Computer:

Computer is an advanced electronic device that accepts raw data from the user and processes it and forms an output as meaningful information within a short time without any mistakes.

Earliest Computer:

- Originally calculations were computed by humans, whose job title was computers.
- These human computers were typically engaged in the calculation of a mathematical expression.

History of Computer:

1. **Abacus:**
   - An abacus is a **mechanical device** used to aid an individual in performing **mathematical calculations**.
   - The abacus was invented in **Babylonia in 2400 B.C.**
   - The abacus in the form we are most familiar with was **first** used in **China** in around **500 B.C.**
   - It used to perform **basic arithmetic operations.**
   - It consists of beads or disks that can be moved up and down on a series of sticks or strings within a usually wooden frame.
   - The frame of the abacus has a series of vertical *rods* on which a number of wooden *beads* are allowed to slide freely.
   - **A horizontal *beam* separates the frame into two sections, known as the *upper deck* and the *lower deck*.**
   - **Upper deck means Heaven and lower deck means Earth.**
   - **Each bead in the *upper deck* has a value of 5; each bead in the *lower deck* has a value of 1.**
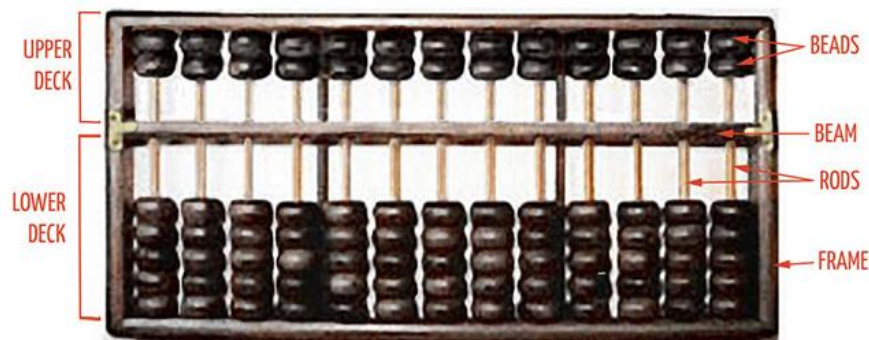
