

FUNDAMENTALS OF COMPUTING & COMPUTER PROGRAMMING

UNIT – I

INTRODUCTION TO COMPUTERS

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

2 MARKS

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?

(JAN

2009)

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. Compare Computer with calculator

| SNO | Characteristic | Calculator | Computer |
|------------|-----------------------|---|--|
| 1 | Speed | Fast | Much Fast |
| 2 | Performance | Simple Calculation and numeric processing. | Complex problem and non-numeric processing also. |
| 3 | Memory | Less internal memory, no permanent storage, temporary storage only. | Large internal memory and large permanent storage available. |
| 4 | Machine | Electronic Device. | Electronic Device. |
| 5 | Operation | Arithmetic. | Arithmetic and logical. |

10. 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. |

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

(JAN

2010)

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.

12. 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.

13. 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.

14. 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.

15. 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.

16. 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.

17. 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.

18. 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).

19. 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.

20. 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.

21. What is meant by generation in computer terminology?

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

22. 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.

23. 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.

24. 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.

25. 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.

26. 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.

The term includes:

27. 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.

28. 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.

29. 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.

30. 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.

31. 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.

32. 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.,

33. 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.

34. 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.

35. 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.

36. What are the components of the computer systems?

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

37. 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: $3 \times \frac{1}{3}$ 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.

38. What are the types of Number System?

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

39. 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 |

40. 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.

41. What is a Base?

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

42. 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

43. 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.

44. Specify the method to convert decimal number system.

1. Remainder method.
2. Power method.

45. 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.

46. 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).

47. 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:

$$112_8 = 1 \times 8^2 + 1 \times 8^1 + 2 \times 8^0$$

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

48. 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.

49. 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.

50. 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.,

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

1. Micro computers
2. Mini computers

3. Mainframe computers

4. Super computers

53. 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.

54. 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.

55. Write the binary and octal equivalent of hexadecimal number 7BD? (APR 2009)

Binary Equivalent of 7BD = $(0111\ 1011\ 1101)_2$

Octal Equivalent of 7BD = $(011\ 110\ 111\ 101) = (3675)_8$

56. Give any two tasks, which humans perform better than computers? (JAN 2009)

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

57. What is the use of computer in medicine and healthcare? (JAN 2009)

- Study of biological vision system.
- Medical Imaging.
- Mobile healthcare technology.
- Nano technology.
- Bioinformatics.

58. Convert binary number 100110 into its octal equivalent? (JAN 2009)

Octal equivalent of 100110 = $(100\ 110) = (46)_8$

59. What are registers? (JAN 2009)

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.

60. Differentiate analog and digital computers? (JAN 2010)

| 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. |

61. Find the decimal equivalent of hexadecimal number 4D.C8 (JAN 2010)

$$\begin{aligned}
 4D.C8 &= 4 \times 16^1 + 13 \times 16^0 + 12 \times 16^{-1} + 8 \times 16^{-2} \\
 &= 64 + 13 + 0.75 + 0.03125 \\
 &= (77.78)_2
 \end{aligned}$$

62. Convert hexadecimal number into binary equivalent of EBC (JAN 2010)

$$\text{Binary equivalent of EBC} = (1110\ 1011\ 1100)_2$$

12 MARKS

1. Define computer. Explain the characteristics briefly?

(MAY 2009\FEB

2009)

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.

Characteristics of Computers

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

2. With suitable examples, explain about Number systems.

(JAN 2009)

A number system is a set of rules and symbols used to represent a number. There are several different number systems. Some examples of number systems are as follows:

- Binary (base 2)
- Octal (base 8)
- Decimal (base 10)
- Hexadecimal (base 16)

Decimal and Hexadecimal numbers can each be represented using binary values. This enables decimal, hexadecimal, and other number systems to be represented on a computer which is based around binary (0 or 1 / off or on). The base (or radix) of a number system is the number of units that is equivalent to a single unit in the next higher counting space. In the decimal number system, the symbols 0-9 are used in combination to represent a number of any sizes.

