one interrupt can make any affect to microprocessor.

If more than one interrupt come from peri-phesral devices, then it is difficult to identify which operation is executes. To avoid this situa-tion priority Interrupt controller is necessary.

pin diagram of Intel-8259A:

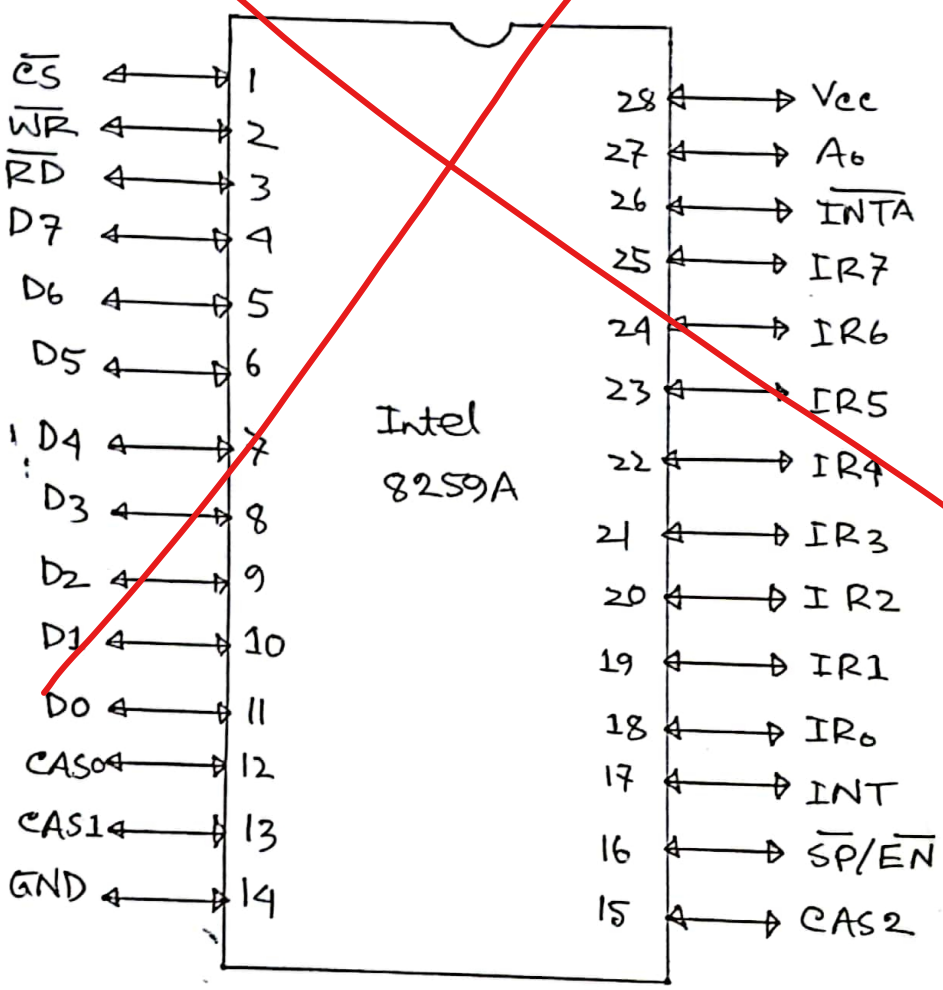


Fig: pin diagram of 8259A

Block Diagram of 8259A :

