

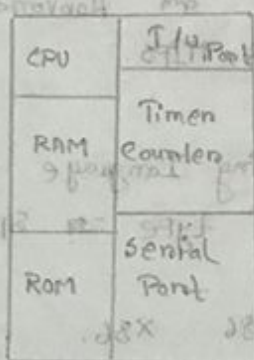
1. Define Micro Controller

Ans:

A micro-controller is a compact integrated circuit designed to govern a specific operation in an embedded system.

2. Draw the block diagram of micro-controller

Ans:



3. Define Micro-Processor.

Ans:

It is a digital integrated circuit capable of executing program.

4. Write the differences between Micro-Processors & Micro-Controller.

Ans:

Micro-Controller	Micro-Processor
i. CPU, RAM, ROM, I/O & timer are all on a single chip	i. CPU is stand-alone. RAM, ROM, I/O, timer, are separate
ii. Single Purpose	ii. General Purpose
iii. Typically 8/16 bit	iii. Typically 32/64 bit
iv. Low Processing Power	iv. High Processing Power

- * Micro-Controller Example \rightarrow ATmega 32
- * Micro-Processor

- * Micro-Processors Example \rightarrow Intel, 8086, 8051

Computer Architecture = 13 bits base 2, Microprocessor = 13 bits
Type = 13 bits and Harvard Architecture.
Example: ATmega32, MIPS.

Assembly Programming Language \rightarrow উইথ base system,
Microprocessor \rightarrow type \rightarrow বিন বন non neumann
Architecture.
Example: Intel 8086 X86.

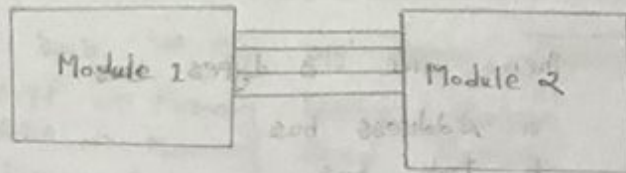
5. Define BUS

Ans: The bus is an electrical path that connects the CPU, memory & the other hardware devices on the motherboard.

* The bus is a group of Parallel wires.

১০. প্রণীত wine ২-টি করে
আর, information যাগিত—

* 4 টি wine-র ক্ষেত্রে $2^4 = 16$ টি choice, এক্ষেত্রে 4



16 bit Choice

0	0	0	0
0	0	0	0
0	0	1	0
0	0	1	1
0	1	0	0
0	1	0	1
0	1	1	0
0	1	1	1
1	0	0	0
1	0	0	1
1	0	1	0
1	0	1	1
1	1	0	0
1	1	0	1
1	1	1	0
1	1	1	1

* 64 bit bus Can transfer 8 bytes

$$64 \div 8 = 8 \text{ byte} = 8 \text{ bit}$$

$$8 \text{ byte} = 8 \times 8 \text{ bit} = 64 \text{ bit}$$

* 32 bit bus Can transfer 4 bytes

$$1 \text{ byte} = 8 \text{ bit}$$

$$4 \text{ byte} = 4 \times 8 \text{ bit} = 32 \text{ bit}$$

* 16 bit bus Can transfer 2 bytes

$$1 \text{ byte} = 8 \text{ bit}$$

$$2 \text{ byte} = 2 \times 8 \text{ bit} = 16 \text{ bit}$$

6. Write the types of Bus.

Ans:

There are 3 types bus

- a. Address bus
- b. Data bus
- c. Control bus.

a. Address bus:

It is a group of wires that are used to transfer the addresses of Memory on I/O devices.

b. Data bus:

It is used to transfer data within microprocessor & memory input or output devices.

c. Control bus:

Microprocessors use control bus to process data, that is what to do with the selected memory location.