For example, the number 423 can be viewed as the following string of calculations:
 $(4 \times 100) + (2 \times 10) + (3 \times 1) = 400 + 20 + 3 = 423$

3. Describe evolution of computer?

(JAN 2009 / MAY

2009)

- Abacus
- Astrolabe
- Pascaline
- Stepped Reckoner
- Difference Engine
- Analytical Engine
- Punch Cards
- ENIAC (Electrical Numerical Integrator and Calculator)
- Von Neumann Machine

4. Explain various generations of computers with features?

(FEB 2009\FEB

2010)

Generation of Computers

Each phase of computer development is known as a separate generation of computers. The computer can be classified into four generations according to their type of electronic circuits such as vacuum tube, transistor, IC etc.

(a) The First Generation Computers (1949-55)

Main Features:

- 1) The computers of this generation used vacuum tubes.
- 2) These computers used machine language for giving instructions.
- 3) They used the concept of stored program.
- 4) These computers were 5000 times faster than the MARK-I.
- 5) The first generation computers were welcomed by Government and Universities.

Limitations:

- 1) These computers were very big in size. The ENIAC machine was 30 x 50 feet in size and 30 tons in weight. So, these machines required very large space for their workings.
- 2) Their power consumption was very high.
- 3) These computers had slow operating speed and small computing capacity.
- 4) These computers had a very small memory.

(b) The Second Generation Computers (1956-65)

Main Features:

- 1) The computers of this generation replaced vacuum tubes with transistors.
- 2) Magnetic cores were invented for storage.
- 3) Different magnetic storage devices were developed in this generation.
- 4) Commercial applications were developed during this period. Eighty percent of these computers were used in business and industries.

(c) Third Generation Computers (1966-75)

Main Features:

- The third generation computers replaced transistors with 'Integrated Circuits'. These Integrated Circuits are also known as chips.
- The size of main memory was increased and reached about 4 megabytes.
- Magnetic disk technology had been improved and drive having capacity upto 100 MBPS came into existence.
- The CPU becomes more powerful with the capacity of carrying out 1 million instructions per second.
- This generation computers were relatively inexpensive and faster.
- The application area also increased in this generation. The computers were used in other areas like education, small businesses survey, analysis along with their previous usage areas.

(d) The Fourth Generation Computers (1976-Present)

Main Features:

- i. The fourth generation computers replaced small scale integrated circuits and medium scale integrated circuits with the microprocessors chip.
- ii. Semiconductor memories replaced magnetic core memories.
- iii. The hard-disks are available of the sizes upto 200 GB. The RAID technology (Redundant Array of Inexpensive Disks) gives storage upto thousands of GB.
- iv. Computer cost came down rapidly in this generation.
- v. Application of computers is increased in various areas like visualization, parallel computing, multimedia etc.

(e) The Fifth Generation Computers

Mankind along with the advancement in science and technology is working hard to bring the Vth Generation of computer. These computers will have the capability of thinking on their own like a man with the help of Artificial Intelligence (AI). The 21st century will be better, faster, smaller and smarter computers.

5. Explain the fundamental units of a computer with a block diagram?

(Or)

Explain the basic computer organization in detail?
2009\MAY 2009)

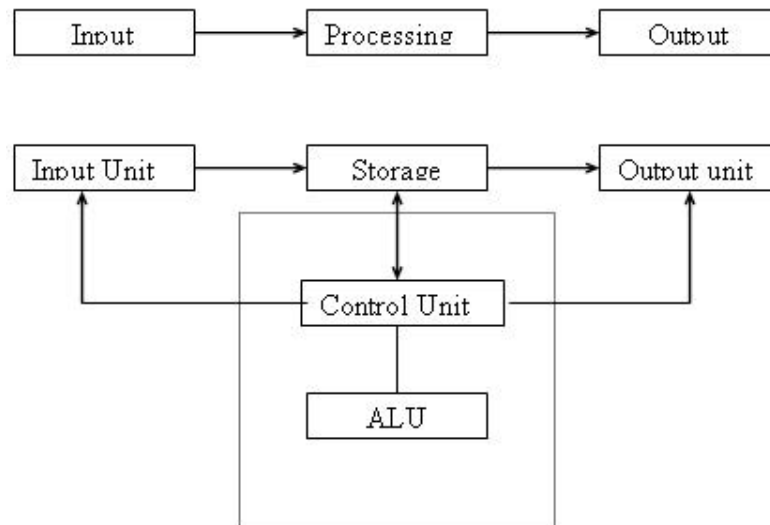
(JAN

A computer can process data, pictures, sound and graphics. They can solve highly complicated problems quickly and accurately.