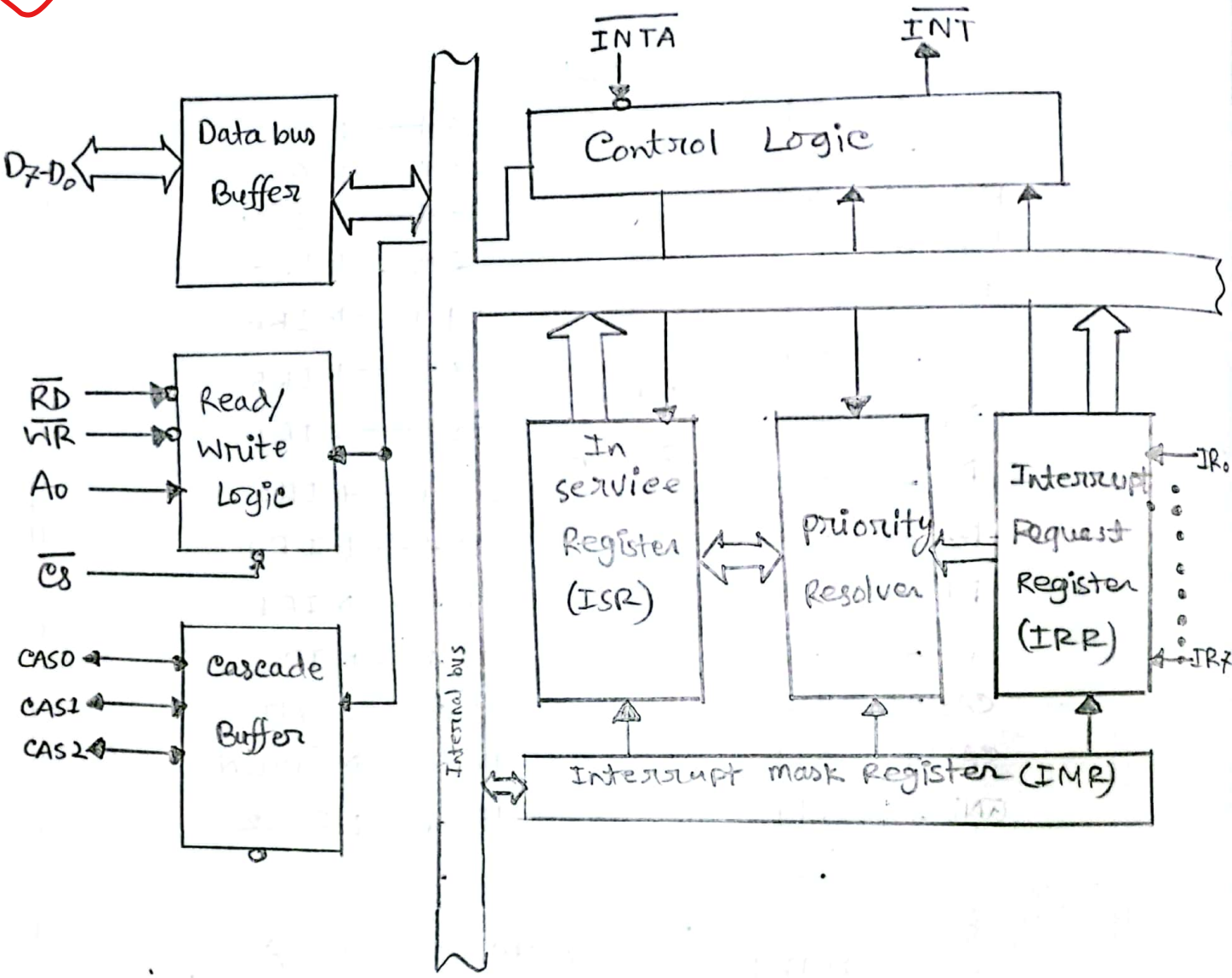


Fig: Internal Block diagram of 8259A.

** How does Intel-8259 handle interrupt request?

If the 8086 interrupt flag is set and the INTR input receives a high signal, then 8086 will -

1) Send out two interrupt acknowledge pulses on its $\overline{\text{INTA}}$ pin to the $\overline{\text{INTA}}$ pin of an 8259A PIC. The $\overline{\text{INTA}}$ pulses tell the 8259A to send the desired interrupt type to the 8086 on the data bus.

2) Multiply the interrupt type it receives from the 8259A by 4 to produce an address in the interrupt vector table.

3) push the flags on the stack.

4) Clear IF and TF. (Interrupt flag & Trap flag).

5) push the return address on the stack.

6) Get the starting address ~~ad~~ for the interrupt procedure from the interrupt vector table and load that address in CS and IP.

