

Microprocessor and C-programming

1. Memory:

Memory is an essential component of a digital computer.

It is needed to store programs, data and results.

The speed of memory should be very high and

it must match the speed of the CPU.

Types of Memory:

semiconductor memory,

Magnetic memory,

optical memory

2. Types of semi-conductor memory:

There are two main types of semi-conductor memory.

(i) RAM - Random Access Memory

(ii) ROM - Read only Memory

(i) Uses of RAM:

In a Random Access Memory any memory location can be accessed in random way without going through any other location.

(ii) Uses of ROM:

It stores information permanently. Its contents are not lost when its power supply is switched off.

3. Types of RAM:

There are two types of RAM.

(i) static RAM

(ii) Dynamic RAM

Static RAM	Dynamic RAM
SRAM retains the stored information as long as power supply is on.	DRAM loses its stored information in a few milliseconds even though its power supply is on.
Six transistors are needed to form a memory cell.	Only one transistor is enough to form a memory cell.
It consumes more power.	It consumes less power.

4. Buses:

Various input/output devices and memory devices are connected to a CPU by groups of lines called Buses.

Types:

Address Bus,

Data Bus,

Control Bus.

5. Hardware:

The physical devices of a computer called hardware.

Eg: Hard disk, printer.

software:

A set of programs written for a computer is known as software.

Eg: OS, compiler.

Firmware:

The programs stored in ROMs, PROMs, EPROMs, EEPROMs or flash memory are known as firmware.

6. Intel 8085:

Intel 8085 is an 8-bit NMOS microprocessor.

It is a 40 pin IC package fabricated on a single 151 chip.

It uses a single +5Vdc supply for its operation.

Its clock speed is about 3MHz. The clock cycle is of 320 ns.

7. Operations performed by ALU:

Addition	Complement
Subtraction	Increment
Logical AND	Decrement
Logical OR	Left shift, Rotate left
Logical EXCLUSIVE-OR	Rotate right
	Clear

8. Control unit is the brain of the computer:

Timing and control unit generates timing and control signal which are necessary for the execution of instructions. It controls data flow between CPU and peripherals. It provides status, control and timing signals which are required for the operation of memory and I/O devices. Thus, it is seen that the control unit of the CPU act as the brain of the computer system.

9. Types of flags:

- (i) carry flag (CF)
- (ii) parity flag (PF)
- (iii) Auxiliary carry flag (AC)
- (iv) zero flag (ZF)
- (v) sign flag (SF)

10. Uses of program counter:

Program counter is used to hold the memory address of the next instruction to be executed so that it points to the address of the next instruction in the program at the end of the execution of an instruction.

11. Three instruction from Arithmetic group:

- Addition (+)
- Subtraction (-)
- Multiplication (*)

12. Instruction of CMA:

Complement of 8 MSBs of the number.

13. Program to place 05 in accumulator, increase it by one and store the result in memory F50H

Address	Mnemonic	Operands	Comments
FC00	MVI	A, 05	Load 05 in the accumulator
FC02	INR	A	Increment the content of accumulator by one
FC03	STA	FC0H	Store the result in FC0H
FC06	HLT		Halt

14. program to shift an 8-bit number left by one bit:

Address	Mnemonics	Operands	Comments
8000	LDA	8501 H	Get data from accumulator
8003	ADD	A	SHIFT it left by one bit
8004	STA	8502 H	store result in 8502 H
8007	HLT		Halt

15. program to mask off most significant 4 bit of an 8 bit number

Address	Mnemonics	Operands	Comments
8000	LDA	8501 H	Get data from accumulator
8003	ANI	0F0	Mask off the least most significant 4-bits
8005	STA	8502 H	Store result in 8502 H
8008	HLT		Halt

16. keyword:

keywords are words belonging to c-language. They have predefined meanings. These words should be used only for their intended purpose. The users have no right to change its meaning.

Keywords should be written in lower case.

Eg: auto, break, for, if, else

17. c-tokens:

c tokens are the smallest individual units. It is of six types.

keywords	special symbols
Identifier	operators
constant	string constant

18. Identifiers:

Identifiers are names given to variables, functions, arrays and other user defined objects.

These are user-defined names.

19. Rules:

Rules for Identifiers:

The first character must be an alphabet.
They are case sensitive.

Identifiers are formed with alphabets, digits and a special character underscore.

20. Variable:

A quantity whose value changes during the execution of the program, is called variable.

A variable refers to the name given to the memory location to store data.

21. getch:

Variable name = getch();

Reading a single character can be done by using the function getch.

putchar:

General format: putchar (variable name);

putchar function is used to write

characters one at a time to the terminal.

22. scanf:

scanf means "Reading data from keyboard".

We can give values of input through keyboard using the scanf function.

Format:

```
scanf("control string", &variable 1; &variable 2);
```

printf:

printf function is used to print the numerical results. It is highly desirable that the outputs are produced in such a way that they are understandable.

Format:

```
printf("control string", arg 1, arg 2, ..., arg n);
```

23. Array:

An array is defined as a group of related data items stored by means of a single variable name.

Format: array name [subscript]

24. Multi-dimensional array:

An array name with three or more subscript is known as a multi-dimensional array.

Eg
Format: int survey [3] [5] [12]

Qs- General Format of "if" statement:

```
if (test expression)
```

```
{  
  statement-block;
```

```
}  
statement X;
```

Use:

If statement is a powerful decision-making statement.

It is used to control the flow of execution of statements.