Input Unit:

Computers need to receive data and instructions in order to solve any problem. Therefore we need to input the data and instructions into the computers. The input unit consists of one or more input devices. Keyboard is the one of the most commonly used input device. Other commonly used input devices are the mouse, floppy disk drive, magnetic tape, etc. All the input devices perform the following functions.

- Accept the data and instructions from the outside world.
- Convert it to a form that the computer can understand.
- Supply the converted data to the computer system for further processing.



Block Diagram of Computer

Storage Unit:

The storage unit of the computer holds data and instructions that are entered through the input unit, before they are processed. It preserves the intermediate and final results before these are sent to the output devices. It also saves the data for the later use.

Types of Storage Devices:

1. Primary Storage:

1. Stores and provides very fast.

2. 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.
3. The primary memory is temporary in nature. The data is lost, when the computer is switched off.
4. In order to store the data permanently, the data has to be transferred to the secondary memory. The cost of the primary storage is more compared to the secondary storage.

2. Secondary Storage:

1. It stores several programs, documents, data bases etc.
2. The programs that run on the computer are first transferred to the primary memory before it is actually run.
3. Whenever the results are saved, again they get stored in the secondary memory.
4. The secondary memory is slower and cheaper than the primary memory. Some of the commonly used secondary memory devices are Hard disk, CD, etc.,

Memory Size:

All digital computers use the binary system, i.e. 0's and 1's. Each character or a number is represented by an 8 bit code. The set of 8 bits is called a byte. A Character occupies 1 byte space. A numeric occupies 2 byte space. Byte is the space occupied in the memory. The size of the primary storage is specified in KB (Kilobytes) or MB (Megabyte). One KB is equal to 1024 bytes and one MB is equal to 1000KB. The size of the primary storage in a typical PC usually starts at 16MB. PCs having 32 MB, 48MB, 128 MB, 256MB memory are quite common.

Output Unit:

The output unit of a computer provides the information and results of a computation to outside world. Printers, Visual Display Unit (VDU) are the commonly used output devices. Other commonly used output devices are floppy disk drive, hard disk drive, and magnetic tape drive.

Arithmetic Logical Unit:

All calculations are performed in the Arithmetic Logic Unit (ALU) of the computer. It also does comparison and takes decision. The ALU can perform basic operations such as addition, subtraction, multiplication, division, etc and does logic operations viz, >, <, =, 'etc. Whenever calculations are required, the control unit transfers the data from storage unit to ALU once the computations are done, the results are transferred to the storage unit by the control unit and then it is send to the output unit for displaying results.

Control Unit:

It controls all other units in the computer. The control unit instructs the input unit, where to store the data after receiving it from the user. It controls the flow of data and instructions from the storage unit to ALU. It also controls the flow of results from the ALU to the storage unit. The control unit is generally referred as the central nervous system of the computer that control and synchronizes its working.

Central Processing Unit:

The control unit and ALU of the computer are together known as the Central Processing Unit (CPU). The CPU is like brain performs the following functions:

- It performs all calculations.
- It takes all decisions.
- It controls all units of the computer.

A PC may have CPU-IC such as Intel 8088, 80286, 80386, 80486, Celeron, Pentium, Pentium Pro, Pentium II, Pentium III, Pentium IV, Dual Core, and AMD etc.

**6. Explain the classification of computers?
2010)**

(MAY 2009\FEB 2009\FEB

CLASSIFICATION OF COMPUTERS

Personal Computers:

A personal computer (PC) is a self-contained computer capable of input, processing, output, and storage. A personal computer is designed to be a single-user computer and must have at least one input device, one output device, a processor, and memory. The three major groups of PCs are desktop computers, portable computers, and handheld computers. Desktop Computers: A desktop computer is a PC designed to allow the system unit, input devices, output devices, and other connected devices to fit on top of, beside, or under a user's desk or table. This type of computer may be used in the home, a home office, a library, or a corporate setting.

Portable Computers:

A portable computer is a PC small enough to be moved around easily. As the name suggests, a laptop computer fits comfortably on the lap. As laptop computers have decreased in size, this type of computer is now more commonly referred to as a notebook computer. Manufacturers recently began introducing a new type of computer called the tablet PC, which has a liquid crystal display (LCD) screen on which the user can write using a special-purpose pen, or stylus. Tablet PCs rely on digital ink technology that allows the user to write on the screen. Another type of portable computer, called a wearable computer, is worn somewhere on the body, thereby providing a user with access to mobile computing capabilities and information via the Internet.