VII) Execute the interrupt service procedure.

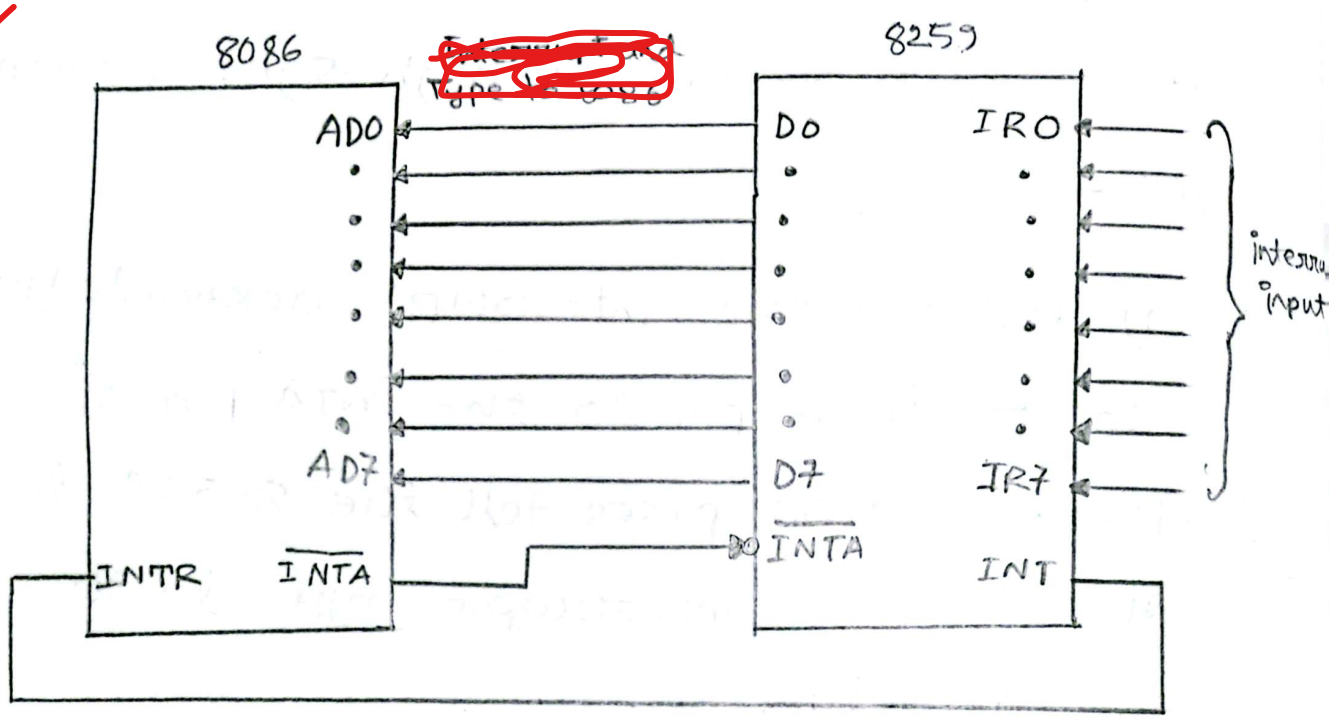


Fig: Block diagram showing an 8259 connected to an 8086

(ভিত্তি বাদ)

(8) Write down the function of CAS0-CAS2 pins of Intel-8259A both for master and slave mode?

Cascade buffer function block compares the IDs of all 8259A's in the system. The associated 3 I/O pins (CAS0-CAS2) are outputs when 8259A is used as a master mode, are inputs when 8259A is used as a slave mode.

As a master, the 8259A sends the ID of the interrupting slave device onto the CAS0-CAS2 pins. The slave 8259A's compare this ID with their own programmed ID.

Describe the function of the important registers available in 8259A.

There are three registers available in 8259A

(I) IRR (Interrupt Request Register)
(II) ISR (In service Register).
(III) IMR (Interrupt Mask Register)

(I) IRR:

IRR stores all the interrupt inputs that are requesting service. It is an 8-bit register. It keeps of which interrupt inputs are asking for service. If interrupt bit is unmasked, then IRR bit will be set.

