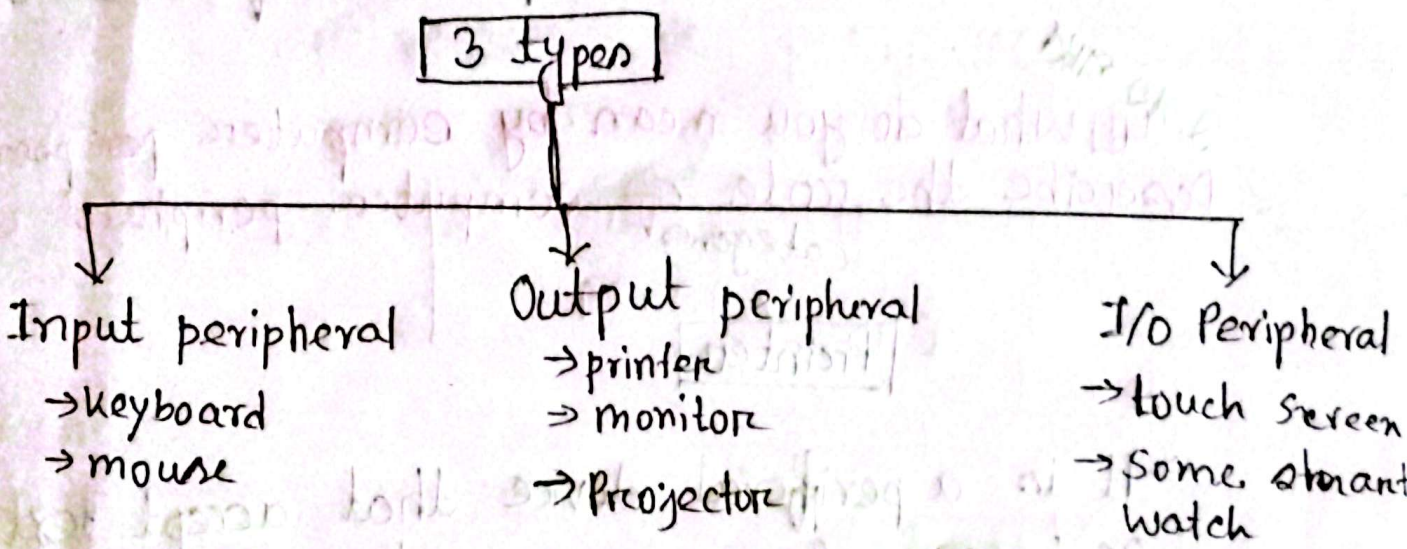
Theory Class - 01

[1] **Computer peripheral** :- Computer peripheral are any system computer component that expand system functionality.

Example:- Keyboard, mouse, printer etc.



[2] **Peripheral Device:** Peripheral device is a device that connect to computer but not the core part of a computer architechture.

1. **Input device:-** An input device sends data or instructions to the computer. Such as, mouse, keyboard, image scanner, barcode reader, web cam etc.

2. Output device: An output device provides output from the computer. Such as Computer monitor, projector, printer, speaker etc.

3. I/O Device: (Both)
Such as, touch screen, pendrive, flash drive etc

Q. What do you mean by computer peripheral. Describe the role of computer peripheral devices (categories)

Printer

→ It is a peripheral device that accept text file or images from a computer and transfer them to a medium such as papers.

→ It is an output device.

→ It connected to computer directly or by network.
↳ wifi / Lord connection.

•ino → extension

Theory class - 02
27-10-24

Types of printer :-

There are two main types of printer :-

1) Impact Printer.
2) Non Impact Printer.

1. Impact Printer :-

→ Makes contact with the paper.
→ It prints text or images by pressing an inked ribbon by using pin.

Example:-

ছাপা ছিন্ন করে চাপ দেওয়া হয়

ⓐ Dot matrix printer ;
ⓑ Line printer ;
ⓒ Daisy wheel printer ;
ⓓ Chain printer ;
ⓔ Drum printer etc.

2. Non Impact Printer :- This printer prints text or images without direct physical contact between printing mechanism and paper.

→ It is more faster than impact printer.

Example:

(a) Laser printer ;
(b) Ink jet Printer ;
(c) Electrostatic Printer ;
(d) Thermal Printer, etc.

Dot Matrix Printer

A-2

→ It is a impact printer

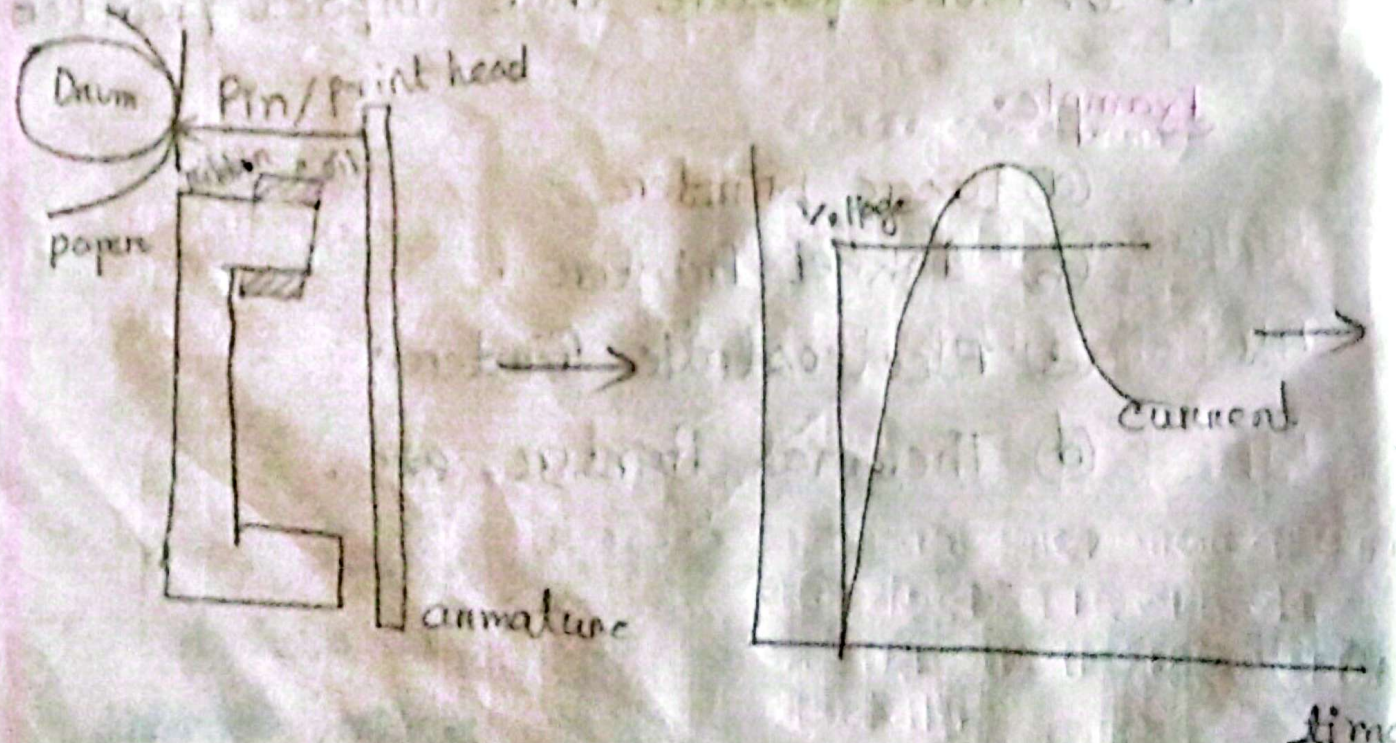
→ It uses patterns of dot to print text or images.

→ It has some printing pin or head. (It has) (head)

→ Normally pin 9 or 24.

→ Printing speed = 30 - 550 character/sec

Dot matrix Printer Working Principle:



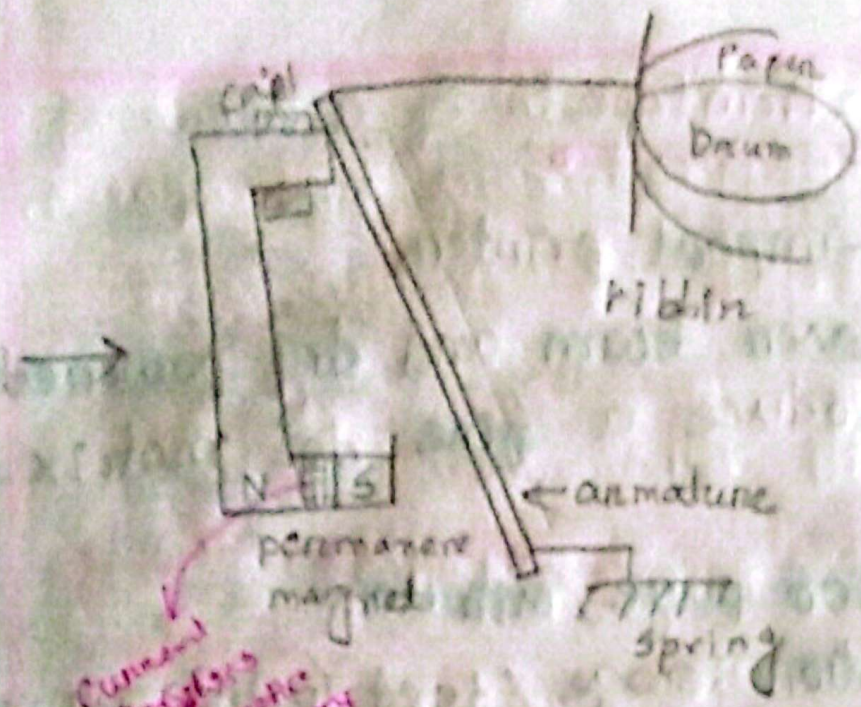


Fig : Dot Matrix Printer working Principle

→ Low quality
→ slow, speed কম, resolution কম
→ Noisy, time consuming

details

Advantages / Disadvantages

→ cost কম
→ যে সকল কাজে low quality printing প্রয়োজন হয় সেখানে use.
→ সব Language print করা যায়।

→ Performance
→ Advantage
→ Disadvantage

Laser Printer

→ It is non-impact printer.

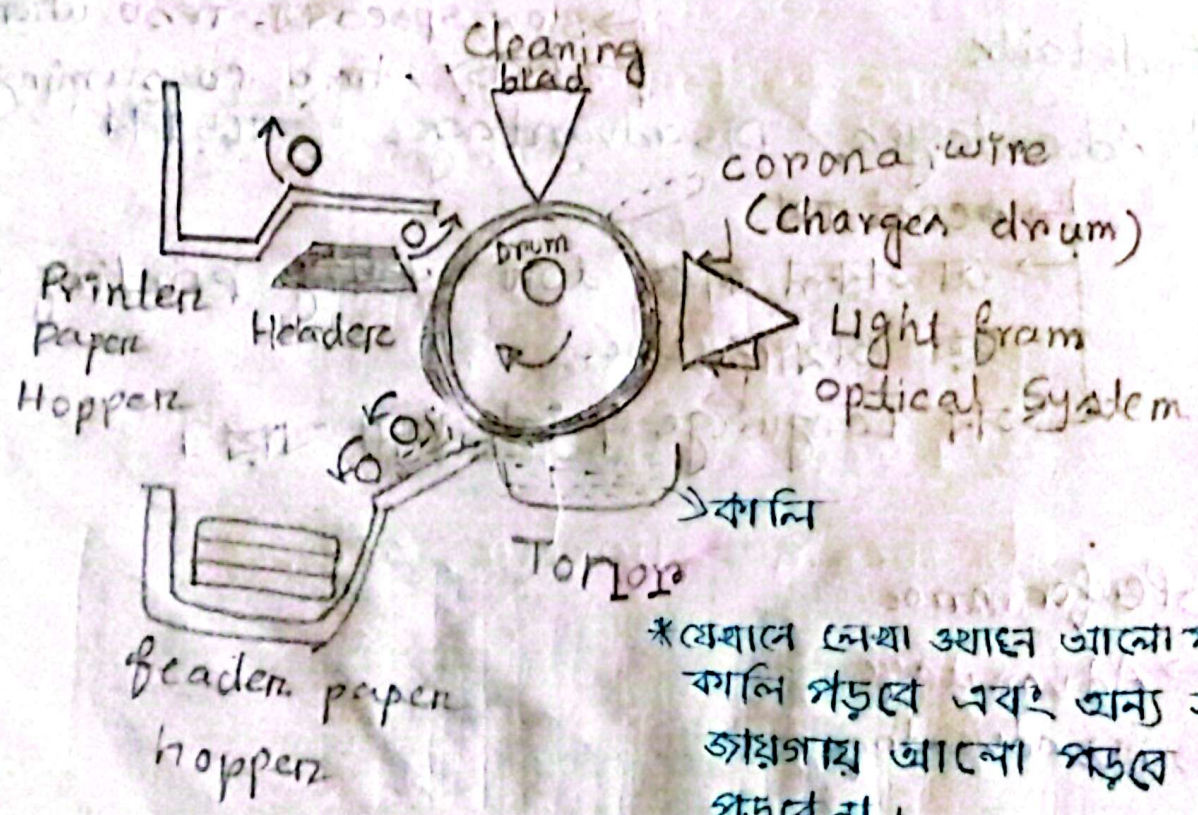
→ It is a laser beam and dry powered ink to produce a fine dot matrix pattern.

→ Speed = 4-100 page/minute.

→ High resolution image/text (print করা যায়)

It produce

→ Color print + Black-white print.



*যেখানে লেখা থাকে সেখানে আলো পড়বেনা কালি পড়বে এবং অন্য সব-জায়গায় আলো পড়বে কালি পড়বে না।

Advantages

Disadvantages

Advantages

→ Color
→ Cost কম
→ Speed বেশি
→ pin ~~machine~~ quality ভালো

Disadvantage

→ repair cost বেশি
→ service charge বেশি
→ easily progr portable নয়
→ স্বাস্থ্যের জন্য ক্ষতিকর (laser রশ্মি নয়)

Difference between dot matrix & Laser printer

পার্থক্যের বিষয়:
→ Speed → pin → quality → cost
→ types → tonur / ribbon → সাদা কালো / রঙিন।
→ resolution.

Theory class- 03
29-10-2024

Barcode & QRcode পার্থক্য

Barcode → machine Readable information

QRcode → Quick Response Code

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

➡ A barcode consists of a series of parallels and adjacent bars and spaces.

কোন্ product এ Barcode কেন থাকে?

Barcode Reader apps.

২. Why we use barcode in a product?

→ একটা Product থেকে অন্য product আলাদা করে।
→ কম জায়গায় অনেক information store করে।
→ Secure & reliable.