Handheld Computers:

An even smaller type of personal computer that can fit into the hand is known as a handheld computer (also called simply handheld, pocket PC, or Palmtop). In recent years, a type of handheld computer called a personal digital assistant (PDA) has become widely used for performing calculations, keeping track of schedules, making appointments, and writing memos. Some handheld computers are Internet-enabled, meaning they can access the Internet without wire connections. For example, a smart phone is a cell phone that connects to the Internet to allow users to transmit and receive e-mail messages, send text messages and pictures, and browse through Web sites on the phone display screen.

Workstations:

A workstation is a high-performance single-user computer with advanced input, output, and storage components that can be networked with other workstations and larger computers. Workstations are typically used for complex applications that require considerable computing power and high-quality graphics resolution, such as computer-aided design (CAD), computer-assisted manufacturing (CAM), desktop publishing, and software development.

Midrange Servers:

Linked computers and terminals are typically connected to a larger and more powerful computer called a network server, sometimes referred to as a host computer. Although the size and capacity of network servers vary considerably, most are midrange rather than large mainframe computers.

(i) Midrange server – formerly known as a minicomputer, a midrange server is a powerful computer capable of accommodating hundreds of client computers or terminals (users) at the same time.

(ii) Terminal – a device consisting of only a monitor and keyboard, with no processing capability of its own.

Mainframe Computers:

Larger, more powerful, and more expensive than midrange servers, a mainframe computer is capable of accommodating hundreds of network users performing different computing tasks. These computers are useful for dealing with large, ever-changing collections of data that can be accessed by many users simultaneously. Government agencies, banks, universities, and insurance companies use mainframes to handle millions of transactions each day.

Supercomputers:

A supercomputer is the fastest, most powerful, and most expensive of all computers. Many are capable of performing trillions of calculations in a single second. Primary applications include weather forecasting, comparing DNA sequences, creating artificially intelligent robots, and performing financial analyses.

7. Describe briefly about Secondary storage devices? (MAY 2009)

Secondary storage devices, as indicated by the name, save data after it has been saved by the primary storage device, usually referred to as RAM (Random Access Memory). From the moment we start typing a letter in Microsoft Word, for example, and until we click on "Save," your entire work is stored in RAM. However, once you power off your machine, that work is completely erased, and the only copy remaining is on the secondary storage device where we saved it, such as internal or external hard disk drive, optical drives for CDs or DVDs, or USB flash drive.

Internal Hard Disk Drive

The internal hard disk drive is the main secondary storage device that stores all of your data magnetically, including operating system files and folders, documents, music and video. The hard disk drive is a stack of disks mounted one on top of the other and placed in a sturdy case. They are spinning at high speeds to provide easy and fast access to stored data anywhere on a disk.

External Hard Disk Drive

External hard disk drives are used when the internal drive does not have any free space and you need to store more data. In addition, it is recommended to always back up all of our data and an external hard drive can be very useful, as they can safely store large amounts of information. They can be connected by either USB connection to a computer and can even be connected with each other in case you need several additional hard drives at the same time.

Optical Drive

An optical drive uses lasers to store and read data on CDs and DVDs. It basically burns a series of bumps and dips on a disc, which are associated with ones and zeros. Then, this same drive can interpret the series of ones and zeros into data that can be displayed on your monitors. There are a few different types of both CD and DVD disks, but the main two types include R and RW, which stand for Recordable (but you can write information on it just once) and Rewritable (meaning you can record data on it over and over again).

USB Flash Drive

USB flash memory storage device is also portable and can be carried around on a key chain. This type of a secondary storage device has become incredibly popular due to the very small size of device compared to the amount of data it can store (in most cases, more than CDs or DVDs). Data can be easily read using the USB (Universal Serial Bus) interface that now comes standard with most of the computers.

8. Explain about memory in Computer System?

(or)

Write short notes on memory of a computer?
2009)

(MAY

The Role of Memory

The term "memory" applies to any electronic component capable of temporarily storing data. There are two main categories of memories:

Internal memory that temporarily memorizes data while programs are running. Internal memory uses micro conductors, i.e. fast specialized electronic circuits. Internal memory corresponds to what we call random access memory (RAM).