- * Micro-Processor এর IP টি দিয়েও denote করা হয়।
- * Data bus bidirectional
- * Address bus unidirectional
- * Address and Data bus - ~~সংগঠিত~~ - ~~কি~~
- ~~আছে~~, - ~~এই~~ Solid Line দিয়ে draw করা হয়।
- * Control bus - ~~আলাদা~~ ~~আলাদা~~ bit ~~এই~~ ~~line~~
line দিয়ে draw করা হয়।

* Control bus bidirectional

* Control bus \rightarrow \rightarrow চার ধরনের Control - সীগনাল

- MWTC \Rightarrow Memory Write Control
- MRDC \Rightarrow Memory Read Control
- IOWC \Rightarrow Input Output Write Control
- IORC \Rightarrow Input Output Read Control.

7. Draw Micro-Computer Structure

Ans:

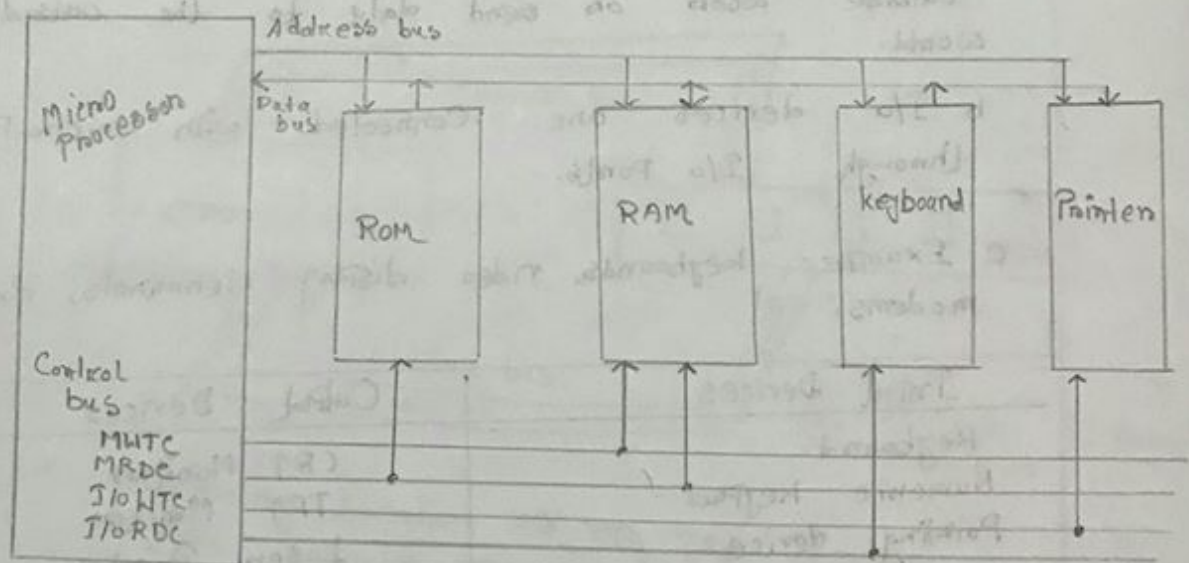


Figure: Micro-Computer Structure Showing different buses

8. Write the Major Parts of Micro-Computers.

Ans:

The major Parts are

- a. CPU
- b. Memory
- c. I/O circuitry
- d. Buses. →
 - i. Address bus
 - ii. Data bus
 - iii. Control bus.

9. Write note on I/O [Input/output]

Ans:

- a. They are used to take in data from outside world or send data to the outside world.
- b. I/O devices are connected with micro-processor through I/O ports.
- c. Example: keyboards, video display terminals, Printers, modems.

Input Devices	Output Devices
Keyboard	CRT Monitor
Numeric keypad	TFT Monitor
Pointing device	Laser Printer
Remote Control	Ink jet Printers
Joystick	Dot Matrix Printers
Touch screen	Speakers
Scanners	Plotters
Graphics Tablet	Multimedia Projectors.
Microphone	
Digital camera	
Webcams	
Light Pens	

10. Write notes on CPU.

Ans.