Barcode Structure

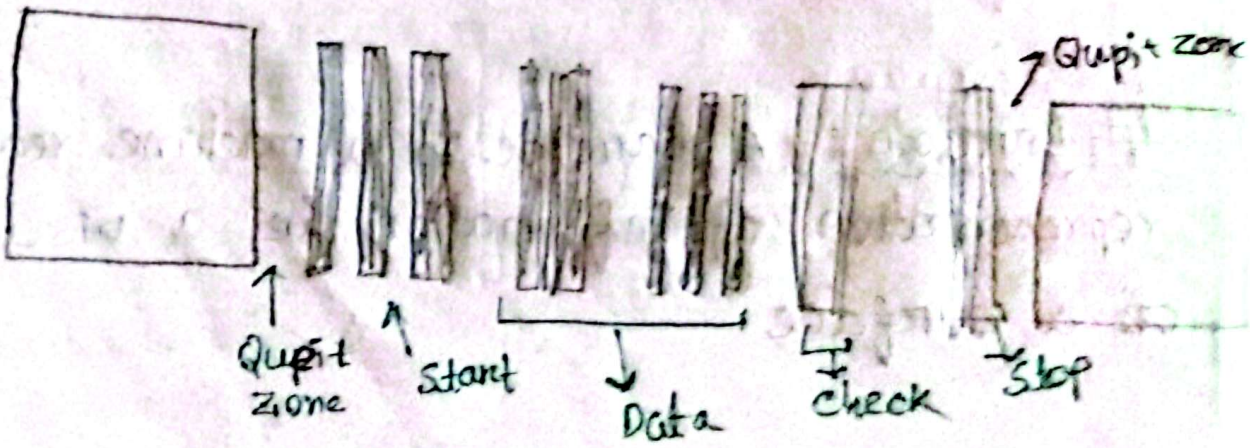


Fig: Structure

(i) Quiet zone : clear space. It helps to start and read code.

(ii) Start Code : Indicate start of bar code.

(iii) Data : Actual data.

(iv) Stop code : end of barcode.

(v) Check digit : Number. (Error detection करने के लिए)

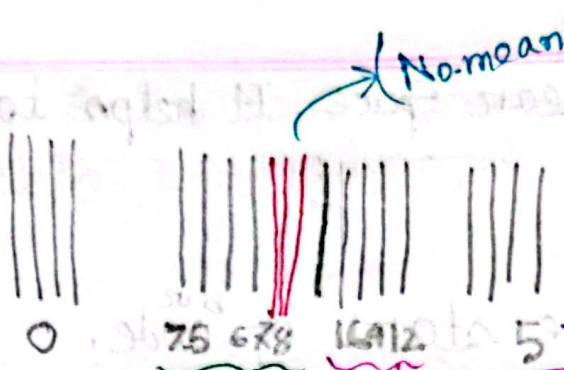
(vi) Elements of barcode ? / major component.

Barcode Symbologies

1. UPC-A (Universal Product code)
2. EAN-13
3. EAN-8
4. Code-39
5. PDF-417
6. ISBN
7. ISSN

1) UPC-A : Universal Product code.

12 digit characteristics + picture.



↳ 12 digit

0 → system character (কোন ধরনের কাজের জন্য barcode তৈরী করা হয়েছে এটা নির্দেশ করে।)

ii) EAN-13 :→ European Article Number.

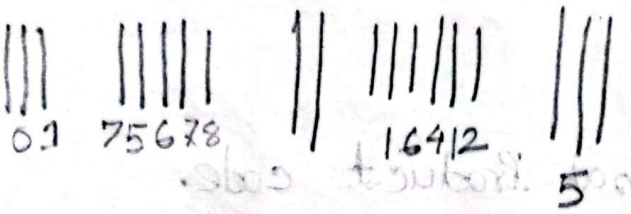
→ 13 digit

→ First two digit = system character

→ Next five " = Mfg

→ Next five " = Product code

→ Last chek " = Check.



Code 39 :

→ character data নেয়া হয়।

→ Numbers + Letters

→ Word Length flexible

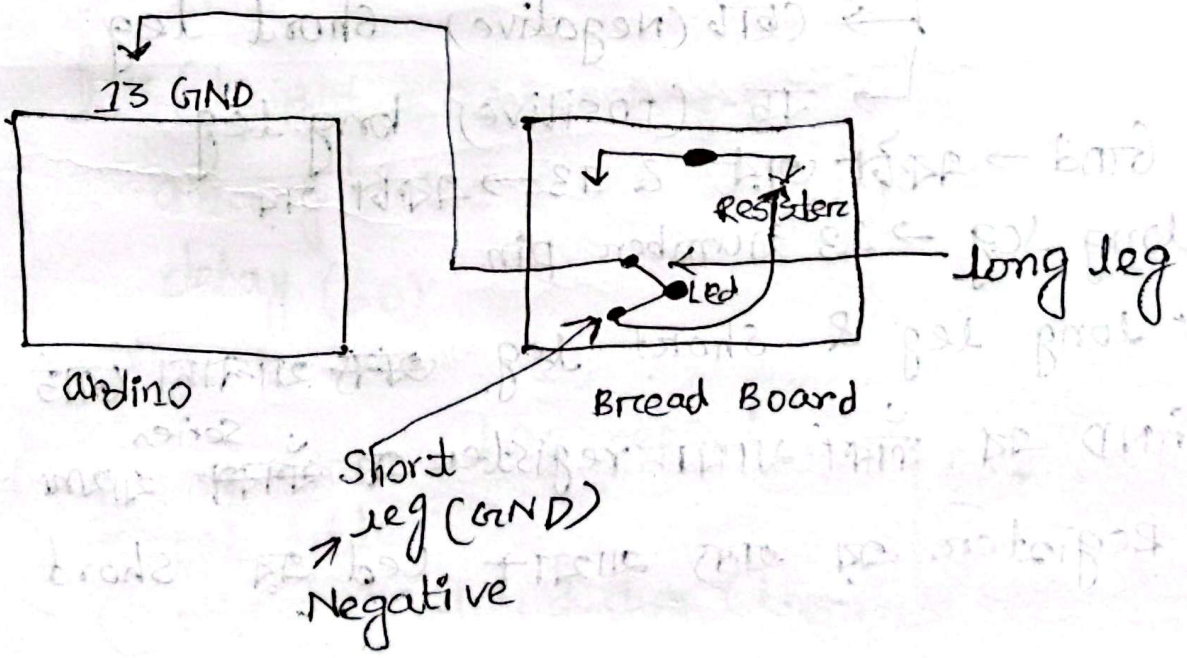
→ Number + Symbole, Alphabet, Start & end character
0-9 % $ # A-Z

Lab-02

Light Blinking

→ digital (High / Low)

→ Analog → Gradually blinking (H→L, L→H)
ধীরে ধীরে উজ্জ্বল হয় এবং ধীরে ধীরে নিভে।



#ISBN math

Theory Class - 04
03-10-24

CT 15-Q
5 to 6 point

How barcode scanner works:-

① LED/Laser : Light emmiting Dide.
② barcode
③ Charge-Coupled Device → CCD sensor/ photo diode

i.e. black black white black white black black
Off Off On Off On Off On

0010101

④ Scanner ⑤ circuit ⑥ Digital code.

website
explainthatstuff.com/barcodescanners.html

Check Digit

সবগুলো calculation করে check করে check digit এর সমান কিনা।

Check digit UPC-A :-

$$R = 10 - \{3x_1 + x_2 + 3x_3 + x_4 + \dots + 3x_{11}\}$$

Let,

UPC-A :- 036000291457

$R = 10 - [0+3+18+0+0+0+2+7+9+3+4+15] \% 10$

$= 10 - [75 \% 10] 8$

$R = 2$

Theory class - 05

Check digit

EAN-13

digit; $R = 10 - [\{3x_1 + x_2 + 3x_3 + \cdots + 3x_{11} + x_{12}\}] \bmod 10$

EAN-13 :- 1 2 3 4 5 6 7 8 9 0 1 2 ?

$R = 10 - [3+2+9+4+15+6+21+8+27+10+3+7] \% 10$

$= 10 - [90 \% 10]$

$= 10 - 0$

$= 10$

$= 3$

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

Short Note

OMR

OMR Optical Mark Reader / Optical mark ~~reg~~ Recognition.

→ OMR is a process of capturing human-marks data from documents forms such as survey or tests. It detects absence and presence of marks.

use:-

→ question nairs
→ survey : Help quickly process answer in survey
Exam → Multiple choice Question (MCQ) etc
voting:-

OCR → ছবি থেকে লেখা কে text এ convert করে।

Optical character Recognition (OCR) :-

It is a software that is designed to translate images of handwrite text into machine Readable text.

use

→ cheque.
→ credit card.
→ Magazine.
→ google lens. etc.

ICT Pheloship
↳ Research এ আগ্রহ

NST
National Science Technology

OCR main component :-

I) Scanner
II) Recognition component (Pdf files, image files)
III) OCR Software
IV) Encoder.

necessity + operation এবং (how works)

MICR

Magnetic Ink Character Recognition :-

→ definition (সংজ্ঞা) H.W
→ use (Bank) ↔ ✂

Q: How does MICR read information from bank cheque?

কীভাবে কাজ করে

why OCR is necessary

Theory Class - 06
19-11-2024

CT-01
Date : 26.11.24
Syllabus = First to → keyboard

Keybaard

Keybaard is an external output device that is used to (take) input text, character & other command into a computer or similar devices.

Cntl Alt etc

Most of the keyboard have five groups of key -

(I) Numeric keys (0-9, +, -, *, /)
(II) Alphanumeric keys (a-z, A-Z)
(III) Modifier keys (alt, Ctrl, windows button etc)
(IV) Function keys (f1 - f12)
(V) Cursor movement keys (<, ^, v, >)

QWERTY keyboard
AZERTY "
DVORAK "

Keyboard layout :-

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

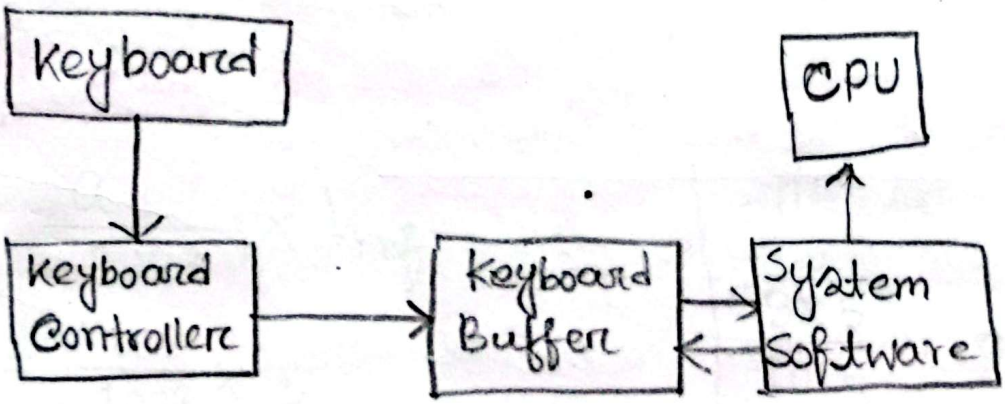
Standard Keyboard layout :-

(i) 100 keys

(ii) Types :- QWERTY, AZERTY, DVORAK

(iii) Five groups of keys (Numeric, Alphanumeric, Modifier, Function, Cursor movement keys)

How keyboard Works :-



Steps :-

1) Key is ~~presented~~ Pressed in the keyboard.
2) The keyboard controller sends the scan code to the keyboard buffer.

3) The keyboard ~~controller~~ buffer sends an interrupt request to the system software.

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

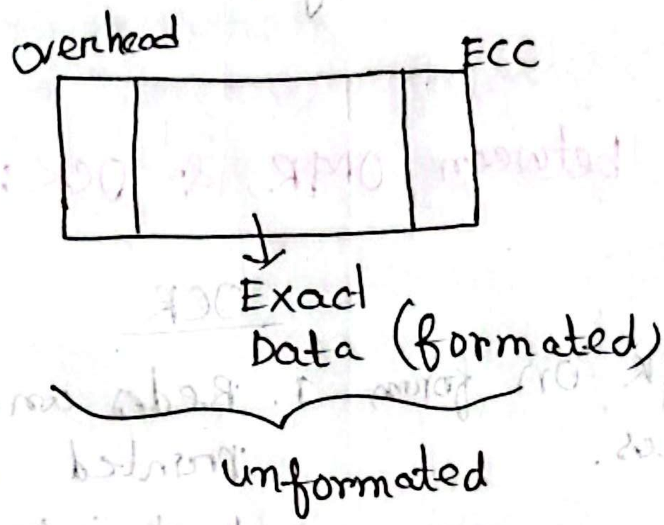
5) The system software passes the scan code to the CPU.

☐ 3 টি keyboard এর পার্থক্য শুধু

Lecture-08
Dec-01, 2024

☐ Syllabus: ☐ HDD structure.pdf

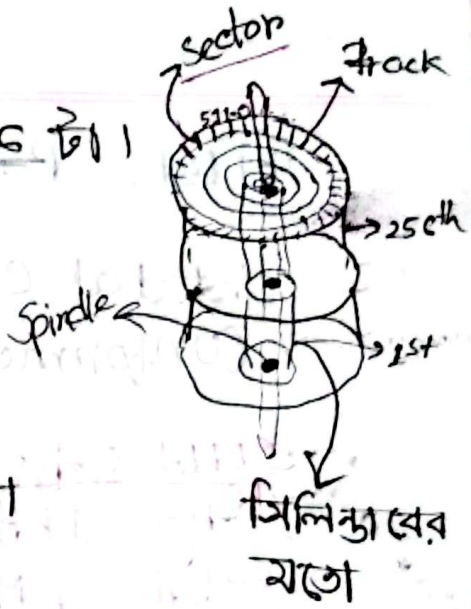
☐ HDD কি? কীভাবে data store করে? formated & unformated
(বেশি space থাকে formated/করলে হ্রাস পায়)



HDD তে অনেকগুলো CD/~~surface~~ platter থাকে।

- ⊛ 1 CD = 1 platter
- ⊛ 1 CD = 2 ~~platter~~ surface
- ⊛ 4 platters = 8 surfaces

☐ HDD এর structure:
→ arm (একটা CD এর জন্য একটা arm)
→ platter
→ surface
→ head (read/write করে)
spindle



ধরি, গোল চিকন দাগ আছে 256 টা। এগুলো কে বলে track. এটা maximum ক্ষেত্রে 2 এর power হবে।

*প্রতিটার ith track মিলে একটা Cylinder. সিলিন্ডারের মতো

*প্রতি sector এ আলাদা আলাদা data থাকে।

Let, 1 sector = 256 Bytes.

একটা HDD এ-

1) P সংখ্যক platter
2) 1P = 2 Surface
3) 1 Surface = t track
4) 1 track = S Sector
5) 1 Sector = B Bytes.

∴ total capacity (unformatted):

$C = P \times 2 \times t \times S \times B$

⊞ let, P = 4, t = 256, S = 512, B = 1024

∴ total capacity (unformated) = 4 × 2 × 256 × 512 × 1024

$= 2^2 \times 2^1 \times 2^8 \times 2^9 \times 2^{10}$

$= 2^{30}$ bytes $= 1$ GiB.

জানার জন্য:

2^{10} byte = 1 kB

2^{20} byte = 1 MB

2^{30} byte = 1 GiB

2^{40} byte = 1 TB

যদি t = 512 then,

capacity $= 2^2 \times 2^1 \times 2^2 \times 2^2 \times 2^{10}$

$= 2^{31}$ bytes.

