* Port A is Programmed as an input Port to read the rows & Port B is Programmed as an output Port to select a column.

* For example if 1116 is output to Port B Pins PB3 - PB0, Columns 6 has a Logic 1, so for four keys in Column 0 are selected. Notice that with a logic 0 on PB0, the only switches that can replace a logic 0 onto Port A are switches 0-3

* Likewise, if 1101 is output to Port B, switches 4-7 are selected & so forth

Slide → 8086 Interrupt Part-01

Q) Define Interrupt

Ans:

Interrupt means break the sequence of operation.

* While the CPU is executing a Program, an interrupt breaks the normal sequence of execution of instructions, diverts its execution to some other Program called interrupt Service Routine (ISR)

* After executing ISR, the Control is transferred back again to the main Program.

* An interrupt is an external event which informs the CPU that a device needs Service

* 8086 এ মোট 256 টি interrupt থাকে,
* Interrupt এর মধ্যে Procedure or function

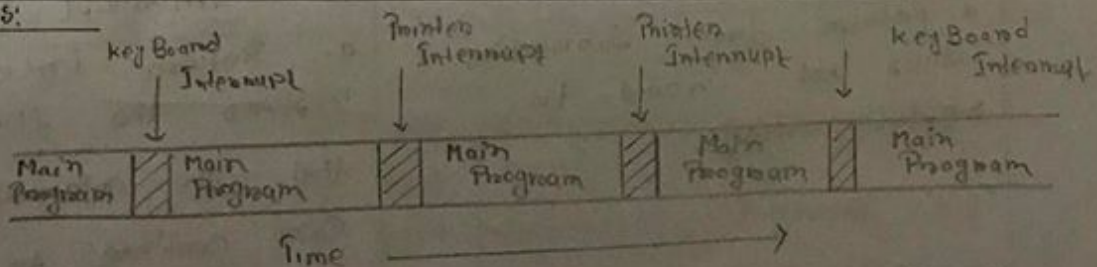**Q) Draw Timeline Diagram**

Ans:

Fig: Micro - Computer Operation Timeline showing Interrupt

Q What's the importance of interrupt

Ans:

a. The interrupt is used to get Processor's attention.

b. In PC interrupts are used to keep accurate time, read the keyboard

void main ()	int function_1 ()
{	{
1.	1.
2.	2.
3.	3.
4. i = function_1 ();	4.
5.	5.
6.	6. return;
}	

Q Write differences between Normal return vs Interrupt return

Ans

Normal Return	Interrupt Return.
a. Return from Subroutine does not need to restore flags.	a. Return interrupt restores the flags, so that the interrupted code can continue to execute Properly.

Q Describe different types of interrupt

Ans:

There are two types of interrupt

1. External Interrupts / Hardware Interrupts:

These interrupts are generated by external devices. Example: Out side the Processor keyboard interrupt. Outside the Processor refers (using NMI, INTR PINS)

⇒

2. Internal Interrupts / Software Interrupt:

It is generally internally generated by the Process circuit or by the execution of an interrupt function.

Example: INT instruction, overflow interrupt, divide by zero interrupt. At the end of each instruction cycle, the 8086 checks to see if any interrupts have been requested.

* Critical Situation এ Non-Maskable interrupt use করা হয়,

NMI ⟵ ⟵ } Interrupt inp

INTR ⟵

INTA ⟶ Interrupt out

NMI → Pin 17
INTR → Pin 18
INTA → Pin 24
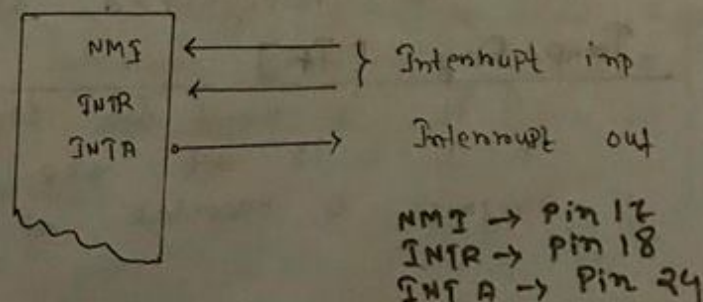
[Pin → 18] NMI: Non Maskable interrupt input Pin which means that any interrupt request at NMI input can not to masked or disabled by any means.

[Pin → 19] INTR: It can be masked using the Interrupt Flag (IF).

[Pin → 24] INTA: Interrupt Acknowledgement. It becomes active after the current instruction has completed execution.

Control Flag -2য় -তিন বরনের:

Interrupt Flag [IF]

a. It is an interrupt enable/disable flag.

b. If it is set, the maskable interrupt can be recognized otherwise ignored.

Trap Flag [TF]

a. It is used for single step control

b. If it is set one instruction of a Program is executed at a time for debugging.

Direction Flag [DF]

a. It is used in string operation

b. If it is set, string bytes are accessed from higher memory address to lower memory address.