- It controls the operation of Computers.
- The CPU fetches binary coded instructions from memory.
- Decodes the instructions into a series of simple actions.
- Carries out these actions in a sequence of steps.

① Please send the data in slot number
100110110000100111101100101



② Ok, here it comes
01001100

Memory Location বা পঠে, সেই Location এ-থেকে
data write করা হবে,
সিস্টেম Control করে Operating System.

- * Processor এর Memory বা Registers memory.
- * Single core Processor এর Cache memory নাম,

11. Write notes on Address bus.

Ans:

- Address bus is a set of wires
- It consists of 16, 20, 24, 32, or 36 Parallel unidirectional signal lines.
- On the lines CPU sends out the address of the memory location on I/O Port that is to be written to or read from.
- The number of locations that the CPU can address is determined by the number of address lines.

12. Write notes on Data bus.

Ans:

- The ~~address~~^{data} bus is a set of wires which consists of 8, 16, 32 Parallel bidirectional signal lines.
- Many devices in the system will have their output connected to data bus, but only one device at a time will have its output enabled.

13. Write notes on Control bus.

Ans:

- The control bus is a set of wires which consists of 4 to 10 Parallel Signal lines.
- The CPU sends out signals on the control bus to enable the outputs of addressed memory devices or I/O devices.
- Example of Control signals: Memory read, Memory write.

14. Define Memory

Ans:

Memory stores binary codes for the sequence of instructions. It also stores binary coded data.

15. Write the name of different types of memory

Ans:

There are 3 types of memory

- Processor Memory
- Primary or Main Memory
- Secondary Memory.

Processor Memory	→ Registers
Primary Memory	→ RAM, ROM
Secondary Memory	→ Hard disk, floppy disk

- * Volatile Memory \Rightarrow RAM
- * Non-volatile Memory \Rightarrow ROM

16. Write notes on Processor Memory

Ans:

- a. It refers to the microprocessor registers.
- b. Registers are used to add temporary results during computation is in progress.
- c. No speed disparity between registers & microprocessor.
- d. Costly.

17. Write notes on Primary Memory

Ans:

- a. All Programs are executed.
- b. Microprocessor can directly access only those items that are stored in Primary memory.
- c. All Programs & data must be within the Primary memory prior to execution.
- d. Example: ROM, RAM

18. Write notes on Secondary Memory

Ans:

- Stores Program & data in access of main memory
- Microprocessor can not directly execute programs which are stored in secondary memory.
- In order to execute these programs, the microprocessor must transfer them to its main memory by operating system.
- Example: Floppy disk, Hard disk

19. Draw Micro-Processor interfacing diagram.

Ans:

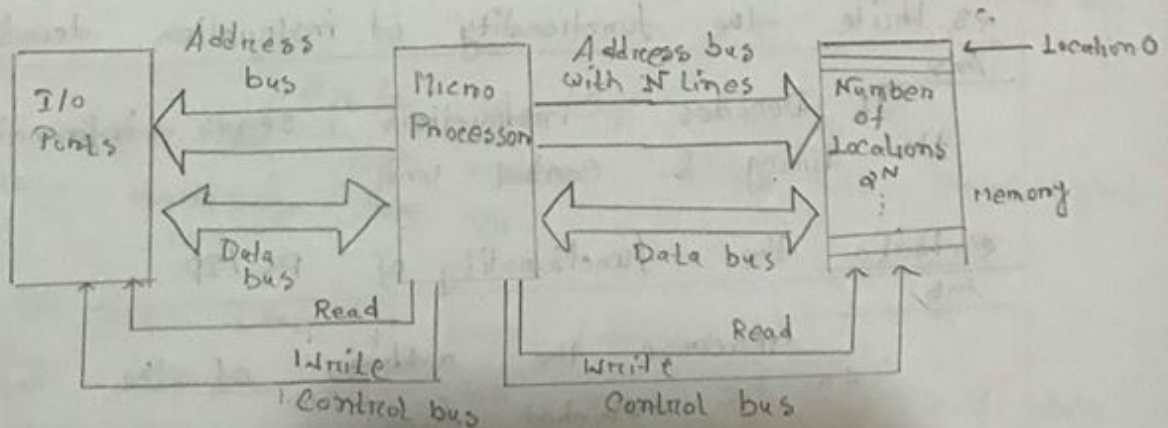


Fig. Micro Processor interfacing with memory & I/O

Q0. Write the functionality of ALU.

Ans:

ALU is an Computational unit. It Performs arithmetic & logic operations.

Q1. Write the Work Process of Flag Register.

Ans:

Various Conditions of the results are stored as status bits.

Q2. Write the functionality of Register Array or Internal Memory.

Ans:

Internal storage of data.

Q3. Write the functionality of Timing & Control unit.

Ans:

Generates control signals for internal & external operations of the microprocessor.

Q4. Write the functionality of instruction decoding unit.

Ans:

It Decodes instructions, sends information to the timing & control unit.

Q5. Write the functionality of PC/IP.

Ans:

Generate the address of the instructions to be fetched from the memory & send through address bus to the memory.

* Logical bit value operation 2 step Process
* 8086 \rightarrow 16 bit Micro-Processor.

Model	Address Bus	Data Bus
8085	16	8
8086	20	16
8088	20	8

* 8086 এর 16 টি Pin এর data দিলে দুই data.
একটি 4 টি - নিম্নে status এর জন্য,

* Address দিলে 20 টি - নিম্নে,

AD₀ - A₁₅ →

AD₀ - A₁₅ → Lower Order Address bus, multiplexed with data.

AD Line memory address transmit করতে জন্য use করা
কিন্তু AD₀ - A₁₅ এর সন্ধিতে A₀ - A₁₅ use হয়.

AD Line এখন data transmit করতে জন্য use
করা হয়, তখন AD₀ - A₁₅ এর সন্ধিতে
D₀ - D₇ , D₈ - D₁₅ , D₀ - D₁₅ একসাথে নিম্নে করা.

A₁₆/S₃ , A₁₇/S₄ , A₁₈/S₅ , A₁₉/S₆

এগুলো হল high order address bus, status signal
- দিয়ে multiplex করা হয়.

BH_E / S₇ [Bus High Enable / Status]

এটি enable data এর most significant half data
bus এর.

BH_E ; S₇ এর সাথে মাল্টিপ্লেক্স

* MN / M_X [Minimum / Maximum] → কোন mode এ processor
operate করছে.

- * Read Pin \Rightarrow 32 number Pin (\overline{RD})
- * Write Pin \Rightarrow 20 number Pin (\overline{WR})

$\overline{RD} \rightarrow$ Low to active \Rightarrow 24

$\overline{WR} \rightarrow$ Low to active \Rightarrow 24

- * ~~24~~ 24 Operation \Rightarrow 24, \overline{WR} active \Rightarrow 24

\overline{RD} inactive \Rightarrow 24

$\overline{RD} \rightarrow$ Inactive \rightarrow 24

$\overline{WR} \Rightarrow$ Active \rightarrow 24

* 8086 ~~for~~ Execution Unit & Bus Interface Unit

\Rightarrow 24 24

Execution Unit	Bus Interface Unit
1. AX AH AL	1. Adden
2. BX BH BL	2. CS [Code Segment]
3. CX CH CL	3. DS [Data Segment]
4. DX DH DL	4. SS [Stack Segment]
5. Temporary SP [Stack Pointer]	5. ES [Extra Segment]
6. BP [Base Pointer]	6. IP [Instruction Pointer]
7. SI [Source Index]	7. Internal Computation Communication Registers
8. DI [Destination Index]	8. Bus Control Logic
9. Temporary Registers	9. Instruction Queue
10. ALU	
11. Flags	
12. Execution unit Control System	

Q Write differences between adder & ALU

Ans:

Adder can add two bits.