$= 2 \times 2^{30}$ bytes

$= 2$ GiB

⊞ সব লাগবেনা just (138.1) picture.
HDD এর structure হিসেবে PISO এর + math বইতে আছে।

→ hdd math example pdf

⊞ Problem : 1

Math সবগুলো pdf থেকে

Periferal অংশ + 

♡ Alhamdulillah ♡

C.T – 02

Keyboard Types

Membrane keyboard:-

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

Working Principle of membrane keyboard:-

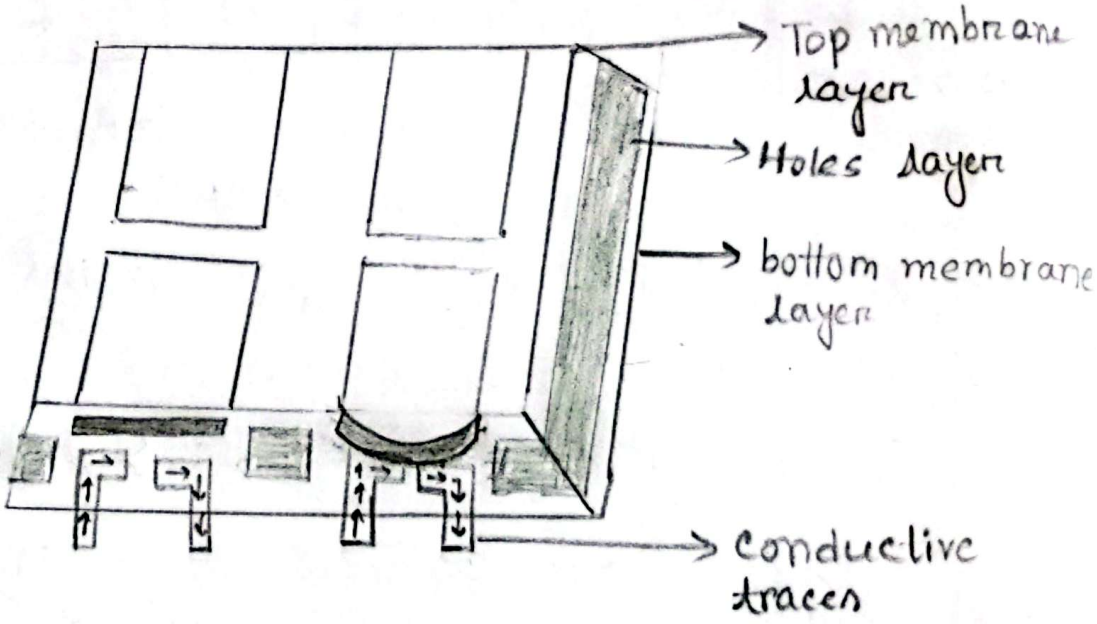


Fig: Membrane keyboard.

(I) There are three layers of membrane keyboard. Top membra layer, holes layer, bottom membrane layer.

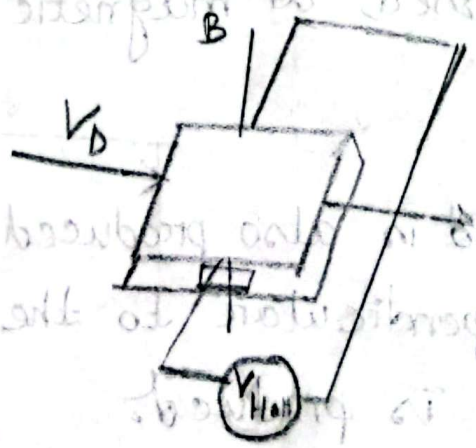
(II) In normal state, the electric circuit is broken because, the current can not cross the non-conductive gap.

(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.

Key switching mechanism :-

Hall effect switch :-

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



Working Principle of Hall Effect keyboard switch:

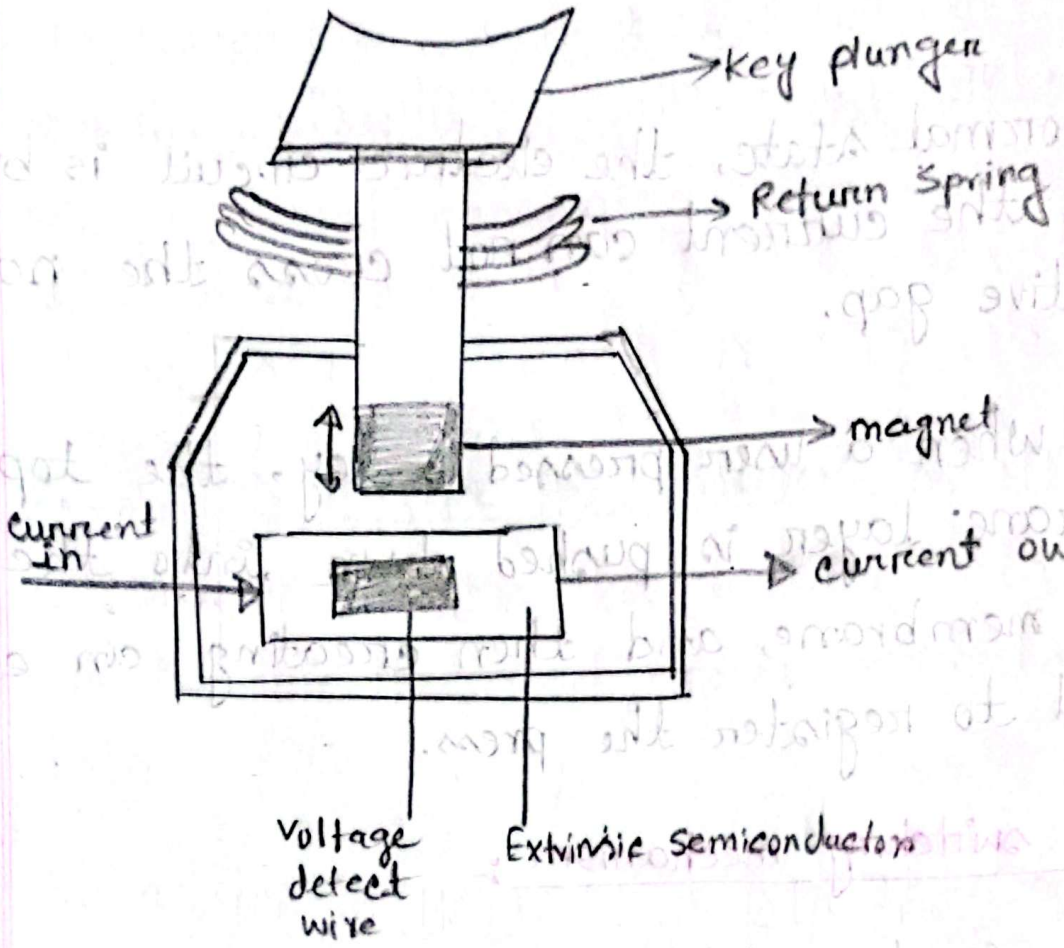


Fig: Hall effect switch keyboard.

(i) When a key is pressed, a magnetic ~~effield~~ field is created. produced.

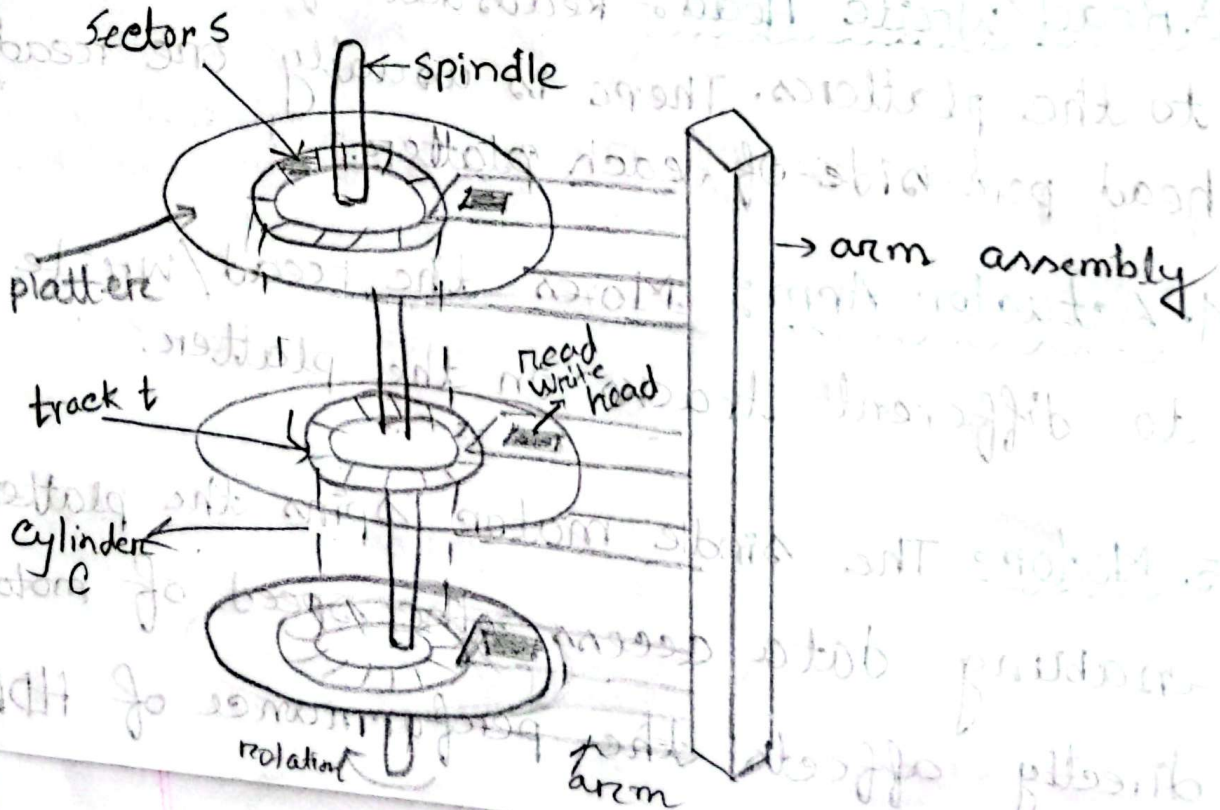
(ii) And an electric field is also produced because electric field is perpendicular to the magnetic field. and current is produced.

(iii) When magnet is touced the voltage detect wire, then the circuit is opened and the current flow is stopped. closed.

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

Hard Disk (HDD)

An HDD (Hard Disk Drive) is a device used to stor data on computers, like files, pictures, music and software. It's like a big storage box inside computer where all important information is saved.



Structure of Hard Disk Drive (HDD):-

The HDD (Hard Disk Drive) figure or diagram illustr
it's structure and how it functions. Here's a
simple explanation of the main parts:

1. Platters:- Circular disks made of metal or glas
Where data is stored in magnetic form.

2. Spindle: Rotates the platters to allow data
access. It ensures the platters rotate at high
speeds for the read/write head to access
data efficiency.

3. Read/Write Head:- Reads data from or writes
to the platters. There is usually one read/write
head per side of each platter.

4. Actuator Arm:- Moves the read/write head
to different tracks on the platter.

5. Motor:- The sindle motor spins the platters,
enabling data access. The speed of motors
directly affects the performance of HDD.

6. PCB (Printed Circuit Board): This is the electronic brain of the HDD, located at the back of the device.

How HDD (Hard Disk Drive) Works:

→ When we request data, the actuator arm moves the read/write head to the correct track on the platters.

→ The platters spin at high speed, and the head reads or writes the magnetic signals on the surface.

→ The PCB processes the data and sends it to the computer.

Hard Disk Drive (HDD) Math

Problem 1: Consider a disk pack with the following specifications - 16 surfaces, 128 tracks per surface, 256 sectors per track and 512 byte per sector.

(i) What is the capacity of disk peak?

→ Capacity = $16 \times 128 \times 256 \times 512$

= (Surface × tracks × sectors × bytes) bytes

= $2^4 \times 2^7 \times 2^8 \times 2^9$

= 2^{28}

= $(2^{10}\, 2^{10})\, 2^8$

= 2^8 MB

= 256 MB (Ans).

| 2^{20} byte = 1 MB

(ii) What is the number of bits required to address the sector?

Total Sector = $(16 \times 128 \times 256)$ Sectors

= $2^4 \times 2^7 \times 2^8$ Sectors

= 2^{19} sectors

∴ required bits = 19 bits (Ans).

(iii) If the formate overhead is 32 bytes per sector what is the formatted disk space?

→ Formatting Overhead = $(16 \times 128 \times 256) \times 32$ bits

$= 2^{24}$ bytes

$= 2^4$ MB

$= 16$ MB

∴ formatted disk Space = $(256 - 16)$ MB

$= 240$ MB.

⊞ Formate overhead includes structures and metadata required for the disks functionality.

(iv) If the formate overhead is 64 bytes per sector? How much amount of byte is lost due to formati

Formatting overhead = $(16 \times 128 \times 256) \times 64$ bytes

$= 2^{25}$ bytes

$= 2^5$ MB.

$= 32$ MB (lost)

(V) If the diameter of innermost track is 21 cm, what is the maximum recording density?

Capacity of track = 256 X 512 bytes

= 2^{17} bytes

= 128 KB

Perimeter = 2 x π x r

= (3.1416 X 2 X 21) Cm

= 65.94 cm

∴ maximum recording density = (128/65.94)

= 1.94 KB/cm.

(VI) If the diameter of innermost track is 21 cm with 2 KB/cm, what is the capacit of one track?

perimeter = 2πr = 2X3.1416X21 = 65.94 cm

Capacity = (density X perimeter)

= (65.94 X 2) KB

= 131.88 KB

≈ 132 KB

(VII) If the disk is rotating at 3600 RPM, what is the data transfer rate?

$$\text{Rate} = 16 \times (256 \times 512) \times \frac{3600}{60}$$

$$= 2^4 \times 2^8 \times 2^9 \times 60$$

$$= 2^{21} \times 60 \quad \text{byte/sec}$$

$$= 2 \times 60 \times 2^{20} \quad \text{byte/sec}$$

$$= 120 \cdot \text{MBPS} \cdot \quad (\text{Ans}).$$

Difference between micro processor and micro-controller :-

Micro Processor	Micro Controller
1. A general purpose processor used in computational task.	1. A compact system with Processor, memory and periferals in one chip.
2. Process data and perform calculation.	2. Control specific hardware in embedded system.
3. It requires external device like RAM, ROM, I/O port.	3. Has built-in RAM, ROM, IO port.
4. Typically wider 16 bit, 32 bit, 64 bit	4. Typically Narrower 8 bit, 16 bit.

Interfacing Part

☐ diffence between micro processor and μ - Controller.

Core i5
i3
i7
} Processor

μ - Controller ←
- Ardino Uno
- Ardino Mega 2560
- Node NCU
- ESP 8266
- ESP 32
- Rus Bery Pie

☐ Simulation apps ⟶ Portino

☐ Peripheral Device কে CPU এর সাথে connect করার জন্য interfacing করা হয় micro-controller দ্বারা।

μcontroller — 8251, 8259, 8255 } interfacing device / micro controller

[details পড়তে হবে]

phone এর μprocessor —

(i) Snap dragon (QualCom)
(ii) NVIDIA
(iii) MediaTek etc.

] → 8th gen

Lecture - 09

Computer Interfacing:- ⊛ characteristics

The circuitry or devices are needed to connect the data bus to a peripheral device is called computer interfacing.

Example: RS232 is a interfacing device.

→ Serial communication ⇒ RS232 (Recommended Standard 232)

→ Connect computer CPU to peripheral device to exchange data bit by bit.

→ is a protocol.

Properties of Interfacing:-

(i) Interfacing must be consists of a logic circuitry of decoder to decode the address.

(ii) It must be consists of a buffer.