Auxiliary memory (also called physical memory or external memory) that stores information over the long term, including after the computer is turned off. Auxiliary memory corresponds to magnetic storage devices such as the hard drive, optical storage devices such as CD-ROMs and DVD-ROMs, as well as read-only memories.

Technical Characteristics

(a) **Capacity**, representing the global volume of information (in bits) that the memory can store

(b) **Access time**, corresponding to the time interval between the read/write request and the availability of the data

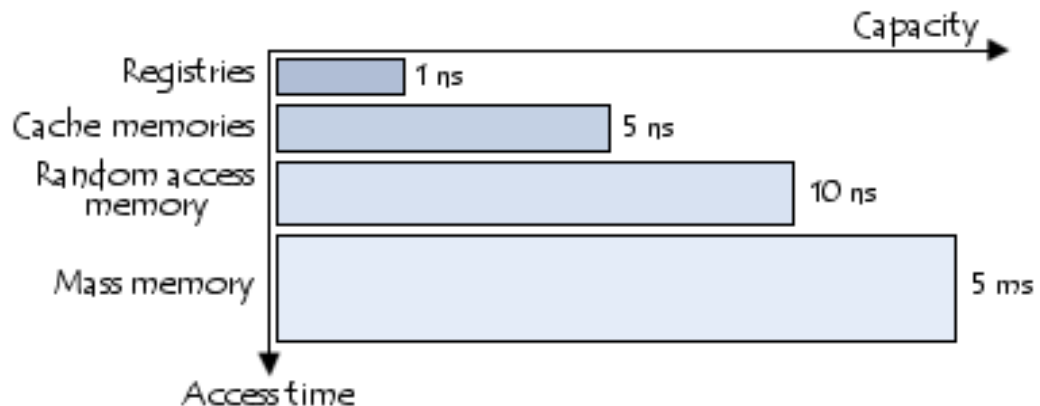
(c) **Cycle time**, representing the minimum time interval between two successive accesses

(d) **Throughput**, which defines the volume of information exchanged per unit of time, expressed in bits per second

(e) **Non-volatility**, which characterizes the ability of a memory to store data when it is not being supplied with electricity

The ideal memory has a large capacity with restricted access time and cycle time, a high throughput and is non-volatile.

However, fast memories are also the most expensive. This is why memories that use different technologies are used in a computer, interfaced with each other and organised hierarchically.



The fastest memories are located in small numbers close to the processor. Auxiliary memories, which are not as fast, are used to store information permanently.

Types of Memories

Random Access Memory

Random access memory, generally called RAM is the system's main memory, i.e. it is a space that allows you to temporarily store data when a program is running.

Unlike data storage on an auxiliary memory such as a hard drive, RAM is volatile, meaning that it only stores data as long as it is supplied with electricity. Thus, each time the computer is turned off, all the data in the memory are irremediably erased.

Read-Only Memory

Read-only memory, called ROM, is a type of memory that allows you to keep the information contained on it even when the memory is no longer receiving electricity. Basically, this type of memory only has read-only access. However, it is possible to save information in some types of ROM memory.

Flash Memory

Flash memory is a compromise between RAM-type memories and ROM memories. Flash memory possesses the non-volatility of ROM memories while providing both read and writes access. However, the access times of flash memories are longer than the access times of RAM.

9. Elaborate the various Input and Output Devices?

Input/Output devices are required for users to communicate with the computer. In simple terms, input devices bring information INTO the computer and output devices bring information OUT of a computer system. These input/output devices are also known as peripherals since they surround the CPU and memory of a computer system.

Some commonly used Input/Output devices are listed in table below.

| Input Devices | Output Devices |
|---------------|----------------|
| Keyboard | Monitor |
| Mouse | LCD |
| Joystick | Printer |
| Scanner | Plotter |
| Light Pen | |
| Touch Screen | |

(a)

Keyboard

It is a text base input device that allows the user to input alphabets, numbers and other characters. It consists of a set of keys mounted on a board.

