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Revised Edition

Computer Awareness

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CONTENTS

CHAPTER

01

INTRODUCTION TO COMPUTER

The word 'computer' has been derived from the Latin word 'computare', which means 'to calculate'. A computer is an electronic device that manipulates information or data according to the set of instructions called **programs**. It has the ability to store, retrieve and process data.

Functions of Computer

1. **Input** Information or data that is entered into a computer is called input. It sends data and instructions to the Central Processing Unit (CPU).
2. **Processing** It is the sequence of actions taken on data to convert it into information which is meaningful to the user. It can be calculations, comparisons or decisions taken by the computer.
3. **Output** It makes processed data available to the user. It is mainly used to display the desired result to the user as per input instructions.
4. **Storage** It stores data and programs permanently. It is used to store information during the time of program execution and possible to get any type of information from it.

Features of Computer

1. **Speed** The computer can process data very fast at the rate of millions of instructions per second.
2. **Accuracy** Computers provide a high degree of accuracy. They respond to the user as per the input instructions.
3. **Storage Capacity** Computers are capable to store huge amount of data, which depends on the capacity of hard disk.
4. **Versatility** Computers can do different types of work simultaneously. They can perform multiple tasks at a same time.
5. **Diligence** Unlike human beings, a computer is free from monotony, tiredness, lack of concentration, etc., and can work for hours without creating any errors.

6. **Secrecy** Leakage of information is reduced by creating login system with password protection.
7. **Reliability** Computers are more reliable than human beings. Computers always produce exact results. The possibility of errors occur only if the input is wrong, i.e. the computers never make mistakes of their own accord.
8. **Plug and Play** Computers have the ability to automatically configure a new hardware and software components.

History of Computer

Computer is not the creation of one day, rather it took a long period for the development of modern computer.

History of computer is described in this table

Inventions	Inventors	Characteristics	Applications
Abacus **1602**	China	▪ First mechanical calculating device. ▪ A horizontal rod represents the one, tens, hundred, etc.	▪ Used for addition and subtraction operations. ▪ Calculation of square roots can also be performed.
Napier's Bones **1617**	John Napier (Scotland)	▪ Three dimensional structure. ▪ Holding numbers from 0 to 9 only. ▪ Represent graphical structure of calculating result. ▪ Technology used for calculation called **Rabdologia**.	▪ Perform multiplication of numbers.
Pascaline **1642**	Blaise Pascal (France)	▪ First mechanical adding machine. ▪ This machine worked on the principle of odometer and watch. ▪ Mainly designed with regard to the pressure of liquid.	▪ Perform addition and subtraction of two numbers.
Jacquard's Loom **1801**	Joseph Marie Jacquard (France)	▪ It was first mechanical loom. ▪ Used punched card for the sequence of operation.	▪ Simplified the process of textiles.
Analytical Engine **1837**	Charles Babbage (London)	▪ First general-purpose computer. ▪ Stored program in the form of 'pegs' also called **barrels.**	▪ It was a decimal machine used sign and magnitude for representation of a number.
Tabulating Machine **1890**	Herman Hollerith (America)	▪ It used punched cards for reading numbers. ▪ It was the first electromechanical machine.	▪ It was used in the 1890 census.
MARK-1 **1944**	Howard Aiken (America)	▪ Consists of interlocking panels of small glass, counters, switches and control circuits. ▪ Data can be entered manually.	▪ Mainly used in the war effort during World War-II. ▪ Magnetic drums are used for storage.
ENIAC **1946**	JP Eckert and JW Mauchly (America)	▪ It is a combination of twenty accumulators. ▪ First electronic digital computer.	▪ Used for weather prediction, atomic energy calculation and other scientific uses. ▪ Used in IBM and other.

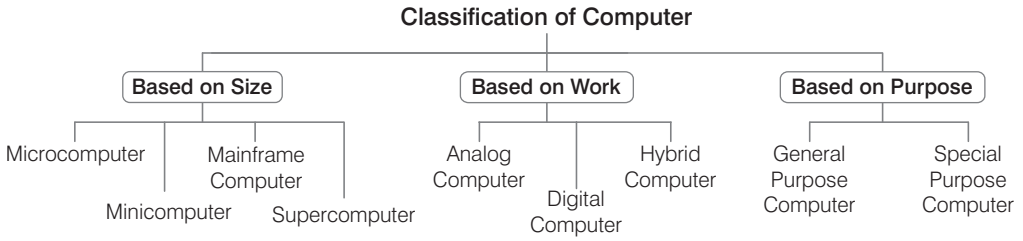
Inventions	Inventors	Characteristics	Applications
EDVAC **1947**	John Von Neumann (America)	▪ Electronic digital computer	▪ Logical design of a computer with a stored program.
EDSAC **1949**	Maurice Wilkes (America)	▪ It was the first computer which provided **storage capacity.** ▪ First computer program was run on machine.	▪ Capable of storing instructions and data in memory. ▪ Used mercury delay lines for memory, vacuum tubes for logic.
UNIVAC **1951**	J. Presper Eckert and John Mauchly (America)	▪ First general-purpose electronic computer with large amount of input and output.	▪ Used magnetic tapes as input and output. ▪ Use for account work.
IBM-650 Computer **1953**	IBM Company	▪ Provided input/output units converting alphabetical and special characters to two-digit decimal code.	▪ Payroll processing ▪ Oil refinery design ▪ Market research analysis

Generations of Computer

A generation refers to the state of improvement in the development of system. Each generation of computer is characterised by a major technological development that fundamentally changed the way, computers operate.