(iii) It has circuitry of read write operation.

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

Block Diagram of Interfacing :

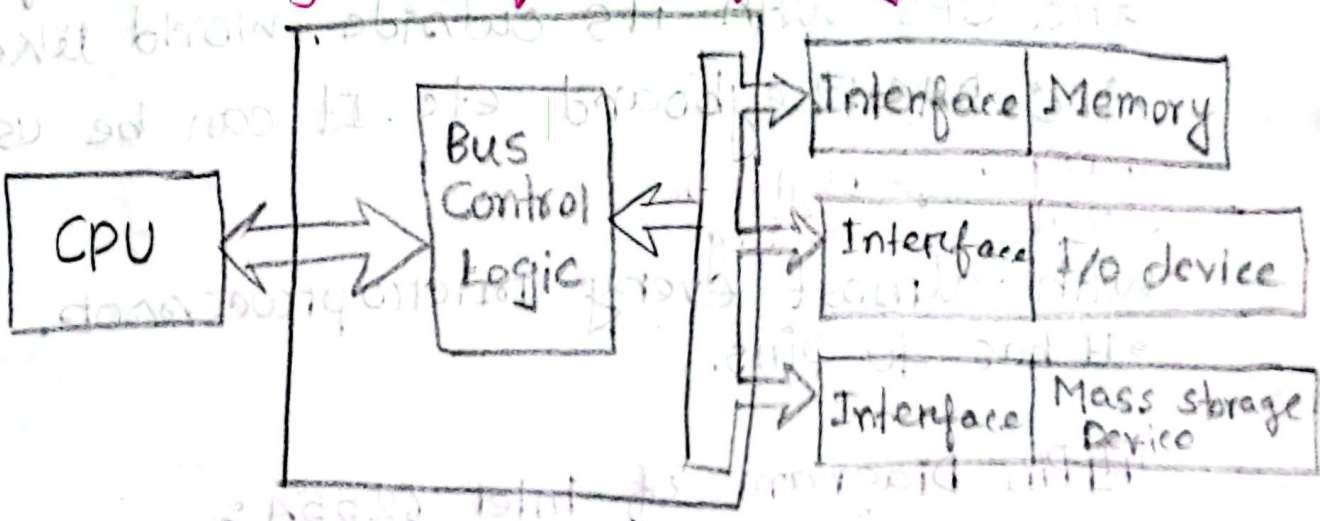


Fig:- Interfacing.

Micro-processor Controller / Interfacing Device কোনগুলো হতে পারে :

1) Intel - 8255A (এর pin diagram)
2) Intel - 8259
3) Intel - 8251

Intel-8255A

Programmable Peripheral Interface (PPI)

The Intel 8255A is designed to interface the CPU with its outside world like ADC, DAC, keyboard etc. It can be used with almost every microprocessor.

ADC: Analog to digital

DAC: Digital to Analog

→ It has 40 pins.

Pin Diagram of Intel 8255A :-

P.T.O

* Pin ৫ ২ ধরনের group :-

group A
- Port A-8
- port C - upper (4) (PC_4 - PC_7)

group B
- port B-8
- port C - lower (4) (PC0 - PC3)

8255A এর pin diagram এবং এর description.

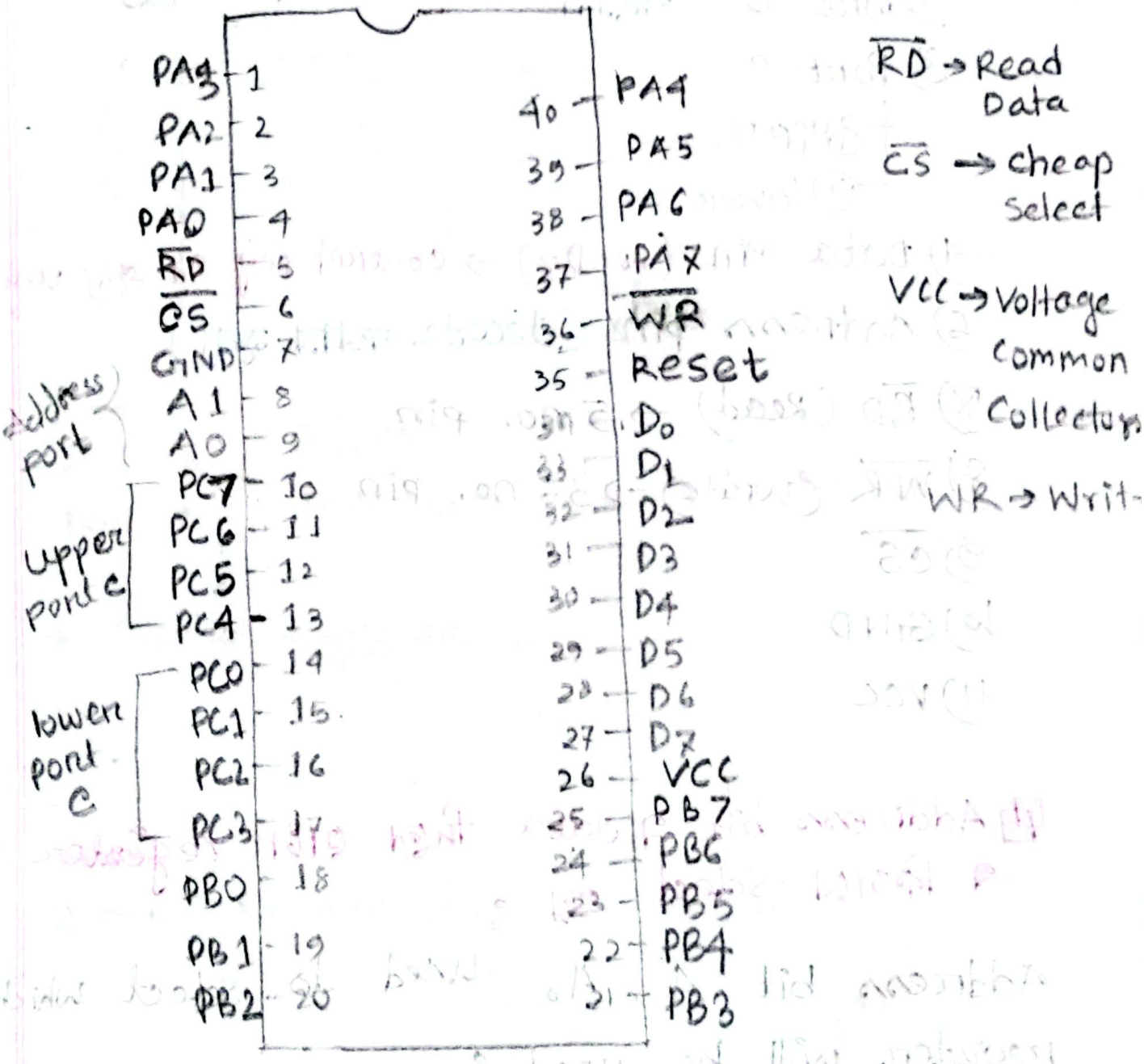


Fig: Pin diagram of 8255A

Description:- কাজ দিতে হবে, শুধু কোনটা কত No. এ টা দিলেই হবে।

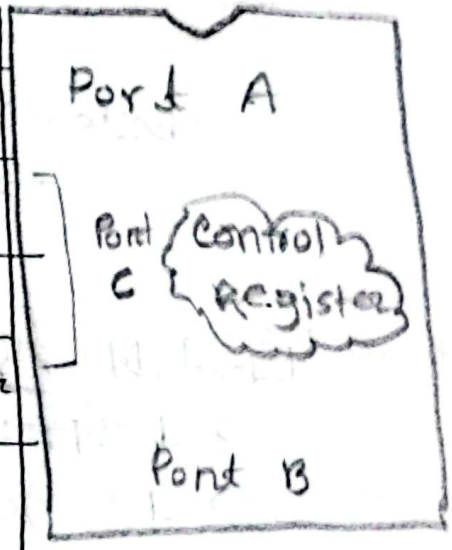
1) Port A — 8 টা pin 8 bit data pass করতে
2) Port B পারে।
3) Port C
   - (i) upper
   - (ii) lower
4) Data pin (D_0 - D_7) → control reg এর জন্য use হয়
5) Address pin (decode করার জন্য)
6) $\overline{RD}$ (Read) → 5 no. pin
7) $\overline{WR}$ (write) → 36 no. pin
8) $\overline{CS}$
9) GND
10) VCC

Address bit এ data দিলে সেটা register এ কিভাবে select হয় :- (CS কে active & inactive)

Address bit A_1, A_0 used to select which register will be used :-

$\overline{CS}$	A1	A2	Selection
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

deactive mode ← 1



* Port A
  port B
  port C
  } 3 ही port
  read/write operation will be held.

* control register ⟶ Write operation will be held.

Lab-5

Website → Tinkercad
→ Auto Desk

→ 1 Bt Ardino
→ 1 Bt Server
→ 1 device
→ 1 micro-controller

Motors Control by L293 Driver ~~done~~

Lecture -10
08-12-24

CT:- 02

Date :- 12-12-24

Keyboard → membrane + Hall effect

Storage device → Math example (HDD) → ~~2nd~~ Structure + Math example.

Interfacing Lecture ~~no~~ 9

↳ Interfacing + Property + block diagram + Intel-8255A + pin + descrip + Table.

Write the addressing Technique of READ & WRITE operation of INTEL 8255A :-

(1) Addressing Technique of READ :-

A_1	A_0	$\overline{RD}$	RD	$\overline{WR}$	WR	$\overline{CS}$	CS	Function Input operation (Read)
0	0	0	1	1	0	1	0	Port A → Data bus
0	1	0	1	1	0	1	0	Port B → Data bus
1	0	0	1	1	0	1	0	Port C → Data bus
1	1	0	1	1	0	1	0	Control Reg → Data bus

(2) Addressing Technique of (WRITE)

A_1	A_0	RD	$\overline{RD}$	WR	$\overline{WR}$	$\overline{CS}$	CS	Function Output operation (Write)
0	0	1	0	0	1	0	1	Data bus → Port A
0	1	1	0	0	1	0	1	Data bus → Port B
1	0	1	0	0	1	0	1	Data bus → Port C
1	0	1	0	0	1	0	1	Data bus → Control Register.

Lecture-11

- hand shacking → acknowledgement দেয়া হয় আগে থেকে।

8255A Operational modes and initialization:

There are three modes :-

① Mode 0 :- Simple I/O mode. There are no handshaking that means basic I/O without handshaking.

→ When we want to use port ~~A or~~ for simple I/O without handshaking, we initialize that port in mode 0.

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

→ Two halves of port-C are independent, So, one can be initialized as input and other can be initialized as output.

Mode0 Example :-

Blinking LED.

(ii) mode 1 :- (Handshaking)

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

* port-A অথবা Port B কে handshake input/output করা।

→ For port-A, Some pins of port-C (upper 4 bits) used as handshaking.

→ For port-B, Some pins of port-C (lower 4 bits) used as handshaking.

→ Example : Printer, ADC or DAC.

(iii) mode 2 : (Bidirectional Handshaking)

→ Only port-A can be ~~used~~ initialized in mode 2. Here port-A can be used for bidirectional ~~handshaking for~~ data transfer. Port-C (upp used as handshaking

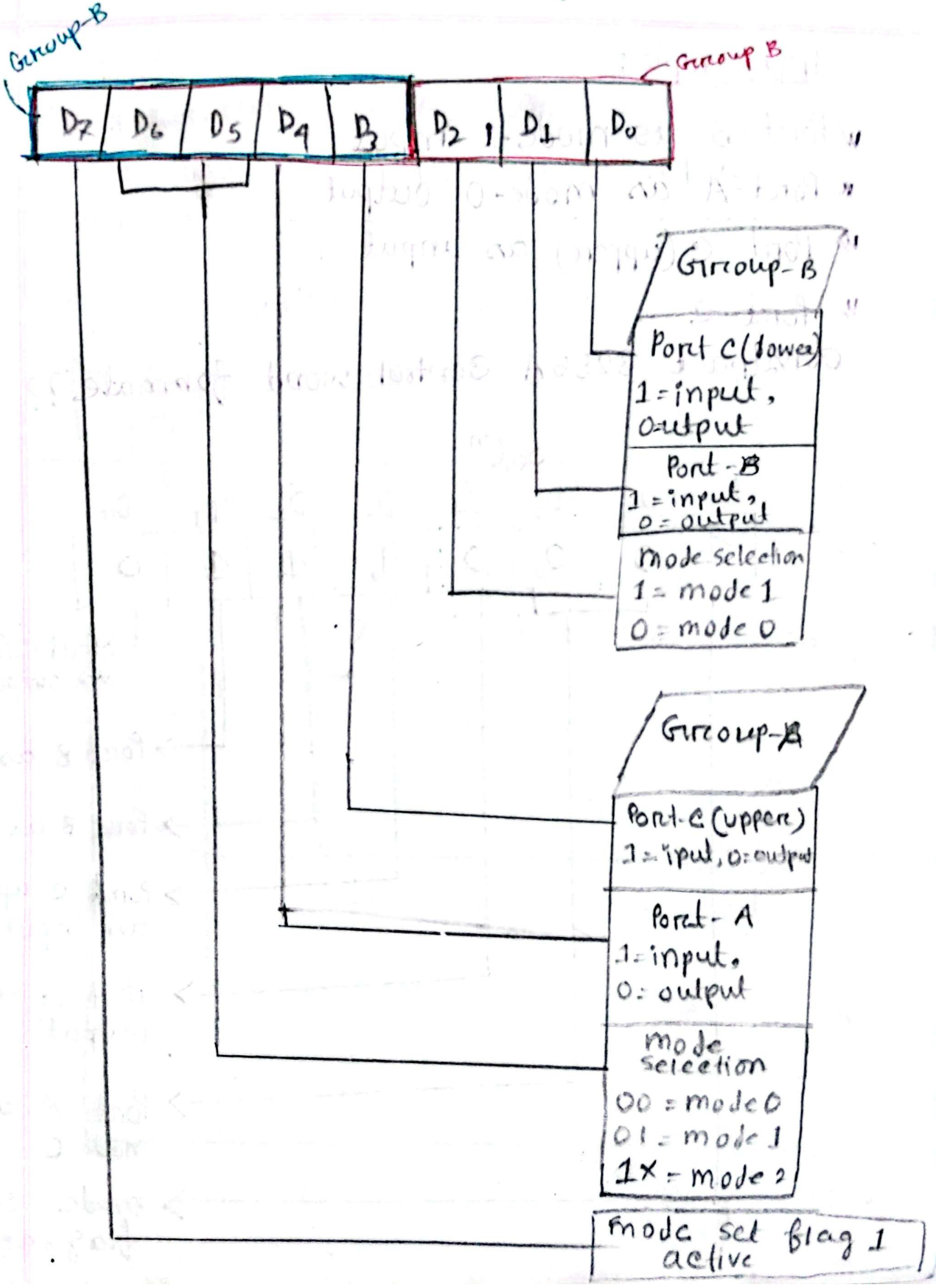
→ Example : Master Slave communication betwe microprocessor & micro-controler.

handshaking ২ প্রকার :-

১। input handshaking

২। output "