ALU can perform various arithmetic operations.

* Arithmetic Operation ~~does~~ result change ~~is~~.

Q Write the features of 8086

Ans:

- a. Clock rates are 5, 8, 10 MHz
- b. 16 bit ALU
- c. 16 bit data bus
- d. 20 bit address bus

⇒ Execution Unit ~~is~~ Bus interface unit ~~is~~ ~~the~~ ~~16~~ bit ALU data bus.

Q Write differences of Execution Unit & Bus interface unit

Ans:

Execution Unit:

- a. Executes operation on bytes on 16 bit words
- b. The result is stored into temp registers or registers connected to the internal data bus.

Bus interface Unit:

- a. Intended to compute the addresses.
- b. Two temporary registers
- c. Four segment registers [DS, CS, SS, ES]
- d. Program Counter [IP]
- e. 6 byte Queue buffers.

* 8086 is single Oscillation 4MHz \rightarrow 1 bit Pulse
Process 28 16 bit data.

* Micro-Processors are memory costly.

* 8086 is At a time 28 Program Load 28.

* 8086 is register registers 16 bit length.

Q Memory addressing Capacity depends on which thing?

Ans:

It depends upon number of address lines in CPU.

Q Define address space

Ans:

Set of all possible addresses that can be generated by CPU is called address space.

* 8086 is address bus 20 bit, which is 20th address line. It gives 1MB memory address space.

* 8086 is Memory size / Capacity is 1MB

Q Calculate the memory size of 8086 Microprocessor

Ans:

Address bus = 20 bits

Data bus = 8 bit

Location Marking = 2^{20}
= 1048576

Total Memory size = 1048576 x 8 bit

= 8388608 bit

= $\frac{8388608}{8}$ byte [8 bits = 1 byte]

= 1048576 byte

= $\frac{1048576}{1024}$ KB [1 byte = 1024]

= $\frac{1048576}{1024}$ KB [1024 byte = 1 KB]

= 1024 KB

= $\frac{1024}{1024}$ MB [1024 KB = 1 MB]

= 1 MB

Ans.

x Address bus 20 bit, 8 bit combination के चरित्रों का -

Q. Calculate the memory size of 8085 microprocessor

Ans.

Address bus = 16 bit

Data = 8 bit

Location Mapping = 2^{16}
= 65536

Total Memory Size = 65536×8 bit
= 524288 bit
= $\frac{524288}{8}$ byte [8 bits = 1 byte]
= 65536 byte
= $\frac{65536}{1024}$ KB [1024 byte = 1KB]
= 64 KB.

8086 Micro Processor

- i. Instruction Queue - है
- ii. अवर्गीकृत Processor supported.

8085 Micro Processor

- i. Instruction Queue नहीं
- ii. अवर्गीकृत Processor support करता ना,

Q Write the differences between 8085 & 8086 micro-Processor

Ans

Parameter	8085	8086
Size	8 bit Processor	16 bit Processor
Address Bus	16 bits address bus	20 bits address bus
Data Bus	8 bit data bus	16 bit data bus
Memory	64 KB of memory	1 MB of Memory
Instruction Queue	No instruction queue	It has 6 byte instruction queue.
Pipelining	Pipelining not supported.	It supports Pipelining architecture
I/O s	It can address $2^8 = 256$ I/O locations	It can address $2^{16} = 65536$ I/O locations
Multiprocessing support	No multiprocessing support.	It has multiprocessing support.

Q Write the work of Bus interface unit.

Ans:

- It works as the secretary for the Execution unit.
- It assists the communication between the execution unit & the memory on I/O devices.
- It transmits address, data, control signals on the external & internal buses.
- Holds 5 registers that store addresses for memory location.
- Provides address relocation.