Generations	Switching Devices	Storage Devices/Speed	Operating Systems/ Programming Languages	Characteristics	Applications
First (1940-56)	Vacuum tubes	Magnetic drums (milli seconds)	Batch operating system /Machine language (Binary numbers 0's and 1's)	▪ Fastest computing device. ▪ Generate large amount of heat. ▪ Non-portable.	▪ Used for scientific purpose. e.g. ENIAC, UNIVAC, MARK-1, etc.
Second (1956-63)	Transistors (Made up of semiconductors)	Magnetic core technology (micro seconds)	Time sharing OS, Multitasking OS/ Assembly language, high level language	▪ More reliable and less prone to hardware failure. ▪ Portable and generate less amount of heat.	▪ Used for commercial production. e.g. PDP-8, IBM-1401, etc.
Third (1964-71)	Integrated Circuits (ICs) (Made up of silicon)	Magnetic core as primary storage medium (nano seconds)	Real-time system/ High level language (FORTRAN, COBOL, ALGOL)	▪ Consumed less power. ▪ Highly sophisticated technology required.	▪ Database management system e.g. NCR-395, B6500, etc.
Fourth (1971-Present)	Large Scale Integrated (LSI) circuit, microprocessor	Semi conductor memory, Winchester disc (pico seconds)	Time sharing /PASCAL, ADA, COBOL-74, FORTRAN IV	▪ More reliable and portable. ▪ This generation leads to better communication and resource sharing.	▪ Electronic fund transfer, Distributed system, e.g. Intel 4004 chip, Macintosh.
Fifth (Present and Beyond)	Super Large Scale Integrated (SLSI) chips	Optical disc	Knowledge Information Processing System	▪ Parallel processing. ▪ Intel core microprocessor is implemented. ▪ Enables mega chips.	▪ Artificial intelligence e.g. Robotics.

Classification of Computer



Based on Size

Microcomputer

This type of computer is the least powerful than other computers, which are based on size, yet the most widely used and is also called **portable computer**.

Some types of microcomputer are as follows

(a) **Desktop Computer or Personal Computer** (PC) This is small and relatively economical computer. This is based on the microprocessor technology (Integrated Circuit-IC).

(b) **Laptop** This computer is also known as **ultra book** or **notebook**. This is portable and lightweighted. It includes rechargeable battery, so you can work with this anywhere.

(c) **Handheld or Palmtop Computer** This is the smallest and is designed to fit into the palm. So, this is also known as **palmtop**.
It is practical for certain functions such as phone books and calendars. It uses the pen for input instead of keyboard. *For example*, PDA (Personal Digital Assistant), tablets, etc.

(d) **Workstation Computer** This computer is dedicated to a user or group of users engaged in business or professional work. It includes one or more high resolution displays and a faster processor than a Personal Computer (PC).

Nano Computer

Nano computer is a general term used to describe a computer smaller than a microcomputer, usually about the size of a credit card.

For example, Raspberry Pi, which could be used in schools to teach science to children.

Embedded Computer

It is a small size, powerful and easy to operate electronic module, based on microcontroller/ microprocessor and acts as a bridge between electronics hardware and computer software. e.g. cellphone, camera, automotive system, digital watch, etc.

Quantum Computer

Quantum computer was first introduced by Richard Feynman. It uses quantum mechanical phenomena. It is the fastest computer imitating brain working.

Minicomputer

These are smaller in size, faster and cost lower than mainframe computers. Initially, the minicomputer was designed to carry out some specific tasks, like engineering and Computer Aided Design (CAD) calculations.

But now, they are being used as central computer which is known as **server**. The speed of minicomputer is between 10 to 30 MIPS (Million Instructions Per Second). First minicomputer was PDP-8. Some examples of minicomputer are IBM-17, DEC PDP-11, HP-9000, etc.

Mainframe Computer

These types of computer having large internal memory storage and comprehensive range of software. It is considered as the heart of a network of computers or terminals that allow a large number of people to work at the same time. Some examples of mainframe computer are IBM-370, IBM-S/390, UNIVAC-1110, etc.

Supercomputer

These are the fastest and most expensive computers. They have high processing speed compared to other computers. Supercomputers are most powerful, large in size and memory, compared to all other computers.

The speed of supercomputers are measured in FLOPS (Floating Point Operations Per Second). Supercomputers are used for highly calculation intensive tasks, such as weather forecasting, nuclear research, military agencies and scientific research laboratories.

Some examples of supercomputer are described below

(i) **CRAY-1** was the world's first supercomputer introduced by Seymour R CRAY (Father of Supercomputing) in 1976.

(ii) **PARAM** was the first supercomputer developed by Vijay Bhatkar in India in 1991.

(iii) **PARAM Siddhi** is the latest machine in the series of PARAM made by C-DAC and released on 16 November, 2020.

(iv) **Pratyush**, the first multi-petaflops supercomputer was unveiled at Pune based Indian Institute of Tropical Meteorology (IITM) in India.

(v) **Fugaku** is a claimed exascale supercomputer at the RIKEN Center for Computational Science in Kobe, Japan. It is scheduled to start operating in 2021. It has defended its title as the world's fastest supercomputer.

Based on Work

On the basis of work, computer is categorised as follows

Analog Computer

These computers carry out arithmetic and logical operations by manipulating and processing of data. *For example,* Speedometers, seismograph, etc.

Analog computer can perform several mathematical operations simultaneously. It uses continuous variables for mathematical operations and utilises mechanical or electrical energy.

Digital Computer

These computers work on binary digits. A digital computer, not only performs mathematical calculations, but also combines the bytes to produce desired graphics, sounds.
For example, Desktop (PC).

Hybrid Computer

These computers are the combination of analog and digital computers. Machines used in hospitals like ECG and DIALYSIS are the commonly used hybrid computers.

Based on Purpose

On the basis of purpose, computer is categorised as follows

General Purpose Computer

General purpose computers are those computers, which are used to solve variety of problems by changing the program or instructions.

