COMPUTER STUDIES

FORM 3

KAMUZU BARRACKS COMMUNITY DAY SECONDARY SCHOOL

HISTORY OF COMPUTER DEVELOPMENT

Computers can be traced back to the time human beings were struggling to invent non electronic tools that would simplify arithmetic operations such as Abacus and Napier's bones.

Non-electronic computing devices

- These are tools that were used to perform **arithmetic** computations manually or mechanically.
- Examples of Non-electronic computing devices include: ***sticks***, ***stones***, ***abacus***, ***bones***, etc.

Abacus

- This is a Chinese counting instrument which dates back to 3000 BC.
- Has bead-like parts that move along rods.
- Each bead above the middle bar stands for five units while each bead below stands for one unit, Figure 1 illustrates the Abacus.

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HISTORY OF COMPUTER DEVELOPMENT

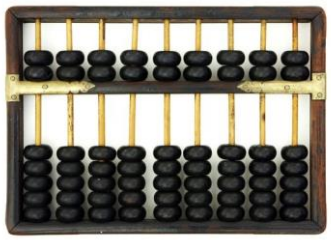

***Figure 1**: Abacus*

Napier's Bones

- Developed by a Scottish mathematician called **John Napier** in the 17th century.
- Used for performing **multiplication** and **division**.
- Figure 2, shows Napier's bones

HISTORY OF COMPUTER DEVELOPMENT

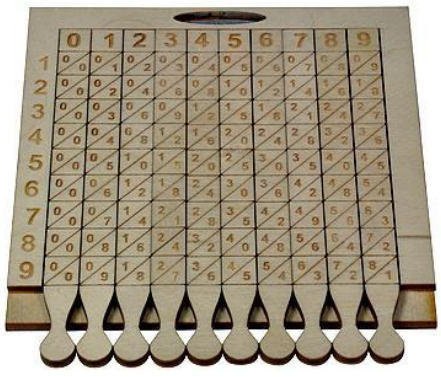

***Figure 2:** Napier's Bones*

HISTORY OF COMPUTER DEVELOPMENT

La Pascaline Machine

- This is a counting machine that was made by **Blaise Pascal** in the 17th Century.
- Used to perform **addition** and **subtraction** calculations.
- Figure 3, shows La Pascaline Machine

Figure 3: *La Pascaline Machine*

HISTORY OF COMPUTER DEVELOPMENT

The Analytical Engine

- Developed by an English mathematician, **Charles Babbage** in 1832.
- The machine was not implemented due to technological limitations at that time.
- However, the engine is recognised as the first ***real computer*** and ***Babbage as the father of computing***.
- Figure 4 depicts a prototype of how the analytical engine would have looked like.

HISTORY OF COMPUTER DEVELOPMENT

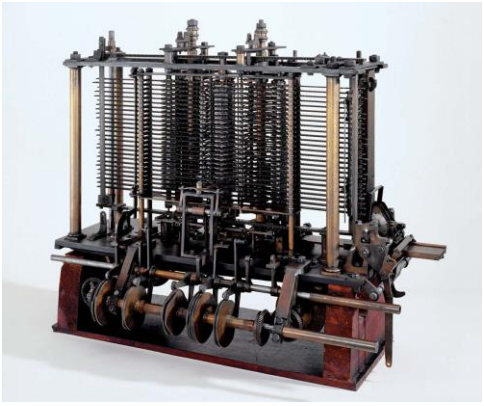

Figure 4: *Analytical engine prototype*

ELECTRONIC COMPUTERS AND THEIR GENERATIONS

1. **First generation computers (1940's to 1958)**
   - In this generations computers were **very large** (physically) and used thousands of electronic gadgets called **vacuum tubes** or **thermionic valves**.
   - These computers also:
     - Consumed a lot of power.
     - Emitted a lot of heat
     - Constantly broke down.
   - Examples of first generation computers include:
     - **ENIAC** – Electronic Numeric Integration and Calculator.
     - **EDVAC** – Electronic Discrete Variable Automatic Computer.