(II) ISR:

The ISR keeps track of which interrupt inputs are currently being serviced. For each input that is currently being serviced, the ISR bit will be set.

iii) IMR :

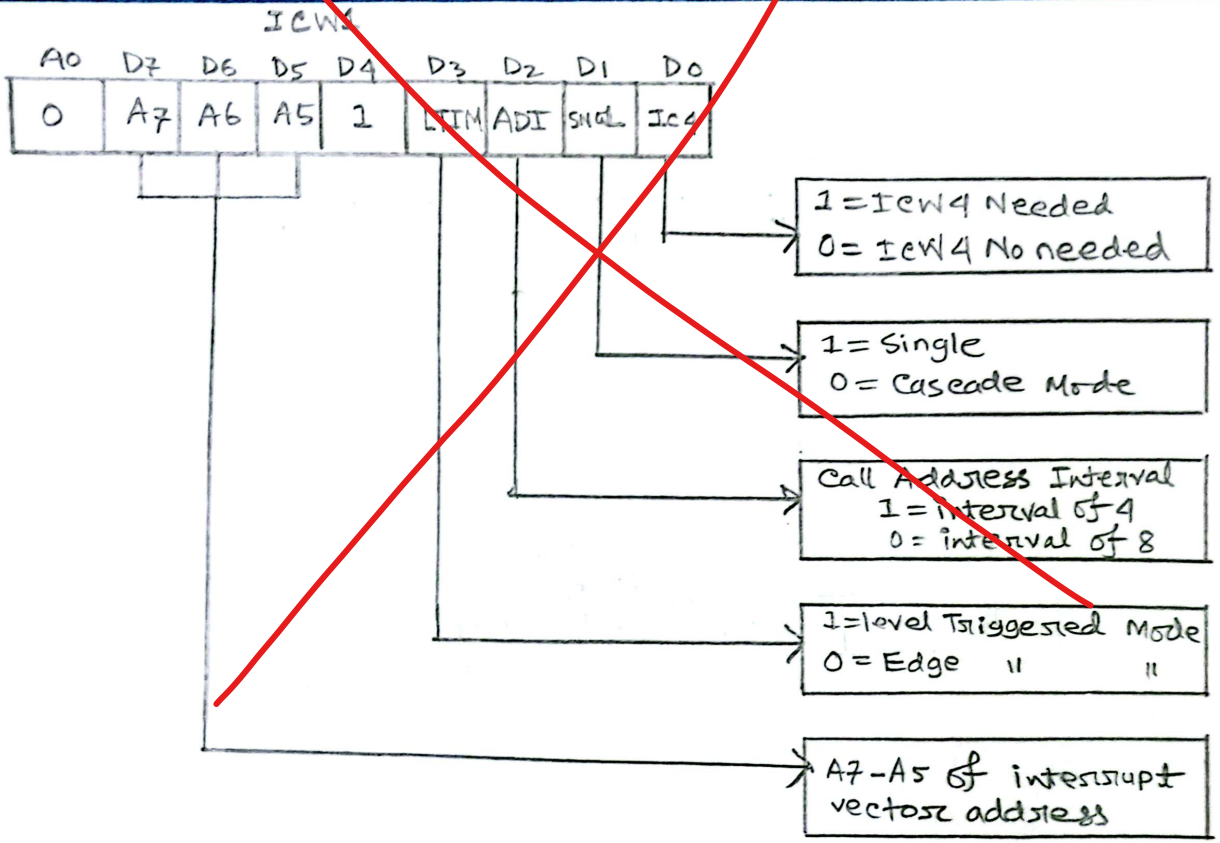
The IMR is used to disable (mask) or enable (unmask) individual interrupt request inputs. This is also an 8 bit register. Each bit in this register corresponds to the interrupt with the same number. The IMR operates on the IRR.

Priority Resolver :

This block determines the priorities of the interrupt. It takes the information from IRR, ISR and IMR to determine the new interrupt request is having highest priority or not. If new interrupt request having the highest priority, then it is selected and processed.

less imp.

