

FUNDAMENTAL OF COMPUTERS

INTRODUCTION TO COMPUTERS

Introduction – Characteristics of Computers – Evolution of Computers – Computer Generations – Classification of Computers – Basic Computer organization – Number Systems.

1. Define computers?

A computer is a programmable machine or device that performs pre-defined or programmed computations or controls operations that are expressible in numerical or logical terms at high speed and with great accuracy.

(Or)

Computer is a fast operating electronic device, which automatically accepts and store input data, processes them and produces results under the direction of step by step program.

2. Why computer is known as data processing system? (MAY 2009)

Any process that uses a computer program will enter data and summarize, analyze or otherwise convert data into usable information. The process may be automated and run on a computer. It involves recording, analyzing, sorting, summarizing, calculating, disseminating and storing data. Thus Computer is known as data processing system.

3. What is Data and Information?

Data - Data is the fact or raw material for the information processing.

Information – The processed data is called information.

4. What are the basic operations of Computer?

- 1) It accepts data or instructions by way of input.
- 2) It stores data.
- 3) It can process data as required by the user.
- 4) It gives results in the form of output.
- 5) It controls all operations inside a computer.

5. Give the applications computer?

- Word Processing

- Internet
- Desktop publishing
- Digital video or audio composition
- Mathematical Calculations
- Robotics
- Weather analysis

6. What are the characteristics of computers? (JAN 2009)

- Speed
- Accuracy.
- Automation.
- Endurance.
- Versatility.
- Storage.
- Cost Reduction.

7. How will you classify computer systems?

Based on physical size, performance and application areas, we can generally divide computers into four major categories:

1. Micro computer
2. Mini Computer
3. Mainframe computer and
4. Super Computer

8. Specify the Electronic components used for different computer generations.

Generations	Electronic Components
I Generation	Vacuum tubes

II Generation	Transistors
III Generation	Integrated Circuits
IV Generation	Microprocessors
V Generation	Artificial Intelligence

9. What are the languages used in computer generations.

Generations	Languages used
I Generation	Machine Language.
II Generation	Assemble Language, Mnemonics
III Generation	High Level Language, BASIC, PASCAL, COBOL, FORTRON.
IV Generation	4GL
V Generation	Artificial Intelligence.

10. Expand ENIVAC, ABC, EDVAC, EDSAC and UNIVAC.

ENIAC – Electronic Numerical Integrator and Calculator.

ABC – Atanasoff and Berry Computer.

EDVAC – Electronic Discrete Variable Automatic Calculator. EDSAC – Electronic Delay Storage Automatic Calculator. UNIVAC – UNIVersal Automatic Computer.

11. Who is the father of computer? Why?

Charles Babbage is the father of computer, because the parts and working principle of the Analytical Engine, which is invented by Charles Babbage is similar to today's computer.

12. Expand COBOL, BASIC, FORTRON and IBM.

COBOL – Common Business Oriented Language.

BASIC - Beginner's All Purpose Symbolic Instruction Code.

FORTRON – FORMula TRANslation.

IBM – International Business Machine.

13. Expand IC, SSI, MSI, LSI, and VLSI.

IC – Integrated Circuit.

SSI - Small Scale Integration. MSI - Medium Scale Integration. LSI - Large Scale Integration.

VLSI - Very Large Scale Integration.

14. What are the components of the computer systems?

Basic components of the computer system are Input Unit, Central Processing Unit, Secondary Storage Unit and Output Unit.

15. What are the functions in the input unit?

An input device is a device that is used to input data or information into a computer. Some examples of input devices include:

- Keyboards.
- Computer mice.
- Light Pen.
- Digitizer.
- Touchpad.
- Trackball.
- Image scanner.
- Webcam.
- Video capture / tuner cards.
- Microphones.
- MIDI instruments.

16. What are the functions in the output unit?

In computers, a unit which delivers information from the computer to an external device or from internal storage to external storage.

- Speakers.
- Printer.
- Headphone.
- Monitor (or) Visual Display Unit (VDU).
- Plotter.