For example, To make small database, calculations, accounting, etc.

Special Purpose Computer

Special purpose computers are those computers' which are used to solve a single and dedicated type of problem.

For example, Automatic aircraft landing, multimedia computer, etc.

Tit-Bits

- **Charles Babbage** is known as the father of computer. **Alan Turing** is known as the father of the modern computer.
- **Siddhartha** was the first computer developed in India. First computer in India was installed in Indian Statistical Institute (ISI), Kolkata.
- Transistors were invented by Bell Laboratory.
- In 1958, Jack St. Clair Kilby and Robert Noyce invented the first IC (Integrated Circuit).
- ENIAC (Electronic Numerical Integrator and Computer) was the first electronic computer developed in Moore School of Engineering, USA.

QUESTION BANK

1. The word 'computer' has been derived from which of the following language?
(1) Greek (2) English
(3) Hindi (4) Latin

2. Input, output and processing devices grouped together represent a(n)
(1) mobile device
(2) information processing cycle
(3) circuit board
(4) computer system

3. Which of the following is the correct order of the four major functions of a computer?
(1) Process, Output, Input, Storage
(2) Input, Output, Process, Storage
(3) Process, Storage, Input, Output
(4) Input, Process, Output, Storage

4. Collecting the data and converting it into information is called
(1) processing (2) compiling
(3) importing (4) exporting

5. Computer cannot perform
(1) input (2) output
(3) thinking (4) processing

6. A computer cannot perform which of the following functions?
(1) Addition (2) Subtraction
(3) Bake a cake (4) Division

7. Part number, description and number of parts ordered are examples of
(1) control (2) output
(3) processing (4) feedback

8. Benefit(s) of computer is/are
(1) very fast and can store huge amount of data
(2) provide accurate output either input is correct or not
(3) think about the processing
(4) All of the above

9. A collection of unprocessed items is
(1) information (2) data **[SBI PO 2015]**
(3) memory (4) reports
(5) None of these

10. Which among the following cycle consists of input, processing, output and storage as its constituents? **[IBPS Clerk Mains 2017]**
(1) Processing (2) Output
(3) Input (4) Storage
(5) Data

11. ..... is data that has been organised and presented in a meaningful fashion. **[IBPS Clerk Mains 2017]**
(1) A process (2) Software
(3) Storage (4) Information
(5) Data

12. Data or information used to run the computer is called
(1) hardware (2) CPU
(3) peripheral (4) None of these

13. The steps and tasks needed to process data, such as responses to questions or clicking an icon, are called **[IBPS Clerk Mains 2017]**
(1) instructions
(2) the operating system
(3) application software
(4) the system unit
(5) the hardware unit

14. The earliest calculating device is
(1) calculator (2) abacus
(3) difference engine (4) analytical engine

15. Abacus can perform
(1) addition (2) subtraction
(3) multiplication (4) Both (1) and (2)

16. The Napier's technology used for calculation is called
(1) Naptologia (2) Vibologia
(3) Semiconductor (4) Rabdologia

17. Pascaline is also known as
(1) abacus (2) adding machine
(3) division machine (4) difference machine

18. Punched cards were first introduced by
(1) Powers (2) Pascal
(3) Jacquard (4) Herman Hollerith

19. Punched card is also called **[RRB NTPC 2016]**

A. Hollerith card B. Video Card
C. Sound Card D. Accelerator Card

Codes

(1) B (2) C
(3) A (4) D

20. Which of the following is known as father of computer? **[SSC CGL 2015, UPSSSC 2016]**

(1) Dennis Ritchie (2) Napier
(3) Charles Babbage (4) Alan Turing

21. Who is known as the father of the modern computer?

(1) Charles Babbage (2) Alan Turing
(3) Blaise Pascal (4) Jordan Murn

22. Analytical engine developed by

(1) Blaise Pascal (2) Charles Babbage
(3) Dennis Ritchie (4) Alan Turing

23. The analytical engine developed during first generation of computers used ..... as a memory unit.

(1) RAM (2) floppies
(3) cards (4) counter wheels

24. Tabulating machine was the first electromechanical machine developed by

(1) Herman Hollerith (2) Howard Aiken
(3) Blaise Pascal (4) John Napier

25. Who among the following created the Electronic Discrete Variable Automatic Computer (EDVAC) with a memory to hold both, a stored program as well as data? **[SSC CGL 2018]**

(1) Thomas H Flowers (2) Arthur Samuel
(3) Bletchley Park (4) John Von Neumann

26. The first computer which provides storage is

(1) EDSAC (2) EDVAC
(3) MARK-I (4) ACE

27. Name the first general purpose electronic computer.

(1) ADVAC (2) ADSAC
(3) UNIVAC (4) EDVAC

28. Computer size was very large in

(1) first generation
(2) second generation
(3) third generation
(4) fourth generation

29. First generation computers were based on

(1) transistors (2) conductors
(3) ICs (4) vacuum tubes

30. Computer built before the first generation computer was

(1) mechanical
(2) electromechanical
(3) electrical
(4) electronics

31. First generation computers used ..... language(s).

(1) machine (2) assembly
(3) Both (1) and (2) (4) high level

32. The second generation of computers was witnessed in the years from **[UPSSSC 2018]**

(1) 1940-1956 (2) 1963-1972
(3) 1957-1962 (4) 1973-Present

33. Second generation computers can be characterised largely by their use of **[SSC CGL 2018]**

(1) integrated circuits (2) vaccum tubes
(3) microprocessors (4) transistors

34. Speed of first generation computer was in

(1) nano seconds
(2) milli seconds
(3) nano-milli seconds
(4) micro seconds

35. Time sharing became possible in ..... generation of computers.

(1) first (2) second
(3) third (4) fourth

36. Third generation of computers was witnessed in the years from.....

[UPSSSC 2018]