8259A Initialization Command Word1 (ICW1) format :



8259A Initialization Command Word 3 (ICW3) Format:

ICW3 (Master device)

A_0	D7	D6	D5	D4	D3	D2	D1	D0
1	S7	S6	S5	S4	S3	S2	S1	S0

Interrupt request

1 = IR input has a slave

0 = IR input has not a slave

ICW3 (Slave Device)

A_0	D7	D6	D5	D4	D3	D2	D1	D0
1	0	0	0	0	0	ID2	ID1	ID0

Slave ID

0	1	2	3	4	5	6	7
0	1	0	1	0	1	0	1
0	0	1	1	0	0	1	1
0	0	0	0	1	1	1	1

For 8259A in cascade mode an ICW3 must be sent to the master and a different ICW3 must be sent to the slave.

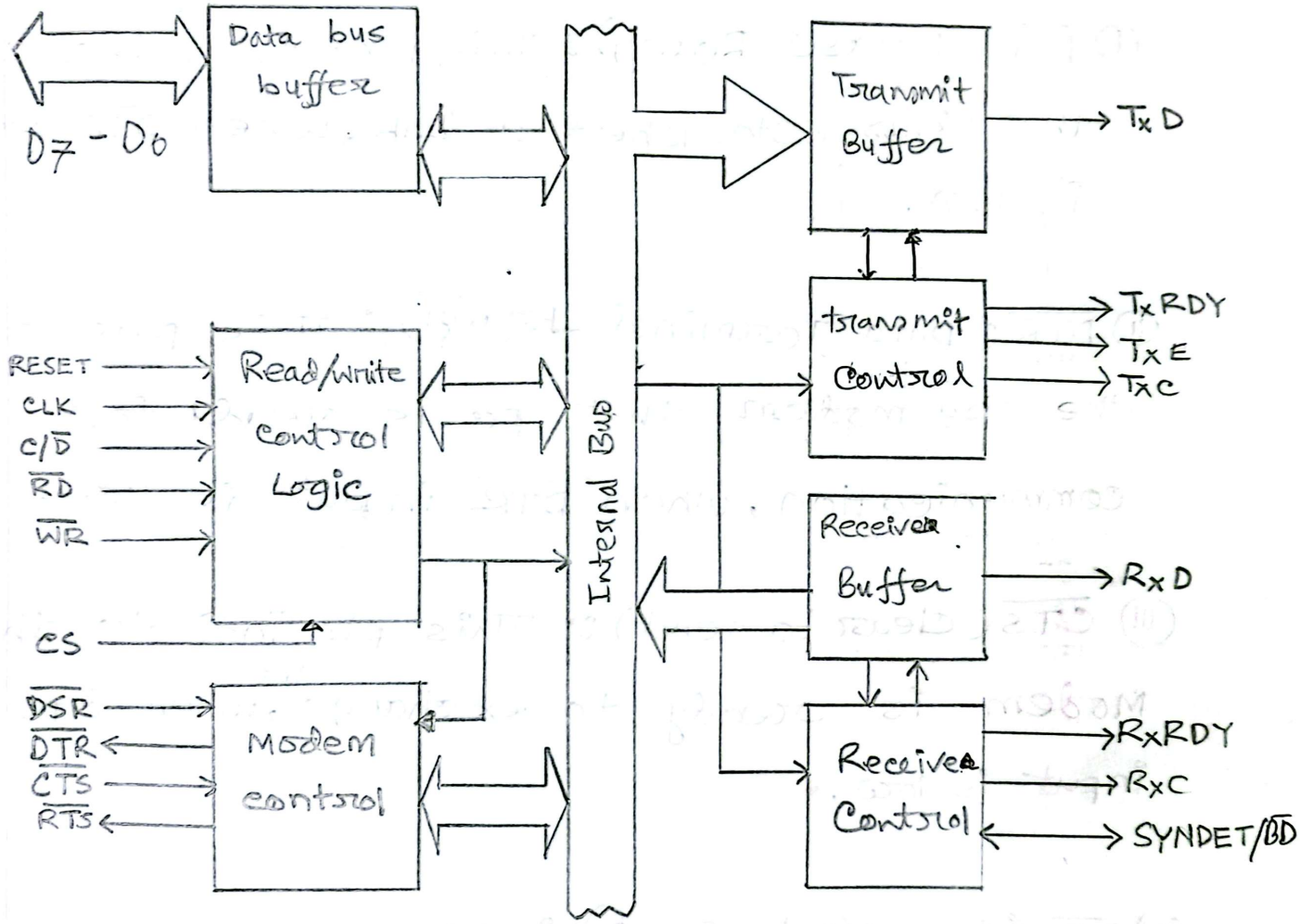
Question: write down the function of Initialize command word 3 (ICW3) of Intel-8259A in cascade mode.