8255A Control Register Format

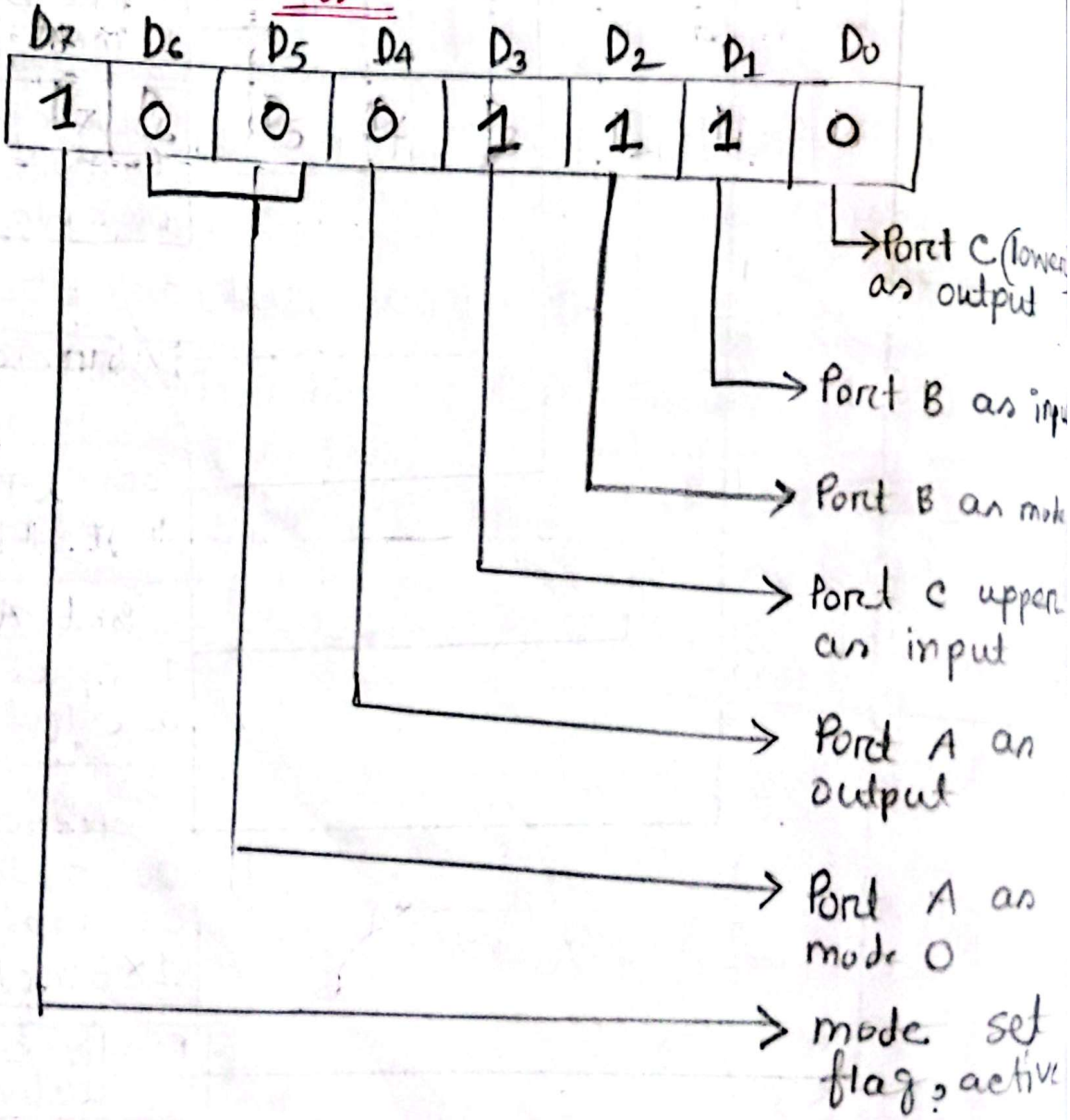


Example:-

- Port-B as mode-1 input
- Port-A as mode-0 output
- Port-C (upper) as input
- ~~Port-C~~

Construct 8255A control word formate??

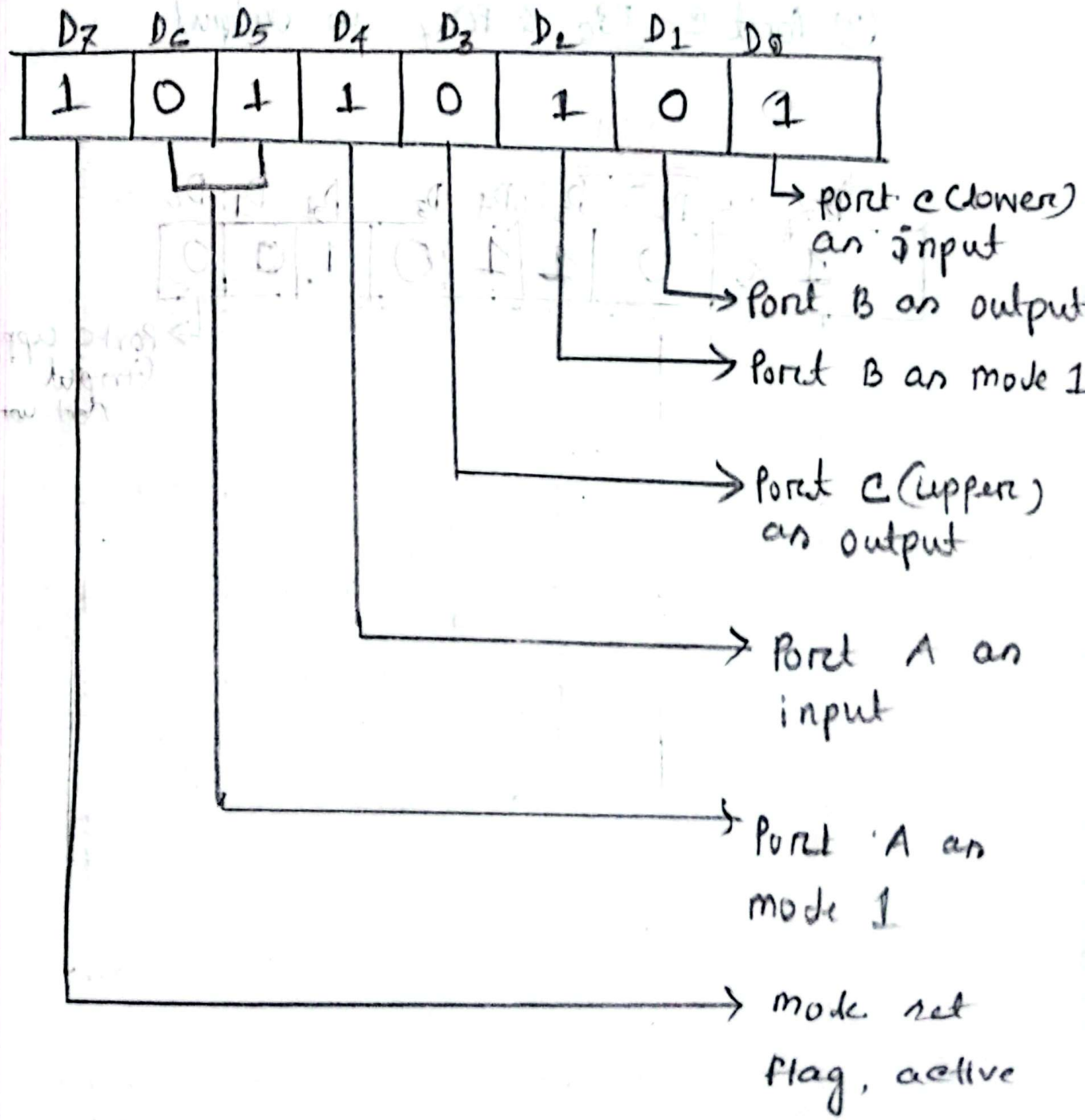
Soln



Example

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

Soln



H.W

Pb: 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 - PC_6 & PC_7 as output.

Soln

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
1	0	1	1	0	1	0	0

↳ Port C upper (input not used)

Lecture-12

8251-A → Programmable Communication Interface (PCI)
↳ version
↳ Synchronous & Asynchronous mode এ কাজ করে

* Periferal Device এর সাথে micro-controller এর connection Communication হয়
* যে signal clock signal দ্বারা modify হয় → synchronous. time signal
* Asynchronous এ clock signal থাকে না।
* Universal Synchronous and Asynchronous Receiver and/ transmitter (USART)
* µP → Interface device → periferal device
Serial transmitter, Parallel communication

8251-A

→ Programmable Communication Interface. (PCI)
→ Intel 8251A is a Universal Synchronous and asynchronous Transmitter/Receiver. (USART) Receiver/Transmitter.
→ 8251A PCI is designed to enable communication between microprocessor and periferal device.
→ It converts parallel to serial (P-S) for transmission and serial to parallel for receiption of data.

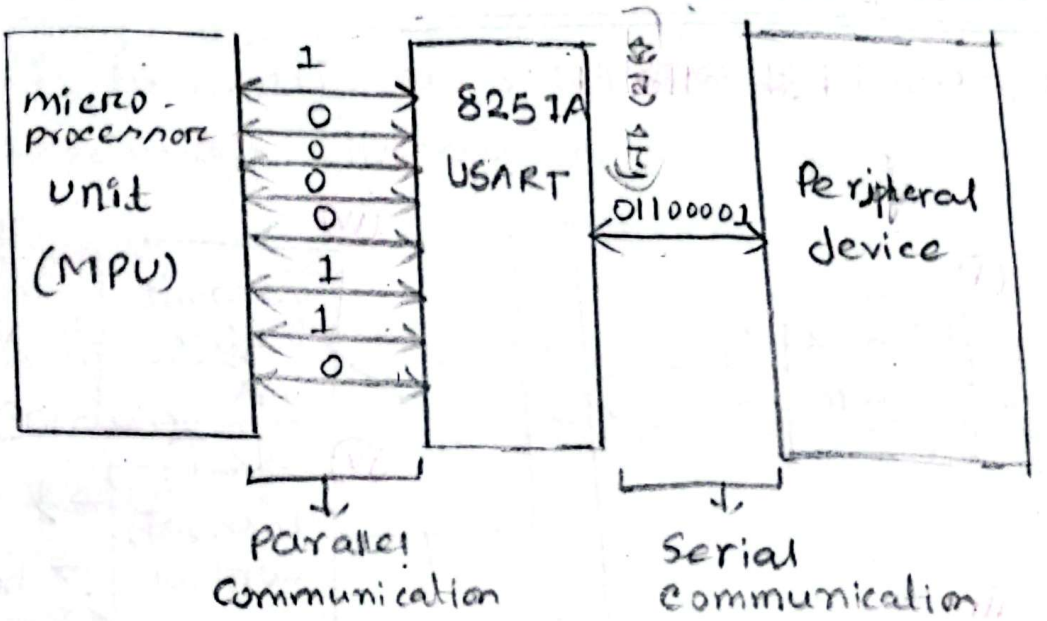
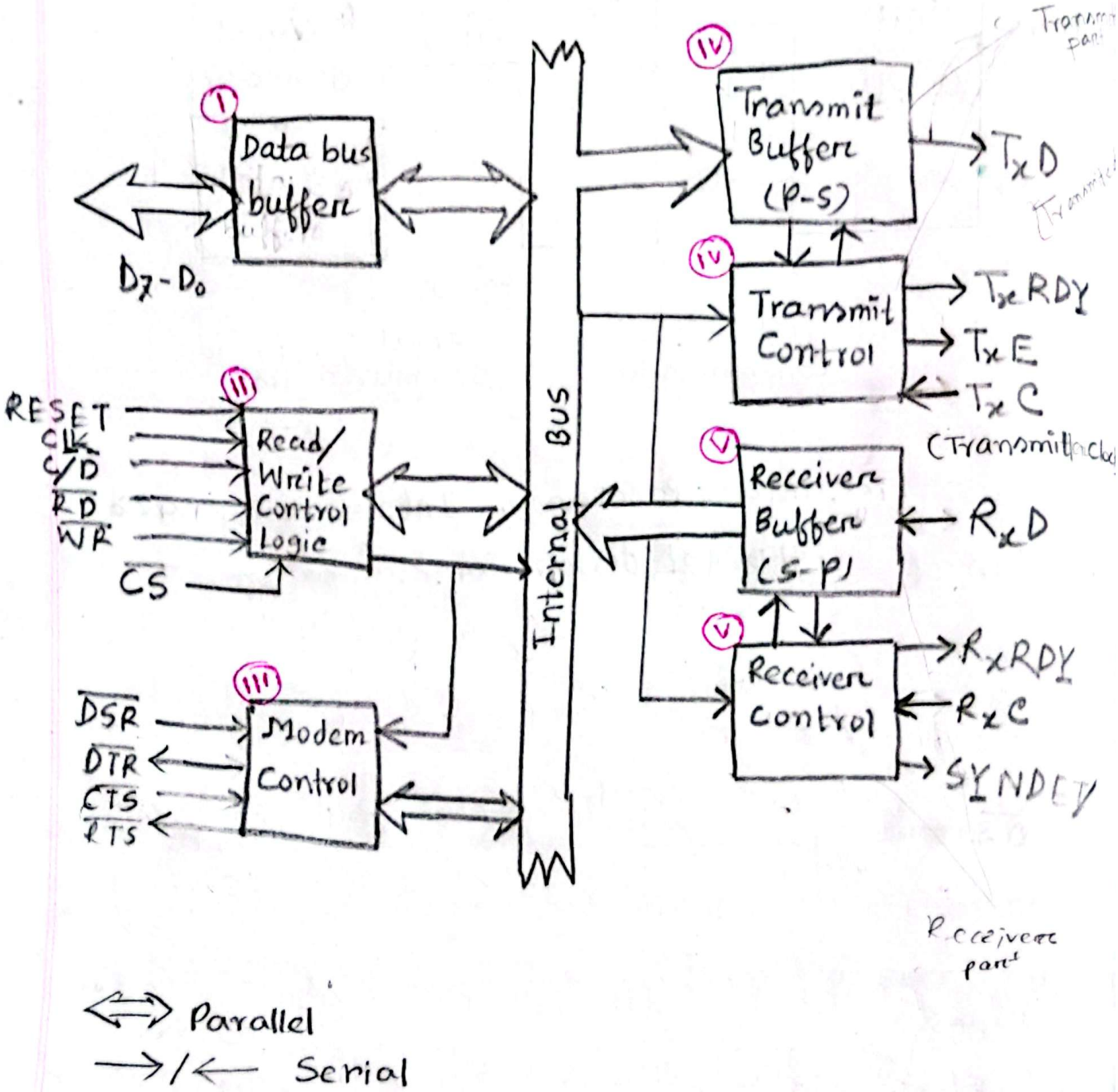


Fig: Micro Processor, Interfacing and peripheral device. Communication.

Architechture of 8251A :-

5 টা part নিয়ে গঠিত।



Block diagram এর সাথে কোনো একটা particul part এর description থাকতে পারে

Pin Description of 8251A :

① Data Bus Buffer :- (D_0-D_7)

→ It is bidirectional 8-bit buffer used to interface 8251A with the system bus of the microprocessor

→ It has 8 pins (D_7 - D_0).

→ It is used to transffer data, control word, command word, status information to the system bus.

② Read/Write control Logic : /Control Signal

→ $\overline{CS}$:- (Chip select) It active for low signal

→ C/$\overline{D}$:- (Control data) If it is high control regester is addressed. If it is low data buffer is addressed.