(1) 1940-1956 (2) 1963-1972
(3) 1957-1962 (4) 1973-Present

37. Integrated Circuits or ICs were started to be used from which generation of computers? **[IBPS PO 2016]**

(1) First generation (2) Second generation
(3) Third generation (4) Fourth generation
(5) Fifth generation

38. Chip is a common nickname for a(n) **[IBPS Clerk 2014, 15]**

(1) transistor (2) resistor
(3) integrated circuit (4) semiconductor
(5) None of these

39. Integrated Circuit (IC) or chips used in computers are made with **[IBPS Clerk 2014]**

(1) copper (2) aluminium
(3) gold (4) silicon
(5) silver

40. Who developed integrated chip?

(1) Robert Nayak (2) C Babbage
(3) JS Kilby (4) CV Raman

41. A complete electronic circuit with transistors and other electronic components on a small silicon chip is called a(n)

(1) workstation (2) CPU
(3) magnetic disc (4) integrated circuit

42. PCs are considered fourth generation and contain **[SBI PO 2014]**

(1) information (2) data
(3) vacuum tubes (4) microprocessors
(5) transistors

43. Fifth generation computers do not have **[SSC MTS 2012]**

(1) speech recognition
(2) artificial intelligence
(3) very large scale integration
(4) vacuum tubes

44. Match the following.

	List I		List II
A	First generation	1.	Transistor
B	Second generation	2.	VLSI microprocessor
C	Third generation	3.	Vacuum tube
D	Fourth generation	4.	Integrated circuit

[UGC NET June 2019]

Codes

	A	B	C	D
(1)	3	4	1	2
(3)	3	1	2	4

	A	B	C	D
(2)	3	1	4	2
(4)	1	3	4	2

45. Small and cheap computers built into several home appliances are of which type? **[SSC (10+2) 2011]**

(1) Mainframes (2) Mini computers
(3) Micro computers (4) None of these

46. Desktop and personal computers are also known as

(1) supercomputers (2) servers
(3) mainframes (4) microcomputers

47. Computers that are portable and convenient to use for users who travel, are known as

(1) supercomputers
(2) minicomputers
(3) mainframe computers
(4) laptops

48. Which of the following uses a handheld operating system?

(1) A supercomputer
(2) A personal computer
(3) A laptop
(4) A PDA

49. Palmtop computer is also known as

(1) personal computer
(2) notebook computer
(3) tablet PC
(4) handheld computer

50. Which of the following is a small microprocessor based computer designed to be used by one person at a time? **[SBI Clerk 2014]**

(1) Netbook (2) Supercomputer
(3) All-in-one (4) Notebook
(5) Personal computer

51. Which of the following options correctly expresses the meaning of the term 'PCs'? **[IBPS PO 2012]**

(1) Independent computers for all working staff.
(2) Personal computers widely available to individual workers with which they can access information from layer systems and increase their personal productivity.
(3) Packed computers system formed by joining together of various computer terminals.
(4) Computer manufactured by the Pentium Company.
(5) None of the above

52. Desktop computers, laptop computers, tablets and smartphones are different types of **[SSC CGL 2018]**
(1) supercomputers
(2) mainframe computers
(3) microcomputers
(4) minicomputers

53. In the context of digital computer, which of the following pairs of digits is referred to as binary code? **[SSC CGL 2018]**
(1) 3 and 4 (2) 0 and 1
(3) 2 and 3 (4) 1 and 2

54. A central computer that holds collection of data and programs for many PCs, workstations and other computers is a
(1) supercomputer
(2) minicomputer
(3) laptop
(4) server

55. First mini computer was **[UPSSSC 2016]**
(1) PDP-8 (2) ENIAC
(3) UNISAC (4) EDVAC

56. Which of the following is generally costlier? **[IBPS Clerk 2015]**
(1) Server (2) Notebook computer
(3) Personal computer (4) Laptop computer
(5) Mainframe

57. The user generally applies ..... to access mainframe or supercomputer.
(1) terminal (2) node
(3) desktop (4) handheld

58. First computer of India is
(1) PARAM (2) Siddhartha
(3) IBM-370 (4) CRAY-1

59. Where was the first computer in India installed? **[UPSSSC 2016]**
(1) Tata Institute of Fundamental Research (TIFR), Mumbai
(2) Indian Statistical Institute (ISI), Kolkata
(3) Compunational Research Laboratory (CRL), Pune
(4) Indian Railway, New Delhi

60. First supercomputer developed in India is
(1) PARAM (2) CRAY-1
(3) PARAM ISHAN (4) EPRAM

61. Pratyush is ..... fastest supercomputer in the world.
(1) first (2) second
(3) third (4) fourth

62. Example of super computer is **[UPSSSC 2016]**
(1) CRAY-2 (2) CRAY XMP-24
(3) Tianhe-2 (4) All of these

63. Which of the following is a supercomputer developed by India? **[SSC CGL 2018]**
(1) Param Yuva 2 (2) Onshape
(3) Venngage (4) Pixir

64. In 1991, India's first indigenous supercomputer named ..... was developed by Vijay Bhatkar. **[SSC CGL 2018]**
(1) Prayas 3000 (2) Prayog 2000
(3) Param 8000 (4) Pragati 5000

65. Who among the following is called the father of supercomputing? **[SSC CGL 2018]**
(1) Ken Thompson (2) Alan Perlis
(3) Seymour Cray (4) Vint Gerf

66. India's fastest and first multi-petaflops supercomputer named Pratyush was unveiled at **[SSC CGL 2017]**
(1) Indian Space Research Organisation
(2) Indian Institute of Science, Bangalore
(3) Indian Institute of Tropical Meteorology, Pune
(4) Indian Institute of Technology, New Delhi