17. What is an ALU?

Arithmetic logic unit, the part of a computer that performs all arithmetic computations, such as addition and multiplication, and all logical operations such as comparison operations. The ALU is one component of the CPU (central processing unit).

18. Define Clients and Servers.

A client is generally a single-user PC or workstation that provides a highly user-friendly interface to the end user. It runs client processes, which send service requests to the server.

A server is generally a relatively large computer that manages a shared resource and provides a set of shared user services to the clients. It runs the server process, which services client requests for use of the resource managed by the server. The network may be single LAN or WAN or an internet of networks.

19. What is a CPU?

The CPU (central processing unit) is the part of a computer that controls the interpretation and execution of instructions. Generally, the CPU is a single microchip.

(Or)

The computing part of the computer. Also called the "processor," it is made up of the control unit and ALU. Today, the CPUs of almost all computers are contained on a single chip.

The CPU, clock and main memory make up a computer. A complete computer system requires the addition of control units, input, output and storage devices and an operating system.

20. What is meant by generation in computer terminology?

Generation is the period of years in which the computers are enhanced as previous.

21. Define personal computers?

A small, relatively inexpensive computer designed for an individual user.

In price, personal computers range anywhere from a few hundred dollars to thousands of dollars.

All are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip.

Example:

Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications.

At home, the most popular use for personal computers is for playing games.

22. Define Mainframe computer?

Mainframes are computers used mainly by large organizations for critical applications, typically bulk data processing such as census, industry and consumer statistics, enterprise resource planning, and financial processing.

The term probably had originated from the early mainframes, as they were housed in enormous, room-sized metal boxes or frames.

23. Define Mini computers?

A mini computer is a multi-user or time-sharing system. It is used for medium scale data processing such as Bank account processing, Payroll processing etc., Mini computer process greater storage capacity and larger memories as compared to micro computer.

24. Define super computer?

The fastest type of computer. Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations.

For example, weather forecasting requires a supercomputer. Other uses of supercomputers include animated graphics, fluid dynamic calculations, nuclear energy research, and petroleum exploration.

25. Define Software?

Computer instructions or data, anything that can be stored electronically is software. (Or)

Computer software or just software is a general term used to describe the role that computer programs, procedures and documentation in a computer system.

26. Define Hardware?

Computer hardware - (computer science) the mechanical, magnetic, electronic, and electrical components making up a computer system hardware.

Hardware includes not only the computer proper but also the cables, connectors, power supply units, and peripheral devices such as the keyboard, mouse, audio speakers, and printers.

27. What is an instruction?

An instruction is a basic command. The term instruction is often used to describe the most rudimentary programming commands. For example, a computer's instruction set is the list of all the basic commands in the computer's machine language.

28. Define memory?

Computer memory refers to devices that are used to store data or programs (sequences of instructions) on a temporary or permanent basis for use in an electronic digital computer.

29. What is a volatile and non-volatile memory?

Volatile memory: also known as volatile storage is computer memory that requires power to maintain the stored information, unlike non-volatile memory which does not require a maintained power supply. It has been less popularly known as temporary memory.

Non-volatile memory: nonvolatile memory, NVM or non-volatile storage, is computer memory that can retain the stored information even when not powered.

Examples of non-volatile memory

- read-only memory
- flash memory
- most types of magnetic computer storage devices (e.g. hard / floppy disks & magnetic tape)
- optical discs
- Early computer storage methods such as paper tape and punch cards.

Non-volatile memory is for long-term persistent storage. The most widely used form of primary storage today is a volatile form of random access memory (RAM), meaning that when the computer is shut down, anything contained in RAM is lost.

30. What is a primary memory?

The primary memory or the main memory is part of the main computer system. The processor or the CPU directly stores and retrieves information from it. This memory is accessed by CPU, in random fashion. That means any location of this memory can be accessed by the CPU to either read information from it, or to store information in it.

Types of Primary Memory:

- RAM is RWM (Read Write Memory), the CPU can write and read information from any primary memory location implemented using RAM.
- ROM stands for Read Only Memory.