(Start)

8251 PCI (programmable communication Interface)

(2014)

* ⊞ Block diagram of Intel-8251A :



Data bus + $\overline{RD}$ $\overline{WR}$ control

Describe the pin function of Intel 8251A:

* Modem control pin:

(I) $\overline{DSR}$ (Dataset Ready): This pins tells the CPU that modem has established a link, when $\overline{DSR}$ input is low.

(II) $\overline{DTR}$ (Data Terminal Ready): This pins tells the ~~cpu~~ modem that pc is ready for communication, when $\overline{DTR}$ input is low.

(III) $\overline{CTS}$ (clear to send): This pin indicate that modem is ready to exchange data, when $\overline{CTS}$ input is low.

(IV) $\overline{RTS}$ (Request to send): This pin informs the modem that pc wants to exchange data, when $\overline{RTS}$ input is low.

Transmitter Control pin:

* (i) TxRDY (Transmitter is Ready): This pin tells the CPU that the terminal is ready to access data from CPU.

(ii) TxE (Transmitter Empty): This pin tells the CPU that the transmitter is empty.

(iii) TxD (Transmit Data): This pin is the actual serial data output.

(iv) TxC (Transmitter clock): This pin is the transmitter shift register clock input.

* Receiver control pin:

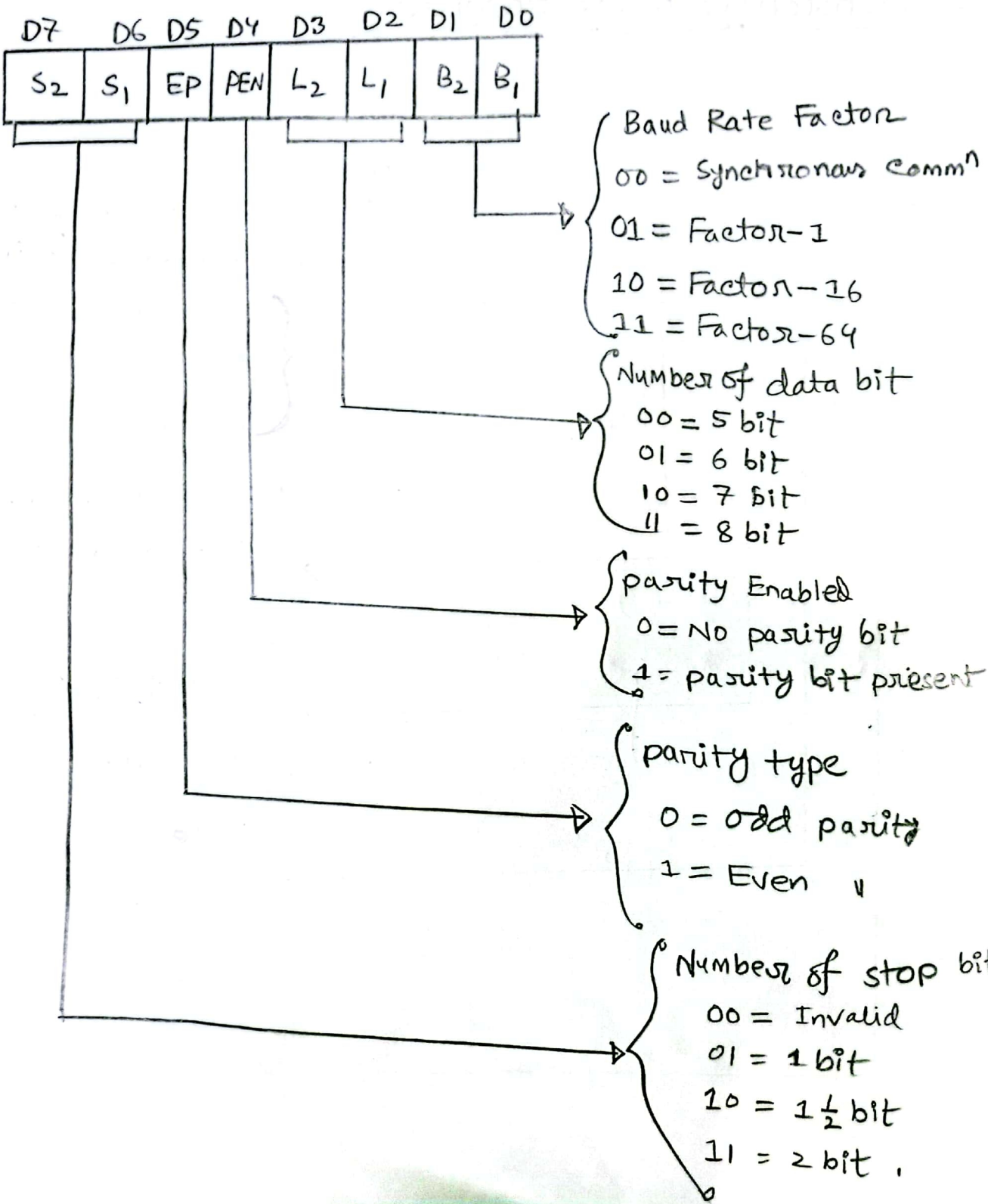
* (i) RxRDY (Receiver is Ready): This pin is indicates that terminal is ready with character.

(ii) RxD (Receiver Data): This pin is the actual serial data input.

(iii) RxC (Receiver clock): This pin is the receiver shift register clock input.

(iv) SYNDET/$\overline{BD}$: This pin uses for synchronous communication.

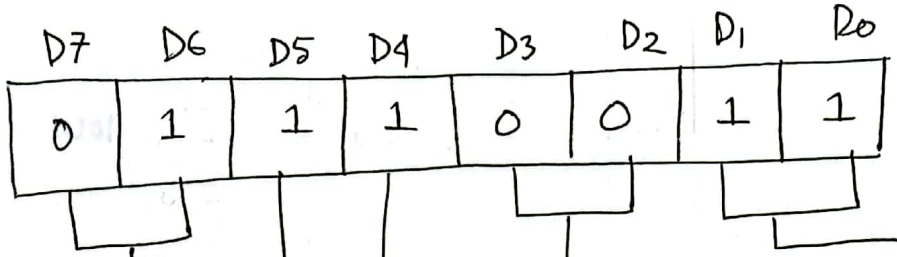
*Asynchronous Mode register :



☐ How is 8251A configured when the mode instruction value is 73H ?

$(73)_{16} = (0111\ 0011)_2$

Here last two bit is 11 it configured by Asynchronous mode register.