67. Choose the odd one out.
(1) Microcomputer (2) Minicomputer
(3) Supercomputer (4) Digital computer

68. A hybrid computer is the one having the combined properties of
(1) super and microcomputers
(2) mini and microcomputers
(3) analog and digital computers
(4) super and mini computers

69. Computer system which do not require any storage device? **[RRB NTPC 2016]**
A. Analog
B. Digital
C. Hybrid
D. Third generation computer
Codes
(1) B (2) A (3) D (4) C

70. The ..... computer is the most common type of computer. It is used to process information with quantities usually using the binary number system. **[UPSSSC 2018]**
(1) Hybrid (2) Digital
(3) Analog (4) Complex

71. Calculator works on which type of computer's work method? **[UPSSSC 2015]**
(1) Hybrid computer
(2) Analog computer
(3) Digital computer
(4) None of the above

72. Which of the following computer is mainly related to convert analog output into digital form? **[UPSSSC 2016]**
(1) Digital computer
(2) Analog computer
(3) Hybrid computer
(4) Mainframe computer

73. Which of the following is not the example of special purpose computer?
(1) Automatic aircraft landing
(2) Word processor
(3) Multimedia computer
(4) All of the above

74. Which type of computer is used in automatic aircraft landing?
(1) General purpose computer
(2) Supercomputer
(3) Special purpose computer
(4) Microcomputer

75. Which of the following is the smallest and fastest computer imitating brain working?
(1) Supercomputer **[IBPS PO 2016]**
(2) Quantum computer
(3) Param-10000
(4) IBM chips
(5) None of the above

ANSWERS

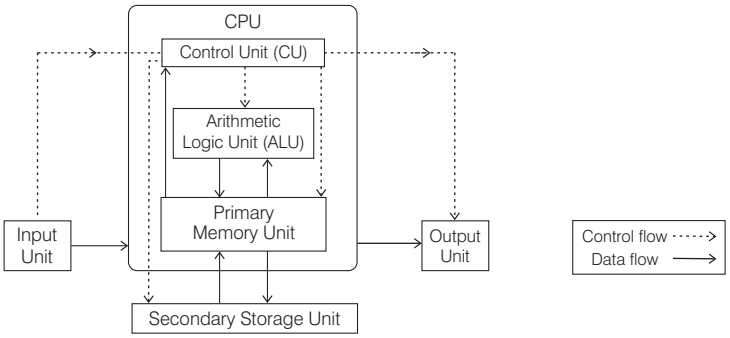
1. *(4)*	2. *(4)*	3. *(4)*	4. *(1)*	5. *(3)*	6. *(3)*	7. *(3)*	8. *(1)*	9. *(2)*	10. *(5)*
11. *(4)*	12. *(4)*	13. *(1)*	14. *(2)*	15. *(4)*	16. *(4)*	17. *(2)*	18. *(3)*	19. *(3)*	20. *(3)*
21. *(2)*	22. *(2)*	23. *(4)*	24. *(1)*	25. *(4)*	26. *(1)*	27. *(3)*	28. *(1)*	29. *(4)*	30. *(2)*
31. *(1)*	32. *(3)*	33. *(4)*	34. *(2)*	35. *(2)*	36. *(2)*	37. *(3)*	38. *(3)*	39. *(4)*	40. *(3)*
41. *(4)*	42. *(4)*	43. *(4)*	44. *(2)*	45. *(3)*	46. *(4)*	47. *(4)*	48. *(4)*	49. *(4)*	50. *(5)*
51. *(2)*	52. *(3)*	53. *(2)*	54. *(4)*	55. *(1)*	56. *(5)*	57. *(2)*	58. *(2)*	59. *(2)*	60. *(1)*
61. *(4)*	62. *(4)*	63. *(1)*	64. *(3)*	65. *(3)*	66. *(3)*	67. *(4)*	68. *(3)*	69. *(2)*	70. *(2)*
71. *(3)*	72. *(3)*	73. *(2)*	74. *(3)*	75. *(2)*					

CHAPTER

02

COMPUTER ARCHITECTURE

Computer architecture deals with the functional behaviour of a computer system as viewed by a programmer. It can also be described as the logical structure of the system unit that housed electronic components. The first computer architecture was introduced in 1970, by John Von Neumann.



Computer Architecture

Components of Computer

1. Input Unit
2. Output Unit
3. Central Processing Unit
4. Memory Unit

Note System unit is a metal or plastic case that holds all the physical parts of the computer. The components that process data are located in it.

Input Unit

The computer accepts coded information through input unit by the user. This unit is used to give required information to the computer. *For example,* keyboard, mouse, etc.

An input unit performs the following functions

- It accepts the instructions and data from the user.
- It converts these instructions and data to computer acceptable format.
- It supplies the converted instructions and data to the computer system for further processing.

Output Unit

This unit sends the processed results to the user. It is mainly used to display the desired result to the user as per input instructions.

For example, monitor, printer, plotter, etc.

The following functions are performed by an output unit

- It accepts the results produced by the computer which are in coded form and hence cannot be easily understood by user.
- It converts these coded results to readable form which convenient to users.
- It produces the converted results to the user.

Central Processing Unit (CPU)

Central Processing Unit is often called the **brain of computer**. The CPU is fabricated as a single Integrated Circuit (IC) and is also known as **microprocessor**.

It consists a set of registers, arithmetic logic unit and control unit, which together interpret and execute instructions in assembly language.

The primary functions of the CPU are as follows

- The CPU transfers instructions and input data from main memory to registers.
- The CPU executes the instructions in the stored sequence.
- When necessary, CPU transfers output data from registers to main memory.