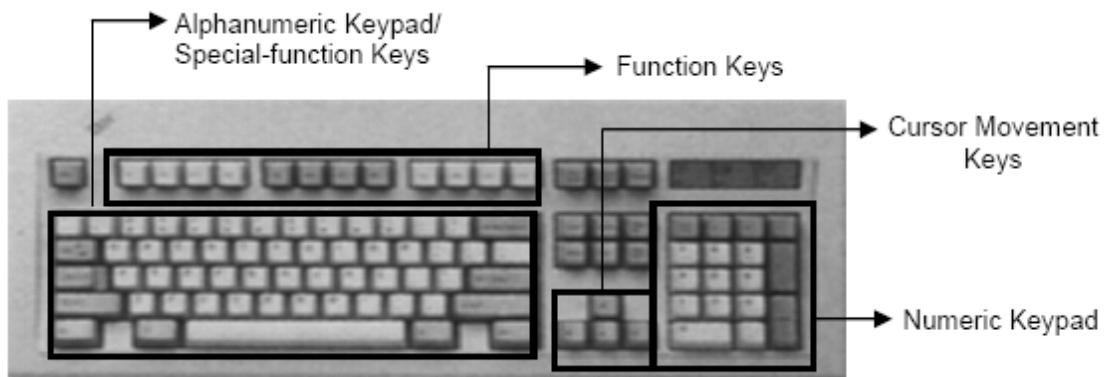


Figure 1: The Keyboard

Alphanumeric Keypad

It consists of keys for English alphabets, 0 to 9 numbers, and special characters like + - / * () etc.

Function Keys

There are twelve function keys labeled F1, F2, F3... F12. The functions assigned to these keys differ from one software package to another. These keys are also user programmable keys.

Special-function Keys

These keys have special functions assigned to them and can be used only for those specific purposes. Functions of some of the important keys are defined below.

Enter

It is similar to the 'return' key of the typewriter and is used to execute a command or program.

Spacebar

It is used to enter a space at the current cursor location.

Backspace

This key is used to move the cursor one position to the left and also delete the character in that position.

Delete

It is used to delete the character at the cursor position.

Insert

Insert key is used to toggle between insert and overwrite mode during data entry.

Shift

This key is used to type capital letters when pressed along with an alphabet key. Also used to type the special characters located on the upper-side of a key that has two characters defined on the same key.

Caps Lock

Cap Lock is used to toggle between the capital lock features. When 'on', it locks the alphanumeric keypad for capital letters input only.

Tab

Tab is used to move the cursor to the next tab position defined in the document. Also, it is used to insert indentation into a document.

Ctrl

Control key is used in conjunction with other keys to provide additional functionality on the keyboard.

Alt

Also like the control key, Alt key is always used in combination with other keys to perform specific tasks.

Esc

This key is usually used to negate a command. Also used to cancel or abort executing programs.

Numeric Keypad

Numeric keypad is located on the right side of the keyboard and consists of keys having numbers (0 to 9) and mathematical operators (+ - * /) defined on them. This keypad is provided to support quick entry for numeric data.

Cursor Movement Keys

These are arrow keys and are used to move the cursor in the direction indicated by the arrow (up, down, left, right).

(b) Mouse

The mouse is a small device used to point to a particular place on the screen and select in order to perform one or more actions. It can be used to select menu commands, size windows, start programs etc. The most conventional kind of mouse has two buttons on top: the left one being used most frequently.

Mouse Actions

Left Click : Used to select an item.

Double Click : Used to start a program or open a file.

Right Click : Usually used to display a set of commands.

Drag and Drop : It allows you to select and move an item from one location to another. To achieve this place the cursor over an item on the screen, click the left mouse button and while holding the button down move the cursor to where you want to place the item, and then release it.



Figure 2: The Mouse

(c) Joystick

The joystick is a vertical stick which moves the graphic cursor in a direction the stick is moved. It typically has a button on top that is used to select the option pointed by the cursor. Joystick is used as an input device primarily used with video games, training simulators and controlling robots



Figure 3: The Joystick

(d)Scanner

Scanner is an input device used for direct data entry from the source document into the computer system. It converts the document image into digital form so that it can be fed into the computer. Capturing information like this reduces the possibility of errors typically experienced during large data entry.



Figure 4: The Scanner

Hand-held scanners are commonly seen in big stores to scan codes and price information for each of the items. They are also termed the bar code readers.