1 → Control active, 0 → Data active

→ $\overline{RD}$:- (Raad) It active for low signal.

→ $\overline{WR}$:- (Write) It active for low signal.

→ RESET :- A high input resets 8251A and forced it to idle mode.

→ CLK :- (Clock) If it is high, then CLK signal is sent.

$\overline{CS}$	C/$\overline{D}$	$\overline{RD}$	$\overline{WR}$	Description
0	1	1	0	Microprocessor Unit writes instruction in Control register
0	1	0	1	MPU reads instruction in control register
0	0	1	0	MPU writes data to USART
0	0	0	1	MPU reads data to USART
1	x	x	x	Chip is not selected.

Lecture-13

(iii) Modem Control :-

(i) $\overline{DSR}$ (Data Set Ready) :- It is an input signal. this pin tells the cpu that modem has established a link, when $\overline{DSR}$ input is low.

(ii) $\overline{DTR}$ (Data Terminal Ready) :- It is an output signal. This pin tells the modem, that PC/CPU is ready for communication, when $\overline{DTR}$ is low.

(iii) $\overline{CTS}$ (Clear to send) :- It is an input signal. This pin indicates that modem is ready to exchange data, when $\overline{CTS}$ is low.

(iv) $\overline{RTS}$ (Request to send) :- It is an output signal This pin informorms model that the CPU wants to exchange data, when $\overline{RTS}$ is low.

(iv) Transmitter control Pins :-

(i) TxD (Transmit data) :- This pin is the actual Serial data output.

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

(iii) TxE (Transmitter Empty) :- This pins tells the CP that the transmitter is empty.

(IV) T_xC (Transmitter Clock):- This pin is the transmitter shift register clock input.

(V) Receiver Control Pins:-

(I) R_xD (Receiver Data): This pin is the actual serial data ~~output~~ input.

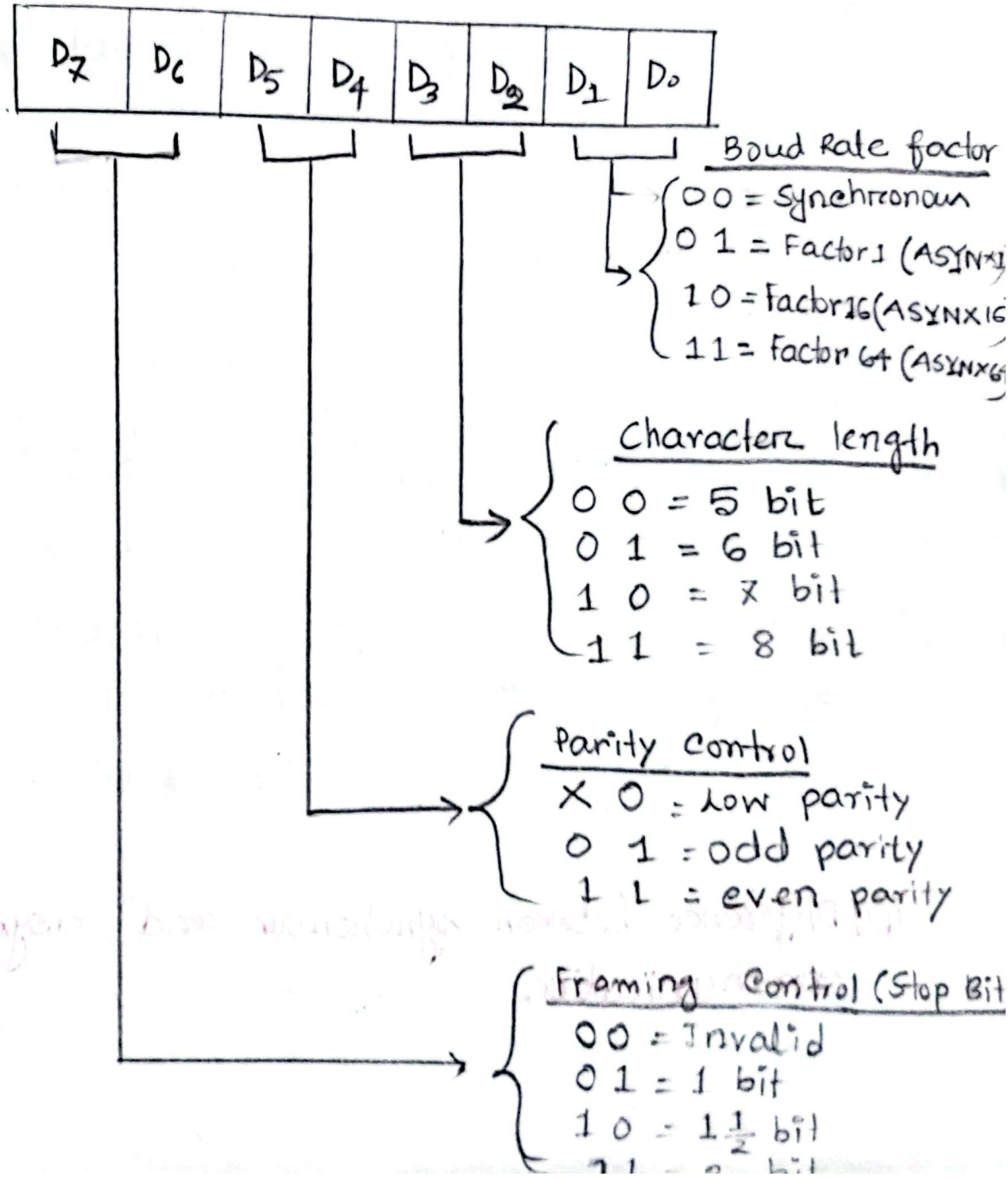
(II) R_xRDY (Receiver is Ready):- This pin indicates the terminal is ready with data.

(III) R_xC (Receiver Clock):- This pin is the receiver shift register clock input.

(IV) SYN DET (Synchronous detect):- This pin ~~use~~ uses for synchronous communication.

(*) 1 sec এ কতগুলো Sample পার হয় → Boudt Rate

Draw the formate of 8251A mode register for both synchronous and asynchronous communication :-



Q:- How is 8251A configured when the mode instruction value is ⁻73H ?

$(\bar{7}3)_{16} = 0\,1\,1\,1\,0\,0\,1\,1$

Difference between synchronous and asynchronous communication.

- formate of control / command Register
- formate of Status Register

} Slide থেকে পড়ে নিবে

Lecture - 14

C.T - 03

Syllabus

→ 8255A এর Read - Write Addressing থেকে last class (All 8251A)

Date

15/01/2025 ⟶ বুধবার

8259A

Intel 8259A is a programmable Interrupt controller (PIC). It combines the multi interrupt input sources into a single interrupt input output source. It handles interrupt of hardware. It has 28 pins.

⊞ Block Diagram & pin diagram (H.W)

→ From Classroom.

ISR
IMR } পড়বে
IRR

⊞ How does Intel 8259A handle interrupt request in hardware?

Q:
→ 8086 এর সাথে 8259 কীভাবে interrupt handle করে।

Project → PL এর আগে

* Project name.
* objectives.
* Necessary equipment + cost.
* output.
* Circuit Diagram কেমন হবে।

⊞ Lab-5 Report (18-01-2025)

Lab report name/Title :- Introduction to IOT (Theory) and Blinking LED by using mobile app and internet server.

Lecture - 15

Why we use cascade buffer in 8259A microcontroller. (2/3 marks)

8259 A (Block diagram):-

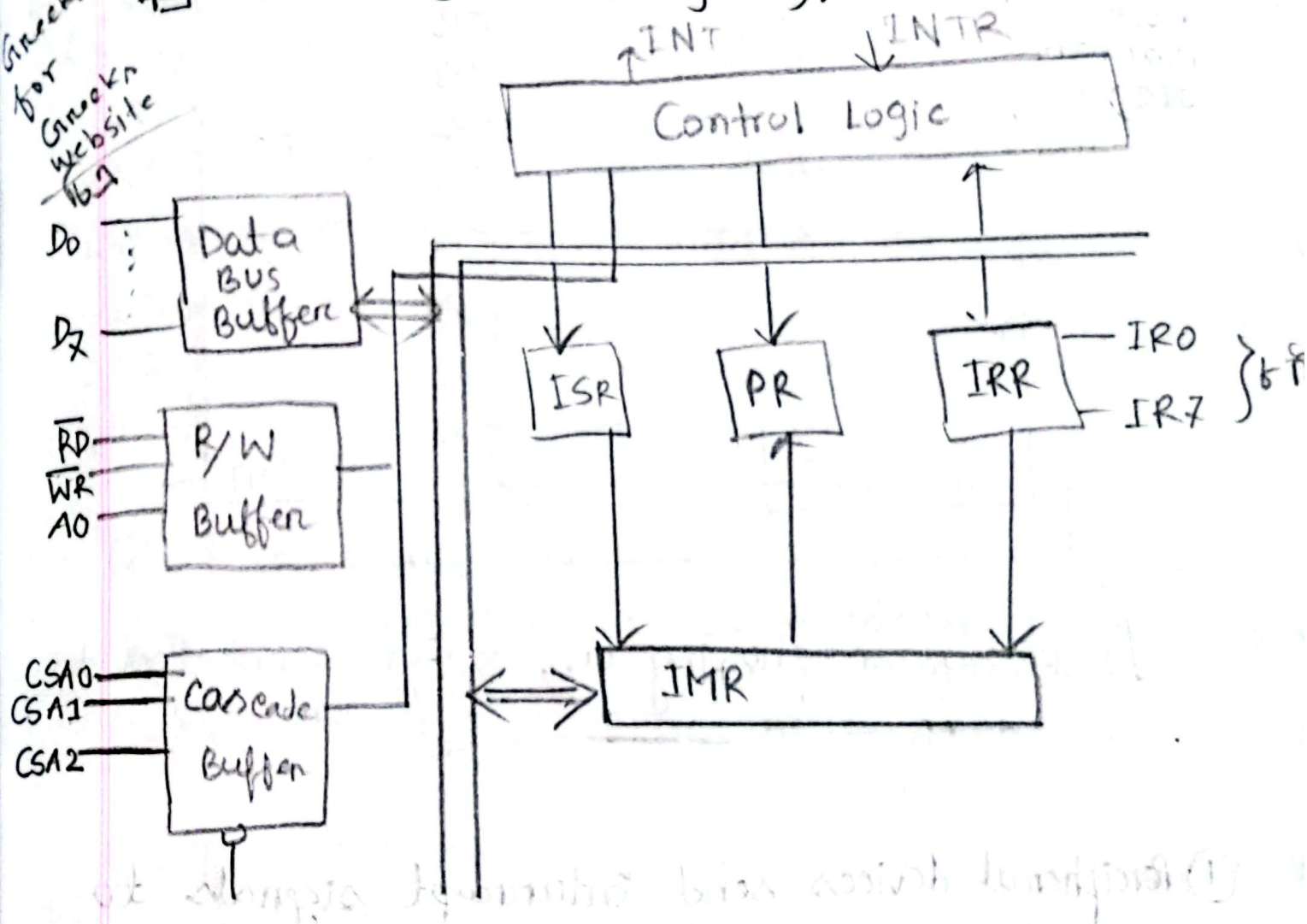


Fig: Block Diagram of 8259A

Write down the function of CSA0, CSA1 CSA2, of Pins of 8259 both for master and slave mode.

→ 2/0 marks 90 Q.

[1] How does Intel 8259A handle interrupt request?

$\overline{INTA}$ → Interrupt Acknoledgement Pin data bus CPU side এ 2টি

4 marks থাকলে just এই চিত্র + ব্যাখ্যা

(marks বেশি থাকলে Block Diagram সহ)

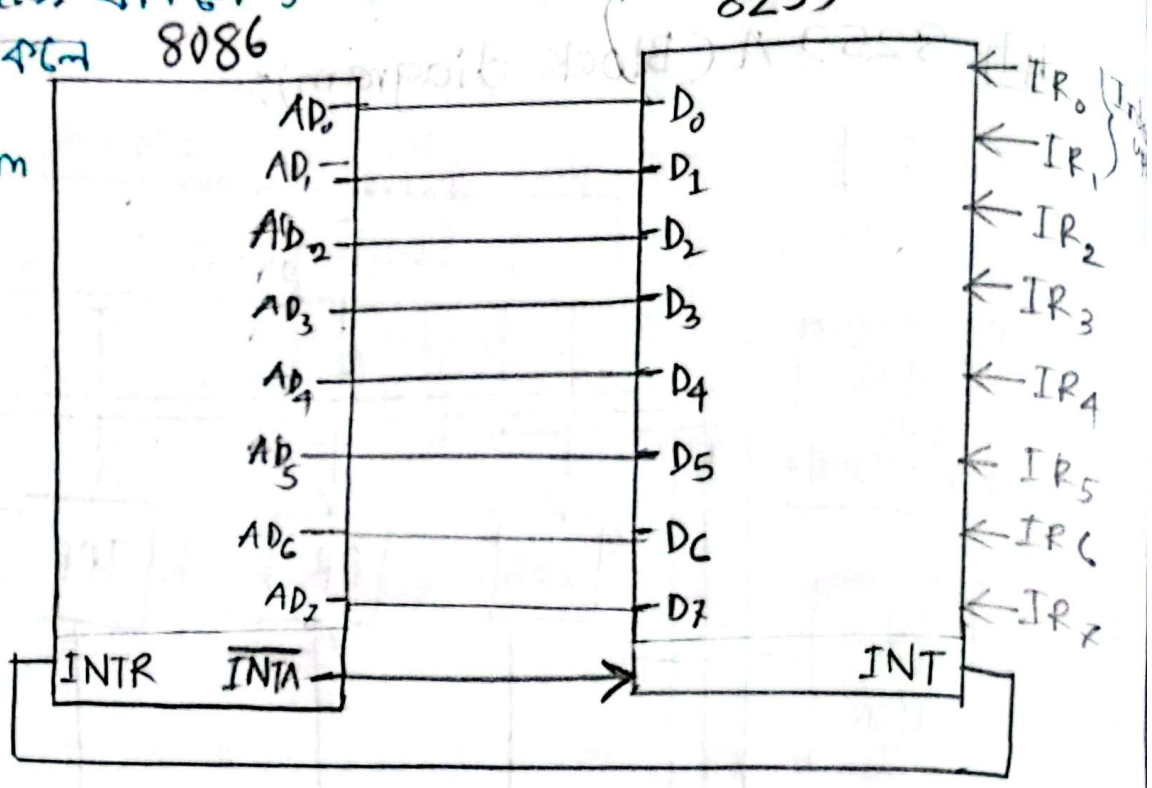


fig: Blockdiagram showing an 8259 connected to an 8086.

① Peripheral devices send interrupt signals to 8259 via IR0-IR7 pins, The 8259 can be handledet up to 64 interrupt by using cascade pin.

⑪ The Interrupt Request Register (IRR) holds the pending interrupt request.

(III) The 8259 determines the priority of pending interrupts using priority Resolver (PR). IR0 has the highest Priority and IR7 the lower.

(IV) The interrupt mask Register (IMR) is checked interrupt is masked or not. If one line/Pin is masked, then 8259 ignore that pin/line.

(V) If interrupt is not masked and has the highest priority, It is pressed to the CPU via the INT Pin.

(VI) The CPU sends an Ackr Interrupt Acknoledg ment ($\overline{INTA}$) Signal to the 8259, indicatin It is ready to process the interrupt.