A CPU controls all the internal and external devices and performs arithmetic and logic operations.

The CPU consists of following main sub-systems

Arithmetic Logic Unit (ALU)

ALU contains the electronic circuitry that executes all arithmetic and logical operations on the available data. ALU uses **registers** to hold the data that is being processed.

Most ALUs can perform the following operations

(i) Logical operations (AND, NOT, OR, XOR).

(ii) Arithmetic operations (addition, subtraction, multiplication and division).

(iii) Bit-shifting operations (shifting or rotating a word by a specified number of bit to the left or right with or without sign extension).

(iv) Comparison operations (=, <, < =, >, > =)

Registers

These are used to quickly accept, store and transfer data and instructions that are being used immediately by the CPU. These registers are the top of the memory hierarchy and are the fastest way for the system to manipulate data. The number and size of registers vary from processor-to-processor.

Control Unit (CU)

CU coordinates with the input and output devices of a computer. It directs the computer to carry out stored program instructions by communicating with the ALU and the registers. It organises the processing of data and instructions.

The basic function of control unit is to fetch the instruction stored in the main memory, identify the operations and the devices involved in it and accordingly generate control signals.

Memory Unit

This unit is responsible to store programs or data on a temporary or permanent basis. It has primary memory (main memory) and secondary memory (auxiliary memory).

The input data which is to be processed is brought into main memory before processing.

Another kind of memory is referred to as secondary memory of a computer system. This unit is used to permanently store data, programs and output. This unit does not deal directly with the CPU.

Microprocessor

It is the controlling element in a computer system and is sometimes referred to as the chip. Microprocessor is the main hardware that drives the computer.

It is a large **Printed Circuit Board** (PCB), which is used in all electronic systems such as computer, calculator, digital system, etc. The speed of CPU depends upon the type of microprocessor used.

Intel 4004 was the first microprocessor made by Intel in 1971 by scientist Ted Hoff and engineer Frederico Faggin.
Some of the popular microprocessors are Intel, Intel Core i7, Intel Core i9, Dual Core, Pentium IV, etc.

Motherboard

The main circuit board contained in any computer is called a motherboard. It is also known as the main board or logic board or system board or planar board.

All the other electronic devices and circuits of computer system are attached to this board like, ROM, RAM, expansion slots, PCI slots and USB ports. It also includes controllers for devices like the hard drive, DVD drive, keyboard and mouse.

Components on Motherboard

(i) CMOS battery (ii) BIOS chip
(iii) Fan (iv) Expansion slot
(v) SMPS (vi) PCI slot
(vii) Processor chip (viii) Buses

Interconnection of Units

CPU sends data, instructions and information to the components inside the computer as well as to the peripheral devices attached to it.

A **bus** is a set of wires used for interconnection, where each wire can carry one bit of data.

In other words, bus is a set of electronic signal pathways that allows information and signals to travel between components inside or outside of a computer.

A computer bus can be divided into two types

1. **Internal Bus** The internal bus connects components inside the motherboard like CPU and system memory. It is also called the **system bus**.

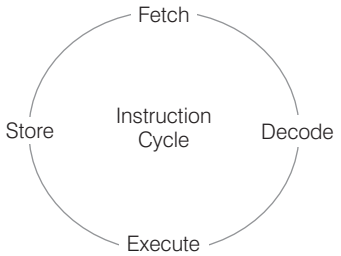
Internal bus includes following buses

(i) The command to access the memory or the I/O devices is carried by the **control bus**.
(ii) The address of I/O devices or memory is carried by the **address bus**.
(iii) The data to be transferred is carried by the **data bus**.

2. **External Bus** It connects the different external devices; peripherals, expansion slots, I/O ports and drive connections to the rest of computer. It is also referred to as the **expansion bus**.

Instruction Cycle

It represents the sequence of events that takes place as an instruction is read from memory and executed.



A simple instruction cycle consists of the following steps

1. **Fetching** the instruction from the memory.
2. **Decoding** the instruction for operation.
3. **Executing** the instruction.
4. **Storing** in memory.

In above steps, steps 1 and 2 instructions are same and known as fetch cycle and steps 3 and 4 instructions are different and known as execute cycle.

Tit-Bits

- **UPS** (Uninterruptible Power Supply) is an electrical apparatus that provides emergency power to a load when the input power source or mains power fails.
- **Power strip** is an electrical device that is used to expand the capacity of a wall outlet in terms of the number of devices it can accommodate.
- **Instruction code** is a group of bits that instruct the computer to perform a specific operation.

QUESTION BANK

1. ..... forms the backbone for building successful computer system.
(1) Computer architecture
(2) Computer model
(3) Computer instructions
(4) None of the above

2. The first computer architecture was introduced in
(1) 1970 (2) 1968 (3) 1971 (4) 1973

3. Which circuit board is used in all electronic systems such as computer, calculators, digital system?
(1) Architecture (2) Printer
(3) Value (4) Register

4. The system unit
(1) coordinates input and output devices
(2) is the container that houses electronic components
(3) is a combination of hardware and software
(4) controls and manipulates data

5. Which of the following is metal or plastic case that holds all the physical parts of the computer? **[IBPS Clerk Mains 2017]**
(1) System unit (2) CPU
(3) Mainframe (4) Platform
(5) Microprocessor

6. The components that process data are located in which of the following? **[IBPS Clerk Mains 2017]**
(1) Input devices (2) Output devices
(3) System unit (4) Storage component
(5) Expansion board

7. Which of the following is not responsible for the performance of the computer? **[IBPS Clerk Mains 2017]**
(1) Number of keys in the keyboard
(2) Format of the video/graphics word
(3) Memory in the video/graphics word
(4) The clock speed of the processor
(5) Number of cores available in the processor

