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COMPUTER

CHAPTER 3

Generations of Computers

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COMPUTER · CHAPTER 3

Generations of Computers

ਜੈਨਰੇਸ਼ਨਜ਼ ਆਫ ਕੰਪਿਊਟਰਸ

IN THIS CHAPTER

- First Generation Computers (1946–1959)
- Second Generation Computers (1959–1965)
- Third Generation Computers (1965–1971)
- Fourth Generation Computers (1971–1980)
- Fifth Generation Computers (1980–Present)
- Important Personal Computer History

A **Generation of Computers** refers to a stage in the development of computer technology. Each generation introduced significant improvements in electronic components, speed, memory, storage, size, reliability, and programming capabilities.

The evolution of computer generations mainly depended on the advancement of electronic circuits:

Vacuum Tubes

↓

Transistors

↓

Integrated Circuits (ICs)

↓

Microprocessors (VLSI)

↓

Artificial Intelligence & ULSI

As technology advanced, computers became:

- ✔ Smaller in size
- ✔ Faster in processing
- ✔ More reliable
- ✔ Less expensive
- ✔ More powerful

1. FIRST GENERATION COMPUTERS (1946–1959)

Main Technology

Vacuum Tubes:Vacuum tubes were used as the main electronic components for processing and memory.

Input Devices

- Punch Cards
- Paper Tape

Output Devices

- Magnetic Tape
- Paper Tape

Internal Storage

- Magnetic Drum

Programming Language

Machine Language :(Binary language consisting of only:

- 0
- 1

Operating System

Batch Processing System

Jobs were processed one after another without user interaction.

Popular First Generation Computers

- ENIAC
- EDVAC
- UNIVAC-I
- IBM-701
- IBM-650

Exam Points

- ✔ Vacuum Tubes used
- ✔ Machine Language used
- ✔ Magnetic Drum memory
- ✔ ENIAC belongs to First Generation

2. SECOND GENERATION COMPUTERS (1959–1965)

Main Technology

Transistors:The transistor was invented at Bell Laboratories.Transistors replaced vacuum tubes.

Memory

Primary Memory

- Magnetic Core Memory

Secondary Storage

- Magnetic Disk
- Magnetic Tape

Programming Languages

Assembly Language:High-Level Languages

- COBOL
- FORTRAN

Operating Systems

- Batch Processing
- Multiprogramming

Popular Second Generation Computers

- IBM 1620
- IBM 7094
- CDC 1604
- CDC 3600
- UNIVAC 1108

Exam Points

- ✔ Transistors replaced Vacuum Tubes
- ✔ COBOL and FORTRAN introduced
- ✔ Magnetic Core Memory used

3. THIRD GENERATION COMPUTERS (1965–1971)

Main Technology

Integrated Circuits (ICs) Invented by Jack Kilby (Robert Noyce independently developed it too), ICs replaced transistors.

A single IC could contain many transistors on a small chip.

Memory

Primary Storage

- Magnetic Core Memory

Important Developments

- Keyboard Introduced
- Monitor Introduced
- Mini Computers Introduced

Operating Systems

- Multiprogramming
- Time Sharing
- Remote Processing

Programming Languages

- FORTRAN II–IV
- COBOL
- PASCAL
- PL/1
- ALGOL-68

Popular Third Generation Computers

- IBM 360 Series
- IBM 370/168
- Honeywell 6000 Series
- PDP (Programmed Data Processor)
- TDC-316

Exam Points

- ✓ ICs introduced
- ✓ Jack Kilby invented IC
- ✓ Keyboard and Monitor introduced
- ✓ Mini Computers introduced

4. FOURTH GENERATION COMPUTERS (1971–1980)

Main Technology

VLSI (Very Large Scale Integration) :Millions of transistors were placed on a single chip.

Most Important Development

- Microprocessor Introduced
- A complete CPU was placed on a single chip.

Operating Systems

- Real-Time OS
- Time Sharing OS
- Distributed OS

Programming Languages

- C
- C++
- Database Languages

Major Developments

- GUI (Graphical User Interface)
- Mouse
- Handheld Devices

- Microcomputers
- Personal Computers (PCs)

Important Historical Events

- 1981: IBM introduced the IBM PC.
- 1984: Apple introduced the Macintosh with GUI.

Popular Fourth Generation Computers

- DEC 10
- PDP 11
- CDC STAR-100
- CRAY-1
- CRAY X-MP

Exam Points

- ✓ Microprocessor introduced
- ✓ Personal Computers introduced
- ✓ GUI introduced
- ✓ Mouse became popular

5. FIFTH GENERATION COMPUTERS (1980–PRESENT)

Main Technology

ULSI(Ultra Large Scale Integration):ULSI chips contain millions to billions of electronic components.

Main Focus

Artificial Intelligence (AI)

Programming Languages

- C
- C++
- Java
- .NET
- Python
- AI Languages

Examples

- Desktop Computers
- Laptops
- Notebooks
- Ultrabooks
- Chromebooks
- AI-Based Systems

Exam Points

- ✔ AI is the hallmark of Fifth Generation
- ✔ ULSI technology used
- ✔ Parallel Processing used

IMPORTANT PERSONAL COMPUTER HISTORY

Commodore PET

The first complete personal computer was Commodore PET Introduced in January 1977

Apple II

Soon after Commodore PET, Apple introduced Apple II which became highly popular.

IBM PC

In 1981, IBM (International Business Machines) introduced IBM PC

IBM PC became the most successful personal computer and established the PC standard used today.

COMPARISON OF ALL GENERATIONS

Feature	First	Second	Third	Fourth	Fifth
Period	1946-1959	1959-1965	1965-1971	1971-1980	1980-Present
Technology	Vacuum Tubes	Transistors	ICs	Microprocessor (VLSI)	ULSI + AI
Size	Very Large	Large	Smaller	Compact	Very Compact
Speed	Slow	Faster	High	Very High	Extremely High
Programming	Machine Language	Assembly, COBOL, FORTRAN	High-Level Languages	C, C++	Java, Python, AI Languages

MEMORY TRICK FOR GENERATIONS

V-T-I-M-A

V → Vacuum Tubes

T → Transistors

I → Integrated Circuits

M → Microprocessor

A → Artificial Intelligence

IMPORTANT INVENTORS TO REMEMBER

Inventor	Contribution
Charles Babbage	Analytical Engine
Alan Turing	Father of Computer Science
Blaise Pascal	Pascaline
Jack Kilby	Integrated Circuit (IC)
Mauchly & Eckert	ENIAC
Bell Laboratories	Transistor

MOST IMPORTANT FACTS FOR COMPETITIVE EXAMS

- ✔ First Generation used Vacuum Tubes.
- ✔ Second Generation used Transistors.
- ✔ Third Generation used ICs.
- ✔ Jack Kilby invented the Integrated Circuit.
- ✔ Fourth Generation introduced Microprocessors.
- ✔ IBM PC was introduced in 1981.
- ✔ Apple Macintosh popularized GUI.
- ✔ Fifth Generation focuses on Artificial Intelligence.
- ✔ ULSI technology is associated with Fifth Generation.
- ✔ ENIAC belongs to First Generation.
- ✔ COBOL and FORTRAN were important Second Generation languages.
- ✔ Keyboard and Monitor became common in Third Generation.
- ✔ Personal Computers emerged in Fourth Generation.