(VII) The 8259 provides an interrupt vector to the CPU at the ISR.

(VIII) The CPU sends and End of Interrupt (EOI) signal after handling an interrupt then 8259 process the next interrupt.

Why is priority interrupt controller necessary?

→ interrupt handle

→ কোনটার পর কোনটা আসছে

→ Micro processor কে জানানো যে interrupt আসছে।

Describe the function of the important registers available in 8259 :-

→ There are three type of registers available in 8259 :-

① IRR (Interrupt Request Register) :- IRR stores all the interrupt inputs that are requesting service. It is an 8 bit register. It keeps of which inputs are asking for service. If interrupt bit is unmasked, then IRR bit will be set.

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

Lecture-16

ISR (Interrupt Service Register/In Service Register) :-

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

8259 command words (Greeksforgreeks থেকে পড়ে নাও)

8259 এর ২ ধরনের command word :-

1. ICW → Initialization Command Words
2. OCW → Operating Command Words.

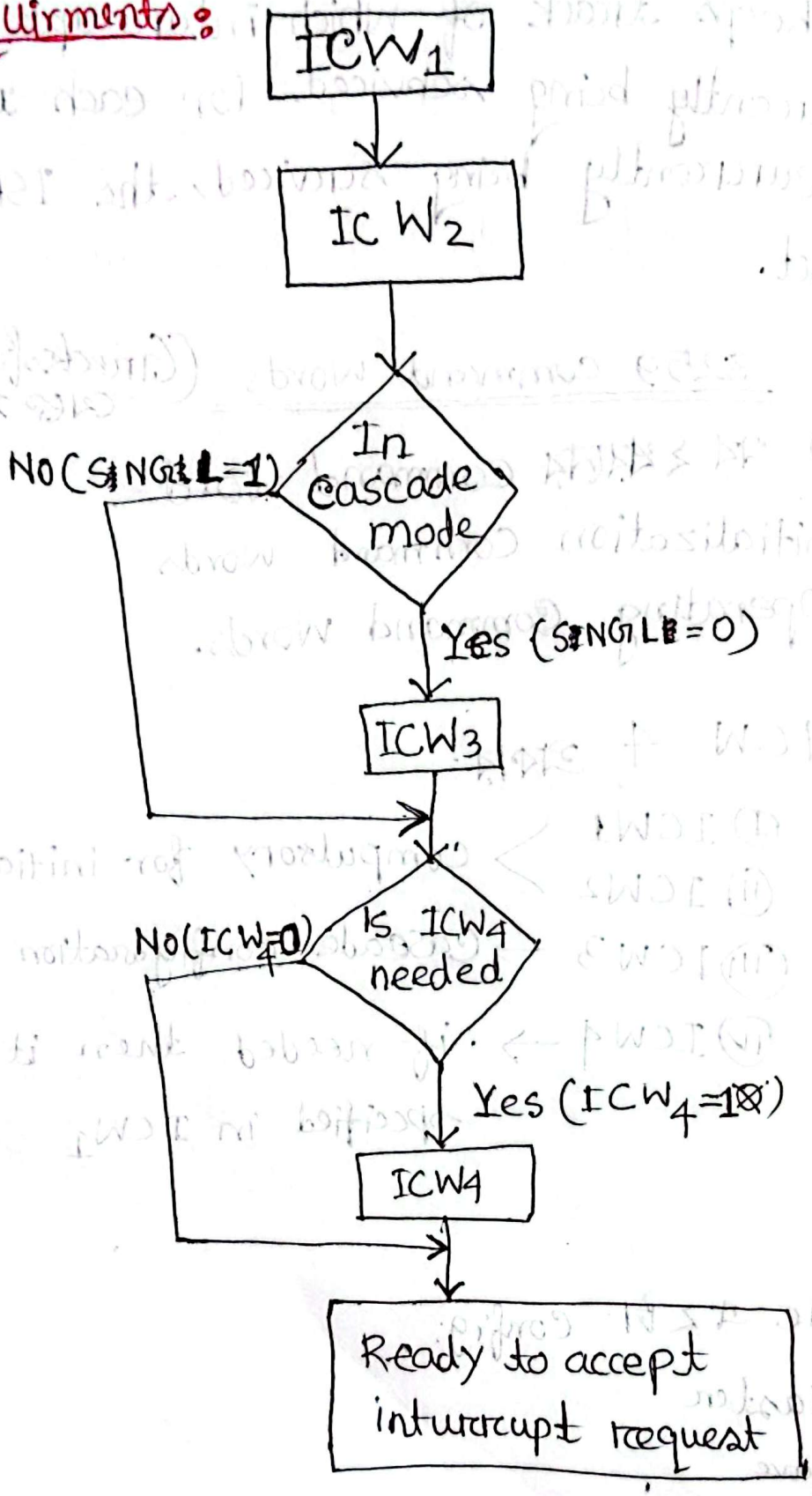
ICW 4 প্রকার :-

(I) ICW1
(II) ICW2 > compulsory for initialization
(III) ICW3 → Cascade configuration এর জন্য
(IV) ICW4 → if needed then it is specified in ICW_1

Cascade এর জন্য config:

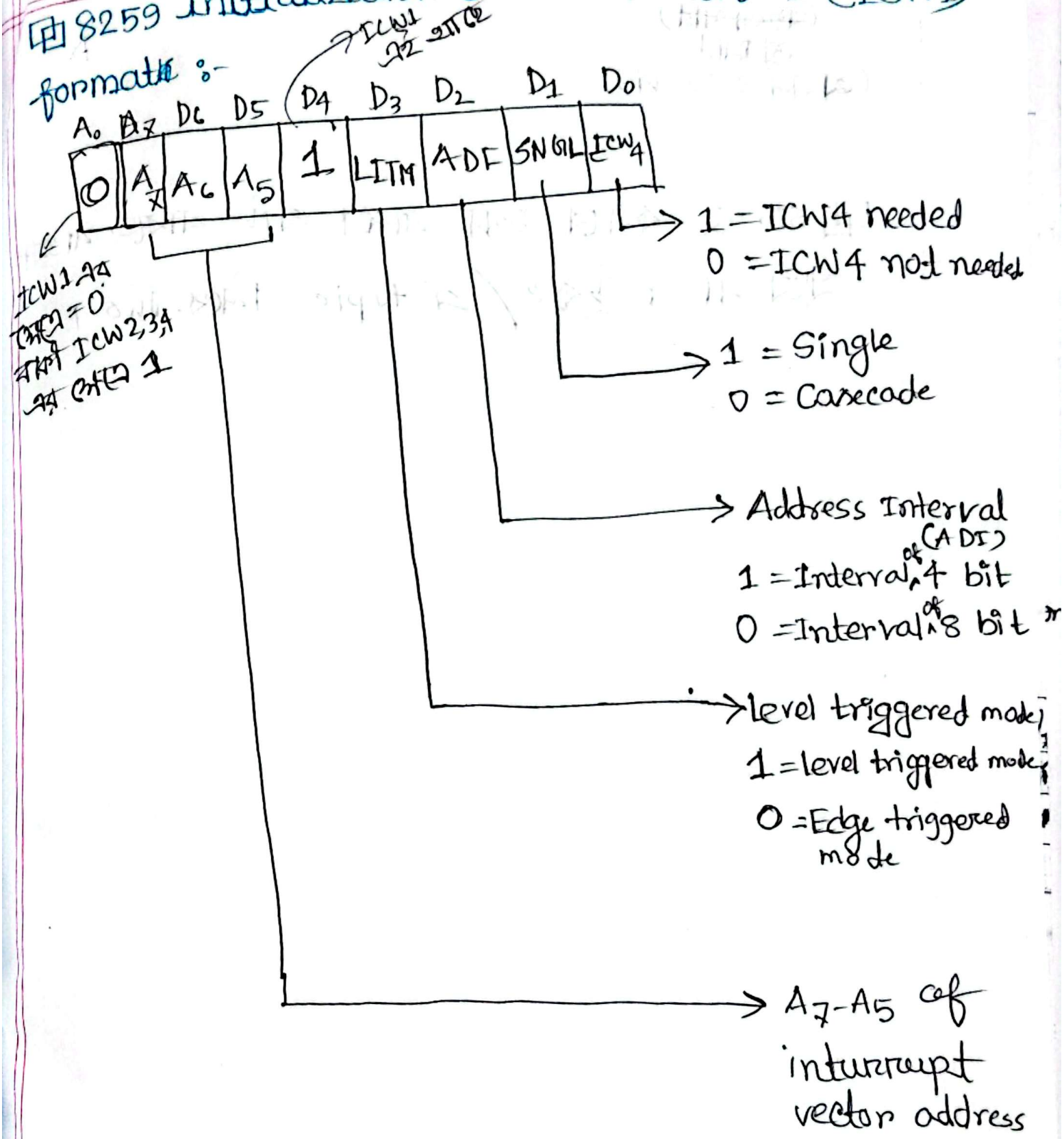
(I) Master
(II) Slave

8259 Initialization Command Word Flowchart: Order requirments:



8259 initialization command word 1 (ICW1)

formate :-



Lecture - 17

8259 initialization Command Word 3 (ICW3) Format:

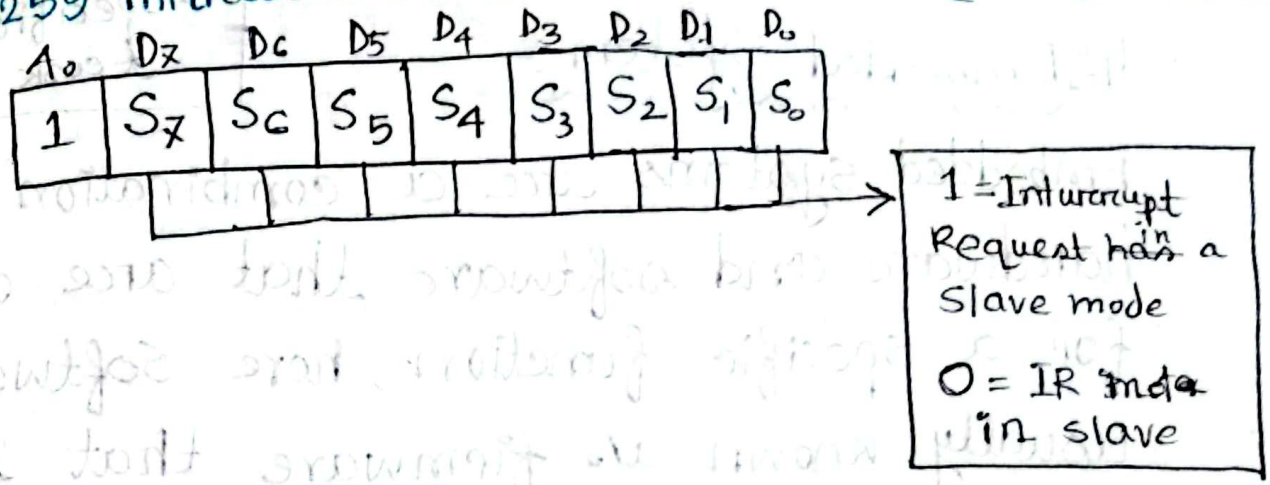


Fig: ICW3 (master device)

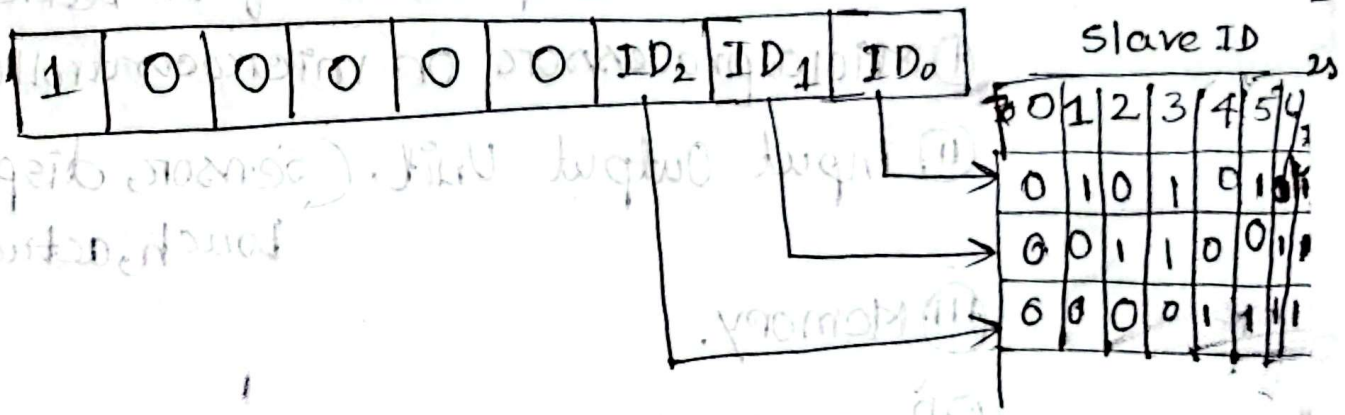


Fig: ICW3 (slave device)

Q: Write down the function of initialization command word 3 (ICW3) of Intel-8259 in cascade mode.

→ Explanation নিচে ।

Raspberry Pie
mobile → ES

Embedded System

Computer System
→ General purpose
Embedded System
→ Specific function
task

Embedded System :-

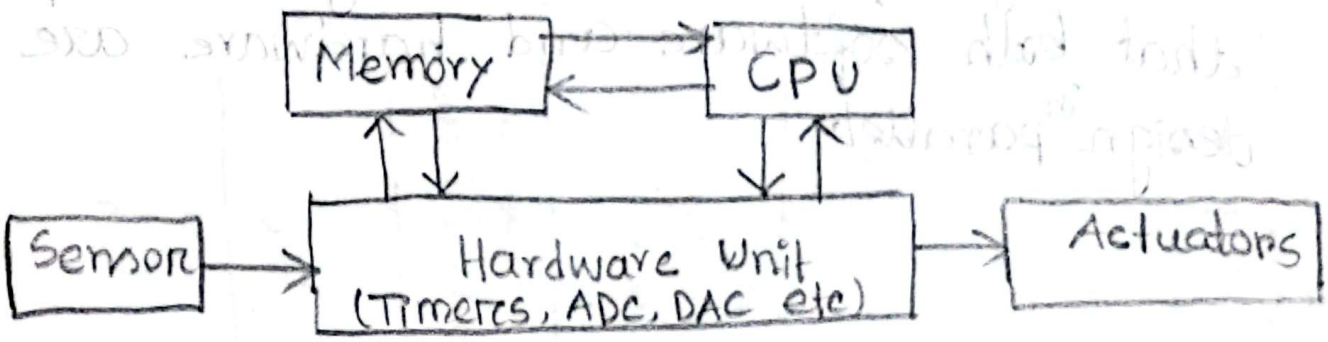
Embedded systems are a combination of hardware and software that are design for a specific function, here software is usually known as firmware that is emb into the hardware.

There are some components of Embedded syste

(i) Microprocessor or microcontroller.
(ii) Input Output Unit. (Sensor, display, LE touch, actuator et
(iii) Memory.
(iv) Power Supply.
(v) ADC (Analog to Digital converters) / Digital to Analog controller) etc.