8. A(n) ..... device is any device that provides information, which is sent to the CPU.
(1) input (2) output
(3) CPU (4) memory

9. Which of the following includes as a type of input?
(1) Data (2) Programs
(3) Commands (4) User response
(5) All of these

10. Information that comes from external source and fed into computer software is called **[IBPS RRB PO Mains 2017]**
(1) output (2) input
(3) throughout (4) reports
(5) process

11. Input unit converts data in computer in ..... form.
(1) suitable (2) acceptable
(3) understandable (4) rejectable

12. This unit sends the processed results to the user.
(1) Input (2) Output
(3) Memory (4) CPU

13. Output unit includes
(1) plotter (2) printer
(3) monitor (4) All of these

14. This component is required to process data into information and consists of integrated circuits.
(1) Hard disk (2) RAM
(3) CPU (4) ROM

15. The Central Processing Unit (CPU) in a computer consists of
(1) input, output and processing
(2) control unit, primary storage and secondary storage
(3) control unit, arithmetic logic unit, memory unit
(4) All of the above

16. Which instruction is used for loading data into CPU accumulator register from memory?
(1) Load (2) Storage
(3) Machine (4) Access

17. Where does computer add and compare data?
(1) Hard disc (2) Floppy disc
(3) CPU (4) Memory chip

18. In computer, which of the following unit is responsible for processing and also known as brain of computer? **[SSC CGL 2019]**
(1) CPU (2) Keyboard
(3) Hard disk (4) RAM

19. The main job of a CPU is to
(1) carry out program instructions
(2) store data/information for further use
(3) process data and information
(4) Both (1) and (3)

20. The main purpose of time-sharing techniques used in computers is to make the best use of the
(1) CPU (2) peripherals
(3) secondary storage (4) floppy discs

21. The CPU is made up of two smaller components
(1) ALU and CU (2) ALU and RAM
(3) RAM and ROM (4) RAM and CU

22. The CPU comprises of control, memory and ..... units.
(1) microprocessor (2) arithmetic/logic
(3) output (4) ROM

23. What is the responsibility of the logical unit in the CPU of a computer? **[IBPS Clerk 2015]**
(1) To produce result
(2) To compare numbers
(3) To control flow of information
(4) To do maths work
(5) None of the above

24. Which unit of computer helps in communication between the memory and the arithmetic logical unit? **[IBPS RRB PO Mains 2017]**
(1) CMU (2) CCU
(3) UPS (4) CPU
(5) ALU

25. Which part of the computer is used for calculating and comparing?
(1) ALU (2) Control unit
(3) Disc unit (4) Modem

26. Pick the one that is used for logical operations or comparisons such as less than, equal to or greater than etc.
(1) ALU (2) CU (3) Input unit (4) MU

27. What does ALU in computing denote? **[UPSSSC 2016, IBPS Clerk 2014]**
(1) Application and Logic Unit
(2) Algorithm Logic Unit
(3) Arithmetic Layered Unit
(4) Arithmetic Legal Unit
(5) Arithmetic Logic Unit

28. How many types of arithmetic operations does the ALU of computer perform?
(1) 4 (2) 2 (3) 5 (4) 8

29. Processors contain a control unit and a/an **[SSC CGL 2016]**
(1) Control unit
(2) Primary storage unit
(3) Input unit
(4) Arithmetic logic unit

30. Which of the following executes the computer commands?
(1) Arithmetic unit (2) Logic unit
(3) Both (1) and (2) (4) Control unit

31. Which unit is a combinational digital electronic circuit that performs arithmetic and bitwise operations on integer binary numbers? **[IBPS RRB PO Mains 2017]**
(1) BOU (2) AEU (3) CPU (4) ALU
(5) UPS

32. Internal memory in a CPU is nothing but
(1) a set of registers (2) a set of ALU
(3) microprocessor (4) bus

33. Which among the following is a small set of data holding place that is a part of the computer processor and may hold an instruction, a storage address, or any kind of data? **[IBPS RRB PO Mains 2017]**
(1) Register (2) WAN
(3) Bus (4) Address
(5) Processor

34. The portion of the CPU that coordinates the activities of all the other computer components is the **[SBI PO 2015]**
(1) motherboard (2) coordination board
(3) control unit (4) arithmetic logic unit
(5) None of these

35. Which among the following is an important circuitry in a computer system that directs the operation of the processor? **[IBPS PO 2016]**
(1) Memory (2) Address Bus
(3) Accumulator (4) ALU
(5) Control unit

36. The part of a computer that coordinates all its functions, is called **[IBPS Clerk Mains 2017]**
(1) ROM program (2) System board
(3) Arithmetic logic unit (4) Control unit
(5) None of these

37. The control unit controls other units by generating
(1) control signal (2) timing signal
(3) transfer signal (4) command signal

38. Control unit of a digital computer is often called the
(1) clock (2) nerve centre
(3) Both (1) and (2) (4) IC

39. Memory unit that communicates directly with the CPU is called the
(1) main memory (2) secondary memory
(3) auxiliary memory (4) register

40. CPU retrieves its data and instructions from
(1) secondary memory (2) auxiliary memory
(3) main memory (4) All of these

41. Which computer memory is used for storing programs and data currently being processed by the CPU?
(1) Mass memory (2) Internal memory
(3) Non-volatile memory (4) PROM

42. The I/O processor has a direct access to ..... and contains a number of independent data channels.
(1) main memory (2) secondary memory
(3) cache (4) flash memory

43. The word 'computer' usually refers to the central processing unit plus
(1) external memory (2) internal memory
(3) input devices (4) output devices