31. What is a secondary memory?

The secondary memory is much slower and also less costly. It stores the data permanently unless it is erased.

Examples:

Floppy disk storage media

Hard disk CD / DVD Pen drive

Memory chips etc.,

32. What is a microprocessor?

A microprocessor incorporates most or all of the functions of a central processing unit

(CPU) on a single integrated circuit (IC).

The first microprocessors emerged in the early 1970s and were used for electronic calculators, using binary-coded decimal (BCD) arithmetic on 4-bit words.

33. What is transistor?

A device composed of semiconductor material that amplifies a signal or opens or closes a circuit. Invented in 1947 at Bell Labs, transistors have become the key ingredient of all digital circuits, including computers. Microprocessors contain tens of millions of microscopic transistors.

34. What is an IC? How does it help in reducing the size of Computers?

IC is an Integrated Circuit; it integrates large number of circuit elements into very small surface (less than 5mm square) of silicon known as Chip's.

35. What are the components of the computer systems?

- Input Unit
- Central Processing Unit.
- Secondary Storage Unit.
- Output Unit.

36. Define number system.

The term computer numbering formats refers to the schemes implemented in digital computer and calculator hardware and software to represent numbers.

For example, if one multiplies: $1 \times 1 = 1$ one might perhaps expect to get a result of exactly 1, which is the correct answer when applying an exact rational number or algebraic model. In practice, however, the result on a digital computer or calculator may prove to be something such as precisely 0.9999999999999999 (as one might find when doing the calculation on paper) or, in certain cases, perhaps 0.99999999923475.

37. What are the types of Number System?

- Positional Number System.
- Non-Positional Number System.

38. What are the positional number systems and what is their base?

Number System	Base
Decimal Number System	10
Binary Number System	2
Octal Number System	8
Hexa Decimal Number System	16

39. Define (1) Nibble (2) Bit (3) Byte?

(1) In computers and digital technology, a nibble (pronounced NIHB-uhl; sometimes spelled nybble) is four binary digits or half of an eight-bit byte. A nibble can be conveniently represented by one hexadecimal digit.

(2) A bit (short for binary digit) is the smallest unit of data in a computer. A bit has a single binary value, either 0 or 1. Although computers usually provide instructions that can test and manipulate bits, they generally are designed to store data and execute instructions in bit multiples called bytes.

(3) In most computer systems, a byte is a unit of data that is eight binary digits long. A byte is the unit most computers use to represent a character such as a letter, number, or typographic symbol (for example, "g", "5", or "?"). A byte can also hold a string of bits that need to be used in some larger unit for application purposes.

40. What is a Base?

A base is the total number of bits in the number system.

41. What is meant by conversion in number system?

Conversion is the process of converting from one number system to another number system.

Example:

- Decimal to Octal.
- Hexadecimal to Decimal

42. Define (1) MSB (2) LSB?

(1) In computing, the most significant bit (MSB) is the bit position in a binary number having the greatest value. The MSB is sometimes referred to as the left-most bit on big-endian architectures, due to the convention in positional notation of writing more significant digits further to the left. The MSB can also correspond to the sign of a signed binary number in one or two's complement notation. "1" meaning negative and "0" meaning positive.

(2) In computing, the least significant bit (LSB) is the bit position in a binary integer giving the units value, that is, determining whether the number is even or odd. The LSB is sometimes referred to as the right-most bit, due to the convention in positional notation of writing less significant digit further to the right.

43. Specify the method to convert decimal number system.

1. Remainder method.
2. Power method.

44. What is a binary number system?

The binary numeral system or base-2 number system represents numeric values using two symbols, 0 and 1. More specifically, the usual base-2 system is a positional notation with a radix of 2.

45. What is a decimal number system?

The decimal numeral system (also called base ten or occasionally denary) has ten as its base. It is the most widely used numeral base.

Examples are

- Roman numerals.
- Brahmi numerals.
- Chinese numerals.
- Hindu-Arabic numerals.
- Roman numerals have symbols for the decimal powers (1, 10, 100, and 1000).