* যে কোন Control flag High হওয়ার ফলে interrupt - সৃষ্টি।

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* While CPU is executing a Program, an interrupt breaks the normal sequence of execution of instructions diverts its execution to some other Program called **Interrupt Service Routine / Interrupt Service Procedure**.
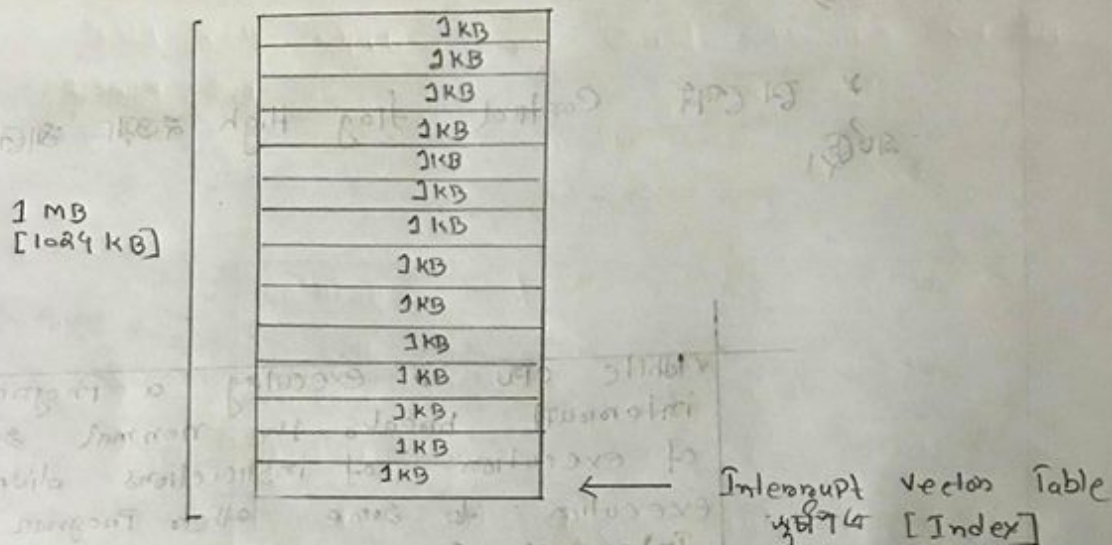
* After execution ISR, the Control is transferred back again to the main Program.

☆ Define Interrupt Vector Table

Ans:

It's a data structure that associates a list of interrupt handlers with a list of interrupt requests in a table of interrupt vectors.

* Interrupt Vector है 4 bytes number
* 8086 का Memory 1MB [1024 KB]
* Interrupt Vector Table का आकार 1 KB

1 MB [1024 KB]	1 KB
	1 KB
	1 KB
	1 KB
	1 KB
	1 KB
	1 KB
	1 KB
	1 KB
	1 KB
	1 KB
	1 KB
	1 KB
	1 KB

⟵ Interrupt Vector Table
का आकार [Index]

* For a single interrupt का Vector 4 bytes memory required.

Segment Base Address :	Offset
16 bits :	16 bits
2 bytes :	2 bytes
CS :	IP
LB	HB	:	LB	HB

2 bytes + 2 bytes = 4 bytes.

About Interrupt Vector Table

* The first 1 KB of memory of 8086 (00000H to 003FF H) is set aside as a table for storing the starting addresses of Interrupt Service Routine (ISR)

* For every interrupt, there must be a Program associated with it. It's called ISR.

* An interrupt vector is a Pointer to where the ISR is stored in memory.

* The table can hold 256 interrupt Procedures.

* IP value is Put in as low word of the vector & cs is Put in high vector.

Why we need Interrupt Vector Table

Ans: The Purpose of the interrupt vector table is to hold the vectors that redirect the microProcessor to the right Place when an interrupt arrives.

* যেভাবে 256 টা interrupt
   . Vector Table -এর size 1 KB = 1024 B
      Vector size 4 bytes
         so $\dfrac{1024}{4}$ = 256

* INT 21H আমরা Input Output Operation -এর জন্য
   ব্যবহার করি,

*

CS HIGH
CS LOW
IP HIGH
IP LOW

   Fig A typical interrupt Vector (4 bytes)

Interrupt Vector Table

INT Number	Physical Address
INT 00	00000
INT 01	00004
INT 02	00008
INT FF	003 FC

int OH

3H	CS HIGH
2H	CS LOW
1H	IP HIGH
OH	IP LOW

int 1H

7H	CS HIGH
6H	CS LOW
5H	IP HIGH
4H	IP LOW

int 2H

BH	CS HIGH
AH	CS LOW
9H	IP HIGH
8H	IP LOW

২টি খেলা আকারে জাগে ৪ byte.

Number	Address	Micro Processor	Function
0	OH - 3H	All	Divide Error
1	4H - 7H	All	Single - Step
2	8H - BH	All	NMI Pin
3	CH - FH	All	Break Point
4	10H - 13H	All	Interrupt on overflow