ELECTRONIC COMPUTERS AND THEIR GENERATIONS

Figure 5: *First generation vacuum tubes*

ELECTRONIC COMPUTERS AND THEIR GENERATIONS

2. Second generation computers (1958 to 1964)

- Second generation computers operated using **tiny solid-state** electronic devices called **transistors** that were much smaller than vacuum tubes.
- Second generation computers also:
  - Produced less heat.
  - Smaller in size.
  - Much faster.
  - They were more reliable than the first generation computers.
- Examples of second generation computers include:
  - IBM 1401 and 7070, UNIVAC 1107, ATLAS LEO Mark III and Honeywell 200.

ELECTRONIC COMPUTERS AND THEIR GENERATIONS

3. Third generation computers (1964 to 1970)

- Computers of this generation used electronic devices called **Integrated Circuits (IC's).**
- An IC consist of thousands of small transistor circuits packed on a semiconductor called a **silicon chip**.
- Characteristics of third generation computers include:
  - Less heat emission.
  - Much faster processing
  - Smaller in size
  - Easier to program, use and maintain
- Examples of third generation computers include:
  - IBM 360 and ICL 19000 series

ELECTRONIC COMPUTERS AND THEIR GENERATIONS

Figure 6: *Integrated circuit on silicon chip*

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ELECTRONIC COMPUTERS AND THEIR GENERATIONS

4. Fourth generation computers (1970 to Present)

- Due to technological improvements, the silicon chip was designed by compressing more tiny circuits and transistors into a smaller space.
- This design produced what is called **Large Scale Integrated (LSI)** and **Very Large Scale Integrated (VLSI)** circuits which were used in the development of the brain of the computer called the microprocessor.
- The computers in this generation were characterised by:
  - Very low emission of heat.
  - Smaller in size.
  - Easier to use and maintain.
- Examples of fourth generation computers include:
  - IBM 370 and 43000, Honeywell DPS-88 and Burroughs 7700

ELECTRONIC COMPUTERS AND THEIR GENERATIONS

Figure 7: *Very Large Scale Integrated Circuit*

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ELECTRONIC COMPUTERS AND THEIR GENERATIONS

5. Fifth generation computers

- Today's computers falls in this generation. The computers of this generation are characterised by:
  - Very high processing power and speed than their predecessors.
  - Very small in size.
  - Artificial Intelligence.
  - Connectivity to the internet
  - Superior hardware and software
- Examples of fifth generation computers include:
  - Intel Pentium inside, Intel CORE i5 vPro inside, AMD Athlon, and AMD Ryzen
- **Artificial Intelligence** refers to the computing capability that emulate human intelligence.

USES OF FIRST COMPUTERS

COMPUTER GENERATION	FEATURES	USES
1st Generation Computers	Built during the 1st world war (WW1) using vacuum tubes	• Computation of very large mathematical and scientific figures. • During the world war it was used to make certain calculations for the construction of a hydrogen bomb.
2nd Generation Computers	Built using transistors. Had tape storage, printer and operating systems and stored programs.	• Programmable computers used mainly for scientific, business applications and computer games.

USES OF FIRST COMPUTERS

3rd Generation Computers	Built using Integrated circuits and semiconductors	• The first computers to process more than one task concurrently (Multitasking). • Had most of the application used today such as word processors, calculators and business application.
4th Generation Computers	Built using very large integrated circuits characterized by microcomputers	• Affordable computers and could be used for most applications. • Financial applications such as VisiCalc and networks particularly the internet became common.

USES OF FIRST COMPUTERS

5th Generation Computers	Today's computers characterized by massive processing power and use of artificial intelligence.	• Used for large number of applications, in particular expert systems used in decision making.

ELECTRONIC COMPUTERS AND THEIR GENERATIONS

Practice Questions

a. Mention four characteristics of the first generation computers.
b. Who developed the Analytical engine?
c. Define the term Artificial Intelligence.
d. Write the following initials in full :
   a. **ENIAC**
   b. **VLSI**
   c. **IBM**
   d. **IC**