46. What is an octal number system?

The octal numeral system, or oct for short, is the base-8 number system, and uses the digits 0 to 7. Numerals can be made from binary numerals by grouping consecutive binary digits into groups of three (starting from the right).

For example:

clip_image003[4]

112 in octal is equal to $64+8+2 = 74$ in decimal. Octal is sometimes used in computing instead of hexadecimal.

47. What is a hexadecimal number system?

In mathematics and computer science, hexadecimal (also base-16, hexa, or hex) is a numeral system with a radix, or base, of 16. It uses sixteen distinct symbols, most often the symbols 0–9 to represent values zero to nine, and A, B, C, D, E, F (or a through f) to represent values ten to fifteen.

Its primary use is as a human-friendly representation of binary coded values, so it is often used in digital electronics and computer engineering. Since each hexadecimal digit represents four binary digits (bits)—also called a nibble—it is a compact and easily translated shorthand to express values in base two.

48. Write short notes on primary storage.

Stores and provides very fast. This memory is generally used to hold the program being currently executed in the computer, the data being received from the input unit, the intermediate and final results of the program.

The primary memory is temporary in nature. The data is lost, when the computer is switched off. In order to store the data permanently, the data has to be transferred to the secondary memory.

49. Write short notes on secondary storage.

Secondary storage is used like an archive. It stores several programs, documents, data bases etc. the programs that we run on the computer are first transferred to the primary memory before it is actually run.

Whenever the results are saved, again they get stored in the secondary memory. The secondary memory is slower and cheaper than the primary memory. Some of the commonly used secondary memory devices are Hard disk, CD, etc.,

50. List out the types of computers based on size, memory capacity.

1. Micro computers
2. Mini computers
3. Mainframe computers
4. Super computers

51. What are the major operations of computers?

A computer performs basically 5 major operations or functions irrespective of their size they are

- It accepts data or instructions by way of input.
- It stores data.
- It can process data as required by the user.
- It gives results in the form of output.
- It controls all operations inside a computer.

52. Write short notes on cache memory.

The speed of CPU is extremely high compared to the access time of main memory.

Therefore, the performance of CPU decreases due to the slow speed of main memory. To decrease the mismatch in operating speed, a small memory chip is attached between CPU and main memory whose access time is very close to the processing speed of CPU. It is called CACHE memory. CACHE memories are accessed much faster than conventional RAM. It is used to store programs or data currently being executed or temporary data frequently used by the CPU. So each memory makes main memory to be faster and larger than it really is. It is also very expensive to have bigger size of cache memory and its size is normally kept small.

53. Write the binary and octal equivalent of hexadecimal number 7BD?

Binary Equivalent of 7BD = (0111 1011 1101)₂

Octal Equivalent of 7BD = (011 110 111 101) = (3675)₈

54. Give any two tasks, which humans perform better than computers?

- Humans can communicate better than computers.
- Humans are much reliable than computers.

55. Convert binary number 100110 into its octal equivalent?

Octal equivalent of 100110 = (100 110) = (46)₈

56. What are registers?

A special, high-speed storage area within the CPU. All data must be represented in a register before it can be processed.

For example, if two numbers are to be multiplied, both numbers must be in registers, and the result is also placed in a register.

57. Differentiate analog and digital computers?

S No	Analog Computer	Digital Computer
1	Process measured data	Process discrete data
2	Analog computers are not precise	Digital computers are more precise
3	Processing speed is low.	Processing speed is high.
4	Less accuracy.	More accuracy.

58. Find the decimal equivalent of hexadecimal number 4D.C8

$$\begin{aligned} 4D.C8 &= 4 \times 16^1 + 13 \times 16^0 + 12 \times 16^{-1} + 8 \times 16^{-2} \\ &= 64 + 13 + 0.75 + 0.03125 \\ &= (77.78)_{10} \end{aligned}$$

59. Convert hexadecimal number into binary equivalent of EBC

Binary equivalent of EBC = (1110 1011 1100)₂

MIMS COLLEGE