44. Who invent the first microprocessor?
(1) Vint Cerf (2) Terence Percival
(3) John Mauchly (4) Ted Hoff

45. A microprocessor is the brain of the computer and is also called a **[RBI Grade B 2014]**
(1) microchip (2) macrochip
(3) macroprocessor (4) calculator
(5) software

46. Microprocessors can be used to make
(1) computer (2) digital system
(3) calculators (4) All of these

47. High power microprocessor is
(1) Pentium, Pentium pro **[UPSSSC 2019]**
(2) Pentium II and III
(3) Pentium II
(4) All of the above

48. The microprocessor of a computer
(1) does not understand machine language
(2) understands machine language and high level language
(3) understands only machine language
(4) understands only high level languages

49. The CPU and memory are located in which of the following devices? **[IBPS Clerk Mains 2017]**
(1) Motherboard (2) Expansion board
(3) Storage device (4) Output device
(5) System unit

50. Personal computers use a number of chips mounted on a main circuit board. What is the common name for such boards?
(1) Daughterboard
(2) Motherboard
(3) Broadboard
(4) None of the above

51. Which of the following are the components that reside on motherboard?
(1) CMOS battery (2) Fan
(3) PCI slot (4) All of these

52. A ..... is the main Printed Circuit Board (PCB) in a computer. **[SSC CGL 2018]**
(1) ROM (Read Only Memory)
(2) CPU (Central Processing Unit)
(3) RAM (Random Access Memory)
(4) Motherboard

53. Which one among the following is a main system board of a computer? **[SSC CGL 2017]**
(1) CPU (2) Keyboard
(3) Microchip (4) Motherboard

54. The communication line between CPU, memory and peripherals is called a
(1) bus (2) line (3) media (4) All of these

55. A physical connection between the microprocessor memory and other parts of the micro computer is known as
(1) path (2) address bus
(3) route (4) All of these

56. The read/write line belongs to
(1) the data bus (2) the control bus
(3) the address bus (4) CPU bus

57. The name of the location of a particular piece of data is its
(1) address (2) memory name
(3) storage (4) data location

58. Which of the following is used to connect the different external devices?
(1) Address bus (2) Data bus
(3) Control bus (4) External bus

59. A computer executes program in the sequence of **[RRB NTPC 2016]**
A. Execute, Fetch, Decode
B. Store, Fetch, Execute
C. Fetch, Decode, Excecute
D. Decode, Fetch, Execute
(1) D (2) A
(3) C (4) B

60. Which is not an integral part of computer? **[SBI Clerk 2012]**
(1) CPU (2) Mouse
(3) Monitor (4) UPS
(5) None of these

61. A device that not only provides surge protection, but also furnishes the computer with battery backup power during a power outage is **[IBPS RRB PO Mains 2017]**
(1) battery strip
(2) UPS
(3) surge strip
(4) USB
(5) memory

62. What is a power strip? **[UPSSSC 2019]**
(1) It is an electrical device that is used to expand the capacity of a wall outlet which can accommodate the devices.
(2) It plugs multiple components into one power outlet.
(3) It provides power supply for electronic devices.
(4) It is used to increase the magnitude of voltage/current/power of an input signal.

ANSWERS

1. *(1)*	2. *(1)*	3. *(1)*	4. *(2)*	5. *(1)*	6. *(3)*	7. *(1)*	8. *(1)*	9. *(5)*	10. *(2)*
11. *(2)*	12. *(3)*	13. *(4)*	14. *(3)*	15. *(3)*	16. *(1)*	17. *(3)*	18. *(1)*	19. *(4)*	20. *(1)*
21. *(1)*	22. *(2)*	23. *(2)*	24. *(4)*	25. *(1)*	26. *(1)*	27. *(5)*	28. *(1)*	29. *(4)*	30. *(3)*
31. *(4)*	32. *(1)*	33. *(1)*	34. *(3)*	35. *(5)*	36. *(4)*	37. *(1)*	38. *(2)*	39. *(1)*	40. *(3)*
41. *(2)*	42. *(1)*	43. *(1)*	44. *(4)*	45. *(1)*	46. *(4)*	47. *(4)*	48. *(3)*	49. *(1)*	50. *(2)*
51. *(4)*	52. *(4)*	53. *(4)*	54. *(1)*	55. *(2)*	56. *(2)*	57. *(1)*	58. *(4)*	59. *(3)*	60. *(4)*
61. *(2)*	62. *(1)*								

CHAPTER

03

COMPUTER HARDWARE

Computer hardware refers to the physical components of a computer that can be seen and touched by the user. The hardware component could be an electronic, electrical and mechanical devices used in the computer system.

Input Devices

An input device can be defined as an electro-mechanical device that allows the user to feed data into the computer. This data is useful for analysis and storage and to give commands to the computer.

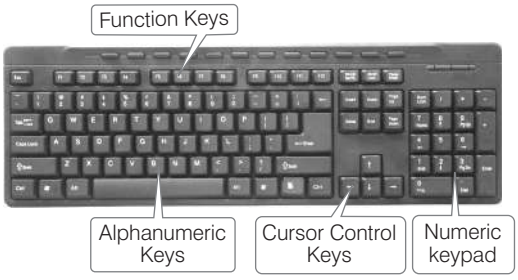
The data is entered into the main memory through these input devices. They accept instructions from the user and convert these accepted instructions into machine language.

Some of the commonly used input devices are described below

Keyboard

Keyboard is used to enter data or information in a computer system, which may be in numeric form or alphabetic form. When key is pressed, keyboard interacts with a keyboard controller and keyboard buffer. Keyboard controller stores the code of pressed key in keyboard buffer. The user can type text and command using this device. The layout of the keyboard was borrowed from the regular typewriter with some additional keys.

There are different types of keyboard such as QWERTY, DVORAK and AZERTY.



Keyboard