[E] Block diagram of Embedded System:

The block diagram of E.S is given below:-

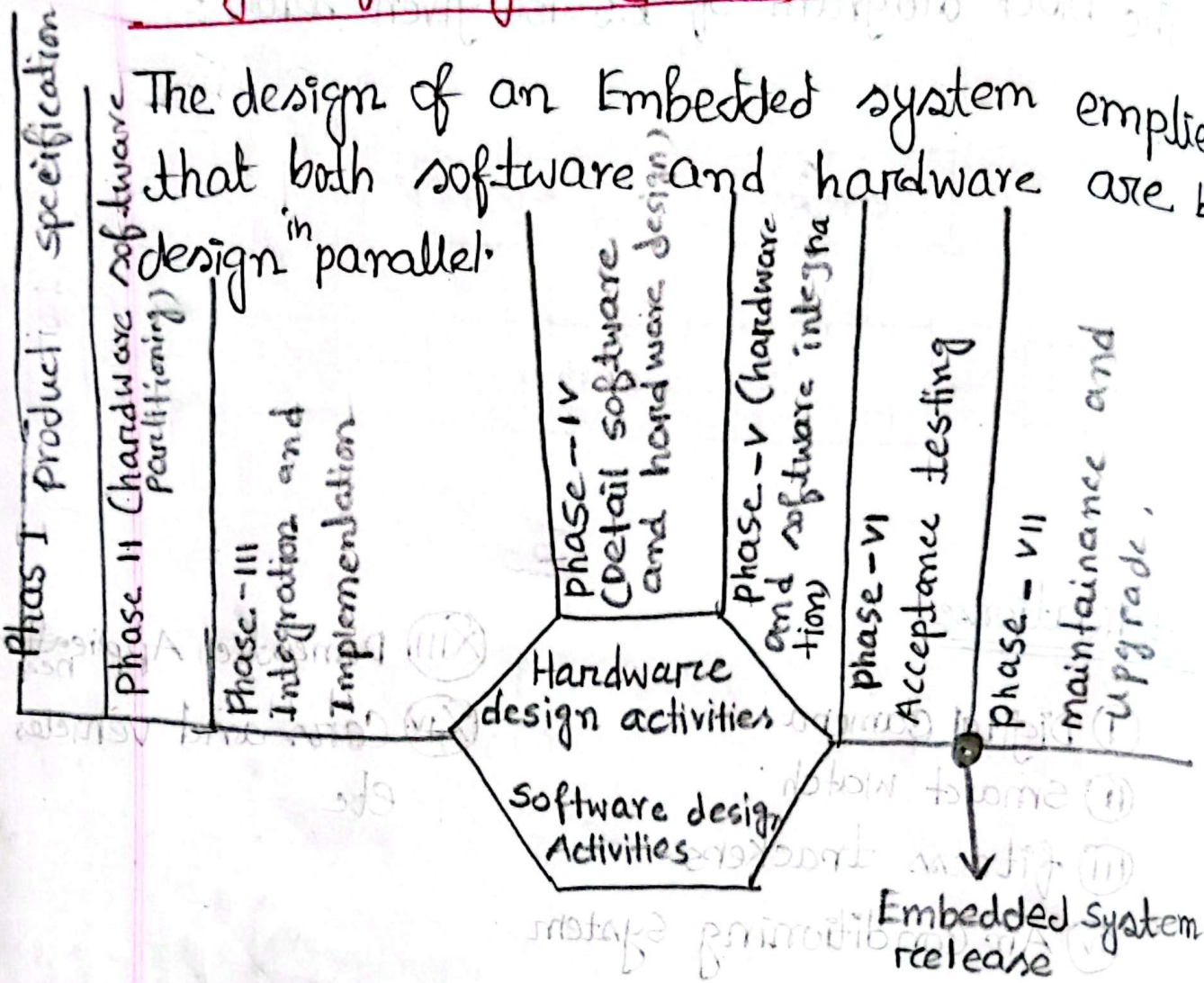


Aplications:-

(I) Digital Camera
(II) Smart Watch
(III) fitness trackers
(IV) Air Conditioning System
(V) GPS
(VI) Smart home
(VII) Pacemakers
(VIII) Medical devices
(IX) Motion Sensor
(X) Manufacturing equipment
(XI) Gamming Console
(XII) Telecommunication equipment
(XIII) Domestic Appliance
(XIV) Cars and vehicles etc

Life cycle of ES / Embedded System design life cycle (EDLC):-

The design of an Embedded system emplies that both software and hardware are be design in parallel.



→ Details (Scribd)

Models of Computation for Embedded system:-

Types of models of computation for Embedded system:-

(I) Data Flow Model (DFG) model
(II) Control Data Flow graph (CDFG) Model.
(III) State machine Model
(IV) Sequential program model
(V) Communication model
(VI) UML (Unified modeling language) etc.

(i) Data Flow Graph (DFG) model:-

This model is small as data driven model. Here data processing requirments are converted into graph. There are two types of DFGs :-

(I) Cyclic DFG
(II) Acyclic DFGs.

Main component of DFGs is :-

(I) Process (which is expressed by circle)
(II) data flow (which is expressed by arrows)

Example : DSP (Digital Signal Processing)

Here,

let,

$x = a + b$

$y = x - c$

দুইটা x, a, b এর উপর dependent.

a, b, c → data

+, - → Process

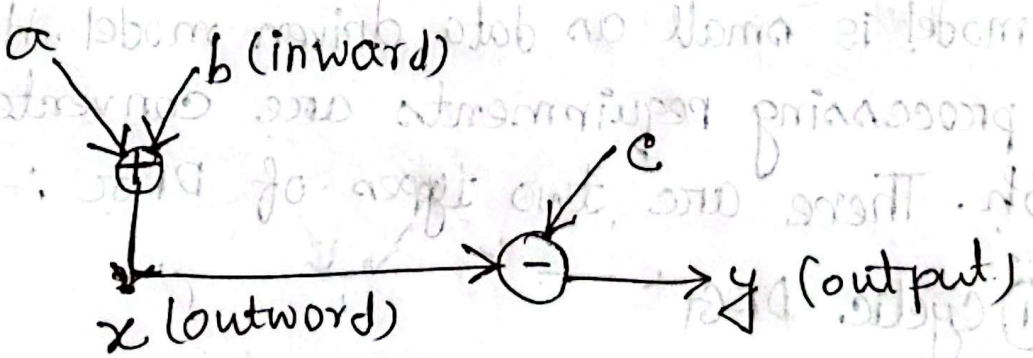


Fig: How DFG Express

এগুলো simple theory তে Example হিসাবে add করতে হবে।

$n_1 = A + B$

$n_2 = C * D$

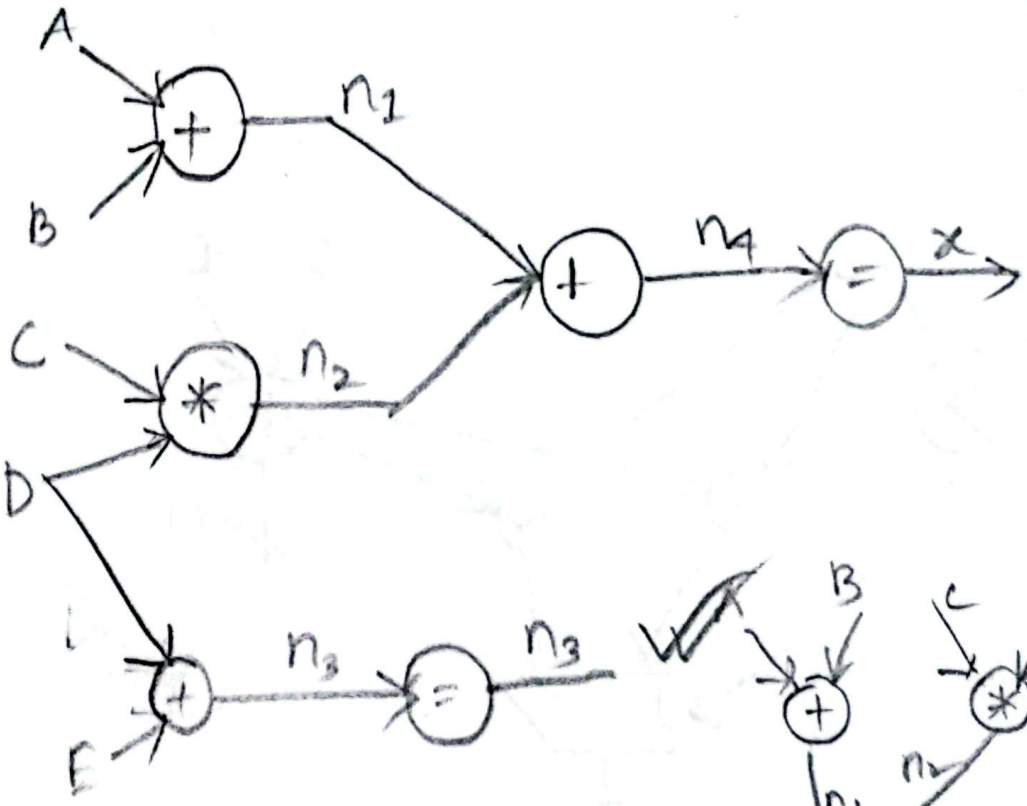
$n_3 = D + E$

$n_4 = n_1 + n_2$

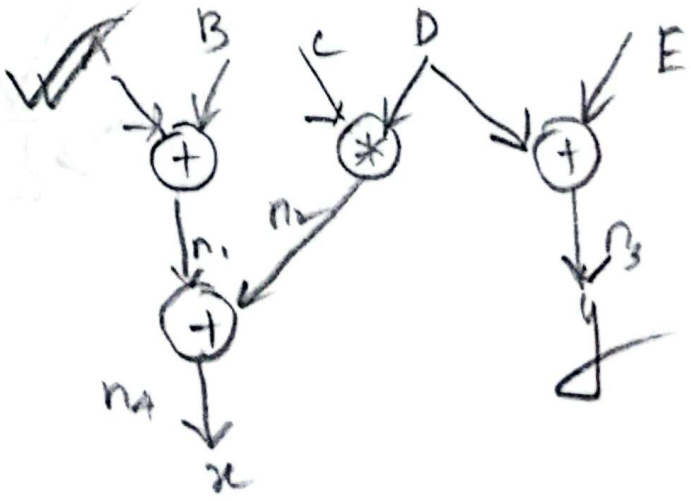
$x = n_4$

$y = n_3$

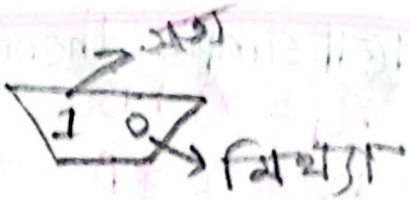
Converd it into DFG



চিত্র থেকে নিচে এঁকে হবে।

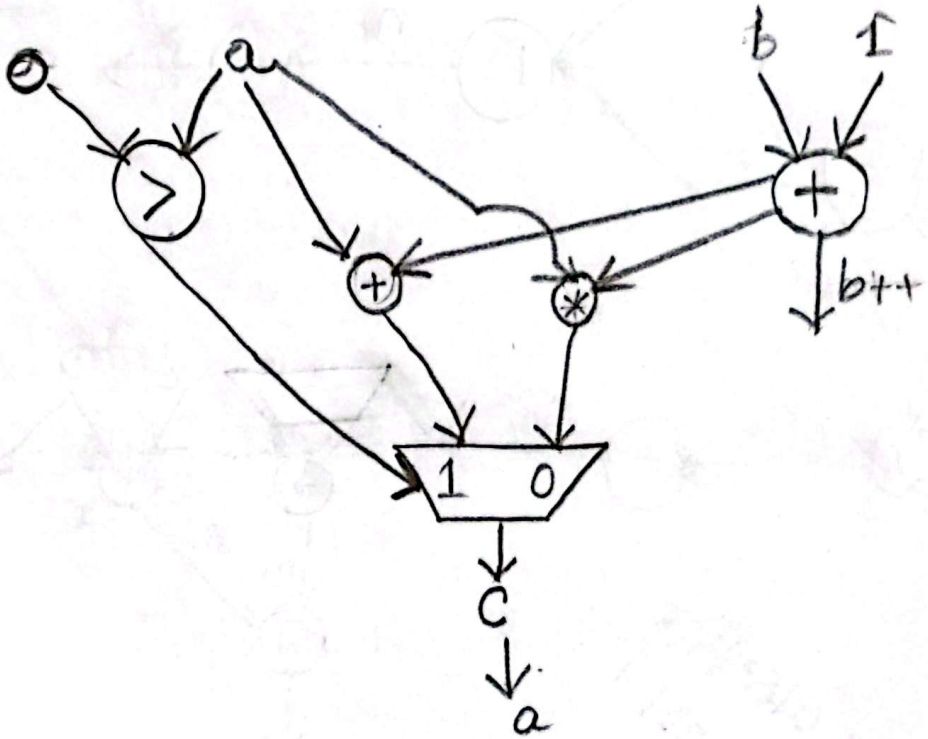


Another Ex:-




```
int a, b, c;
void func(){
  b++;
 if (a>0)
  c = a+b;
 else
     c = a*b
   a=c;
 }
```

Soln:-



H.W

Real Life Example of DFD:-

Smart Room Temparature Control System.

→ (I) Sensore (Data node)

(II) Processer 1 (compare current temparature with setpoint)

(III) Process - II (Fan / AC Control (on/off))

(IV) Process - III (Display data (CRT display) fan

(V) Fan / AC adjusts with room temparature.

(2) Control Data Flow Graph (CDFG) model:

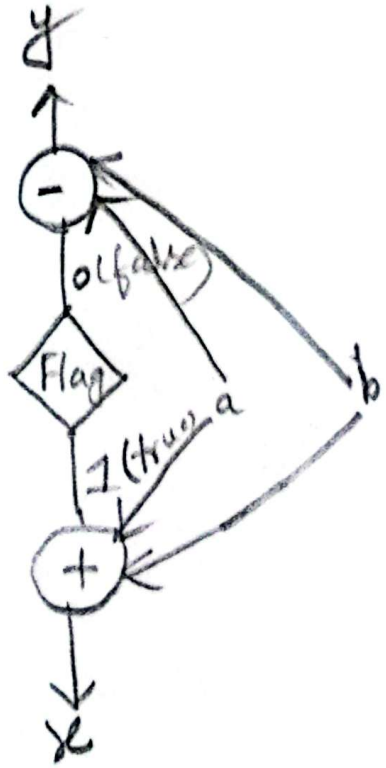
The control Data Flow Graph (CDFG) model is used for modeling applications involving conditional program execution. It is combinational of control and DFG. CDFG contains both data operation and control operation. The CDFG uses DFG as elements and conditional as decision makers.

Example: digital camera.

○ → data

↓ → inward/outward

◇ → decision maker



Math:-

```
if flag == 1
    x = a+b
else
    y = a-b
```

(3) State Machine Model: (H.W)

- Finite State machine Model (FSM) + Example
- Even driven model
- definition + Introduction + Example.
  - 2 ṭ Example
- Classroom

General Language characteristics (classroom)

- SDL (Specification & Description Language)
- Petrinates
- MSC
- UML
- Java
- HDL (Hardware description language)

Embedded System H/W S/W Core design diagram

- 2 ṭ diagram

Embedded OS

- classroom

Question Mark Description

- Computere Peripheral ⟶ 4 set.
- Interfacing ⟶ 2 set.
- Embedded System ⟶ 2 set.