(e) Bar codes

A bar code is a set of lines of different thicknesses that represent a number. Bar Code Readers are used to input data from bar codes. Most products in shops have bar codes on them. Bar code readers work by shining a beam of light on the lines that make up the bar code and detecting the amount of light that is reflected back



**Figure 5: The Bar
(f) Light Pen**

Code Reader

It is a pen shaped device used to select objects on a display screen. It is quite like the mouse (in its functionality) but uses a light pen to move the pointer and select any object on the screen by pointing to the object. Users of Computer Aided Design (CAD) applications commonly use the light pens to directly draw on screen.

(g) Touch Screen

It allows the user to operate/make selections by simply touching the display screen. Common examples of touch screen include information kiosks, and bank ATMs.

(h) Digital camera

A digital camera can store many more pictures than an ordinary camera. Pictures taken using a digital camera are stored inside its memory and can be transferred to a computer by connecting the camera to it. A digital camera takes pictures by converting the light passing through the lens at the front into a digital image.



Figure 6: The Digital camera

(i) The Speech Input Device

The “Microphones - Speech Recognition” is a speech Input device. To operate it we require using a microphone to talk to the computer. Also we need to add a sound card to the computer. The Sound card digitizes audio input into 0/1s .A speech recognition program can process the input and convert it into machine-recognized commands or input.

Output Devices

(a) Monitor

Monitor is an output device that resembles the television screen and uses a Cathode Ray Tube (CRT) to display information. The monitor is associated with a keyboard for manual input of characters and displays the information as it is keyed in. It also displays the program or application output. Like the television, monitors are also available in different sizes.

(b) Liquid Crystal Display (LCD)

LCD was introduced in the 1970s and is now applied to display terminals also. Its advantages like low energy consumption, smaller and lighter have paved its way for usage in portable computers (laptops).



Figure 8: The LCD

(c) Printer

Printers are used to produce paper (commonly known as hardcopy) output. Based on the technology used, they can be classified as Impact or Non-impact printers. Impact

printers use the typewriting printing mechanism wherein a hammer strikes the paper through a ribbon in order to produce output. Dot-matrix and Character printers fall under this category. Non-impact printers do not touch the paper while printing. They use chemical, heat or electrical signals to etch the symbols on paper. Inkjet, Deskjet, Laser, Thermal printers fall under this category of printers.

When we talk about printers we refer to two basic qualities associated with printers: resolution, and speed. Print resolution is measured in terms of number of dots per inch (dpi). Print speed is measured in terms of number of characters printed in a unit of time and is represented as characters-per-second (cps), lines-per-minute (lpm), or pages-per-minute (ppm).



Figure 9: The Printer

(d) Plotter

Plotters are used to print graphical output on paper. It interprets computer commands and makes line drawings on paper using multicolored automated pens. It is capable of producing graphs, drawings, charts, maps etc. Computer Aided Engineering (CAE) applications like CAD (Computer Aided Design) and CAM (Computer Aided Manufacturing) are typical usage areas for plotters.

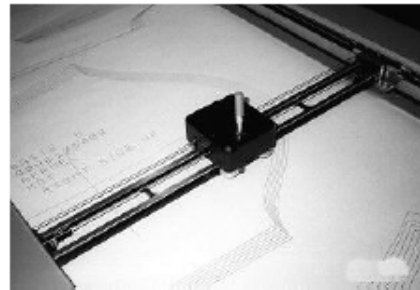


Figure 10: The Plotter

(e) Audio Output: Sound Cards and Speakers:

The Audio output is the ability of the computer to output sound. Two components are needed: Sound card – Plays contents of digitized recordings, Speakers – Attached to sound card.

10. Convert the numbers:

(a) Convert the following number to decimal

(2)

(35)₁₀ (i) (11011011.100101)₂

Answer

$(219.578125)_{10}$

(b) Convert $(231.3)_4$ to Base of 7

(4)

Answer

Step 1: Convert from Base 4 to Base 10

$(45.75)_{10}$

Step 2: Convert from Base 10 to Base 7

$(63.515)_7$

(c) Convert the following Decimal numbers to Hexadecimal numbers (3 * 2 = 6)

(i) $(35)_{10}$

Answer

$(23)_{16}$

(ii) $(275)_{10}$

Answer

$(113)_{16}$

(iii) $(31)_{10}$

Answer

$(1F)_{16}$