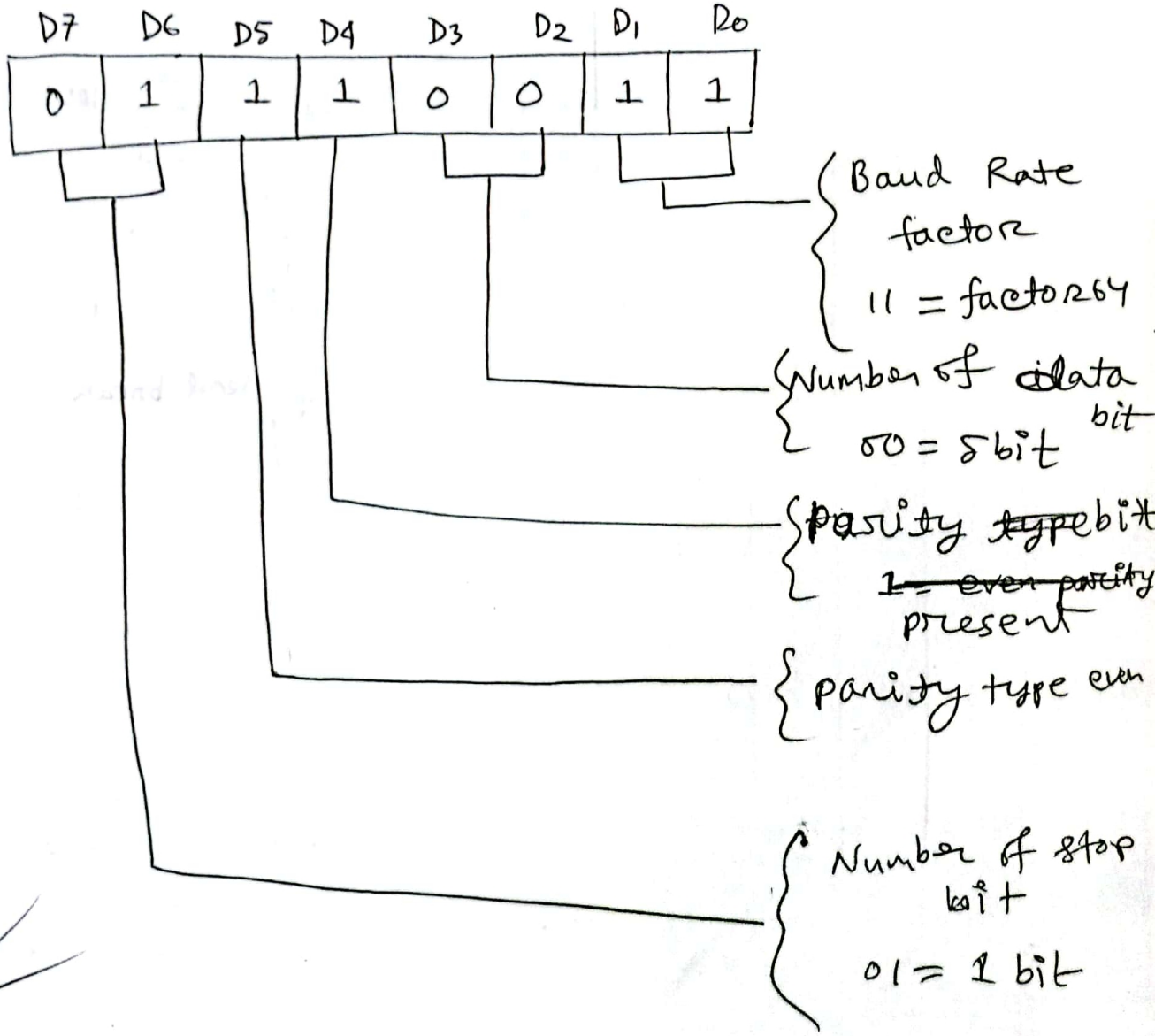


- Baud Rate factor
  11 = factor 64
- Number of ~~data~~ bit
  00 = 5 bit
- Parity ~~type~~ bit
  ~~1 = even parity~~
  present
- parity type even
- Number of stop bit
  01 = 1 bit

How is 8251A configured when the mode instruction value is 73H ?

$(73)_{16} = (0\,1\,1\,1\,0\,0\,1\,1)_2$

Here last two bit is 11 it configured by Asynchronous mode register.



Difference between synchronous and asynchronous communication:

Synchronous Communication	Asynchronous communication
1. There are clock signal between transmitter & receiver.	1. There is no clock signal between transmitter and receiver
2. There is no gap between data.	2. There is gap between data.
3. Data transfer rate is higher.	3. Data transfer rate is lower.
4. Time interval is constant.	4. Time interval is random.