2. **Napier Bones:**
   - Napier's bones, also called Napier's rods, are numbered rods which can be used to perform multiplication of any number by a number 2-9. By placing "bones" corresponding to the multiplier on the left side and the bones corresponding to the digits of the multiplicand next to it to the right, the product can be read off simply by adding pairs of numbers (with appropriate carries as needed) in the row determined by the multiplier.
   - Invented by **John Napier in 1614**.
   - Allowed the operator to **multiply**, **divide** and calculate **square** and **cube roots** by moving the rods around and placing them in specially constructed boards.
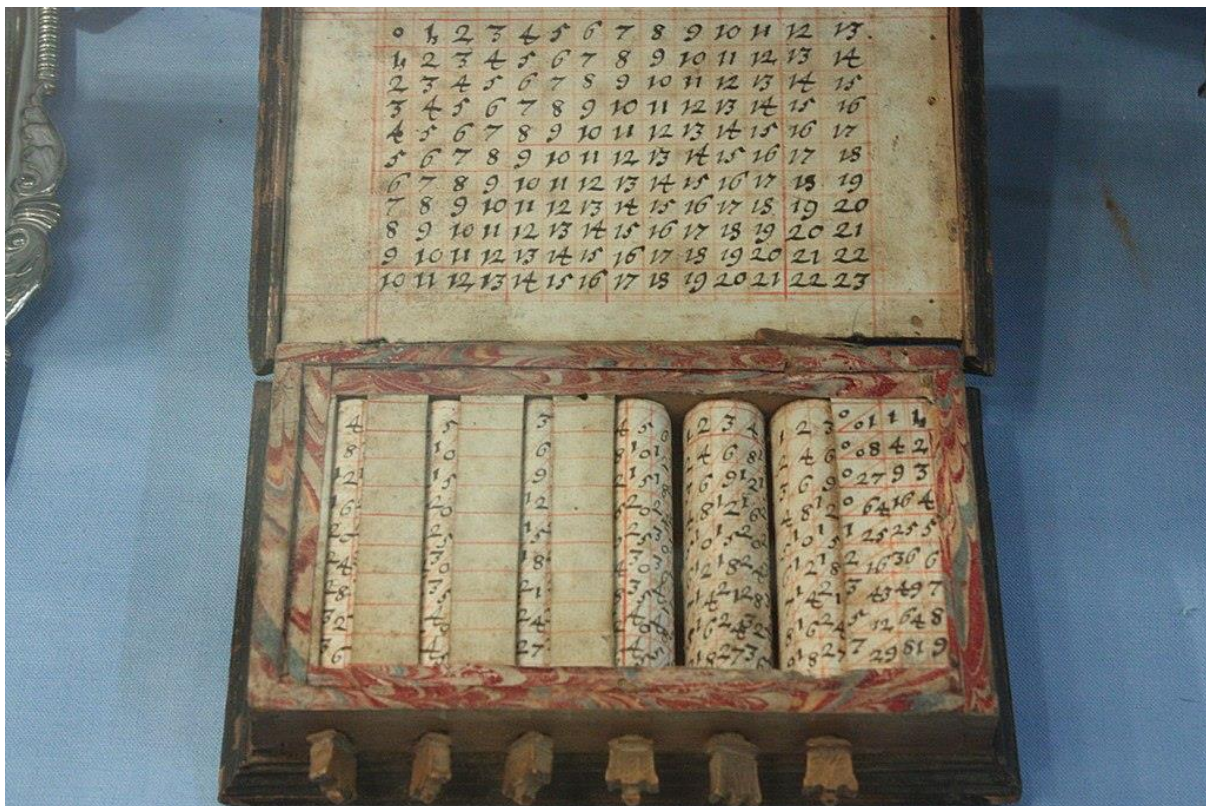
3. **Slide Rule:**
   - It is a ruler with a sliding central strip, marked with logarithmic scales and used for making rapid calculations, especially multiplication and division.
   - Invented by **William Oughtred in 1620**.
   - Is **based on Napier's ideas about logarithms**.
   - Used primarily for **multiplication, division, roots, logarithms, trigonometry**,etc..
   - Not normally used for **addition** or **subtraction**.
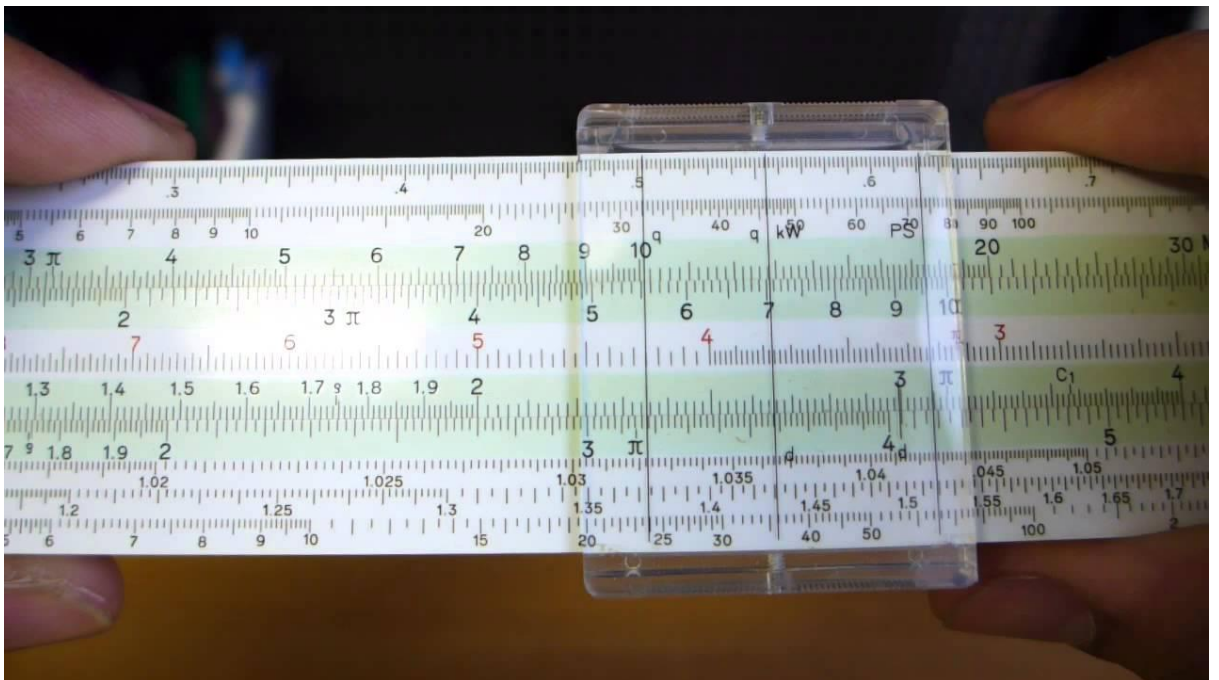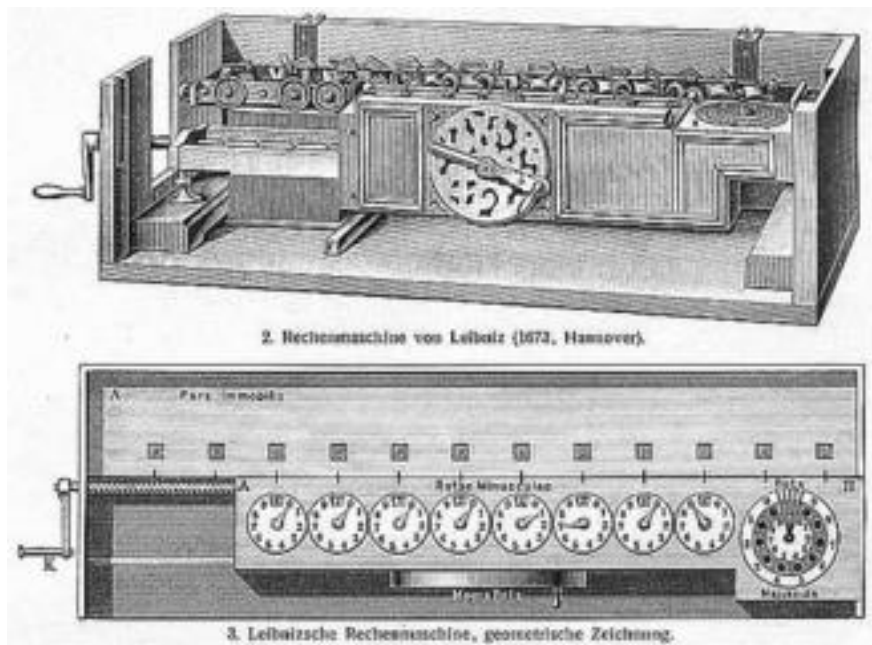
4. **Pascaline:**
   - **Pascaline**, also called **Arithmetic Machine.**
   - Invented by **Blaise Pascal** in **1642**.
   - It is the **first mechanical digital calculator** or adding machine to be produced in any quantity and actually used.
   - It could perform **addition** and **subtraction**.
   - It consists of **eight dials, gears and wheels**.
   - It is **36 cm long**, **13 cm wide** and **8 cm high**.
   - Numbers are entered by dialing a series of numbered wheels, where movement of the wheels started at 9 and moved to 0.
   - By rotating adjacent wheels by one digit helps to accomplish automatic carry over the system.

5. **Stepped Reckoner:**
   - Invented by **Gottfried Wilhelm Von Leibnitz** in **1694**.
   - **First mechanical digital calculator** that could perform all four arithmetic operations: **addition**, **subtraction**, **multiplication** and **division**.
   - The machine is about 67 cm (26 inches) long, made of polished brass and steel, mounted in an oak case.

2. Rechenmaschine von Leibniz (1673, Hannover).

3. Leibnizsche Rechenmaschine, geometrische Zeichnung.

6. Jacquard Loom:

- Invented by **Joseph-Marie Jacquard**, a French silk weaver in **1801**.
- It was controlled by punch cards with punched holes, each row of which corresponded to one row of the design.
- **It was the first machine to use a punch card to control a sequence of operations.**
- It started a technological revolution in the textile industry.
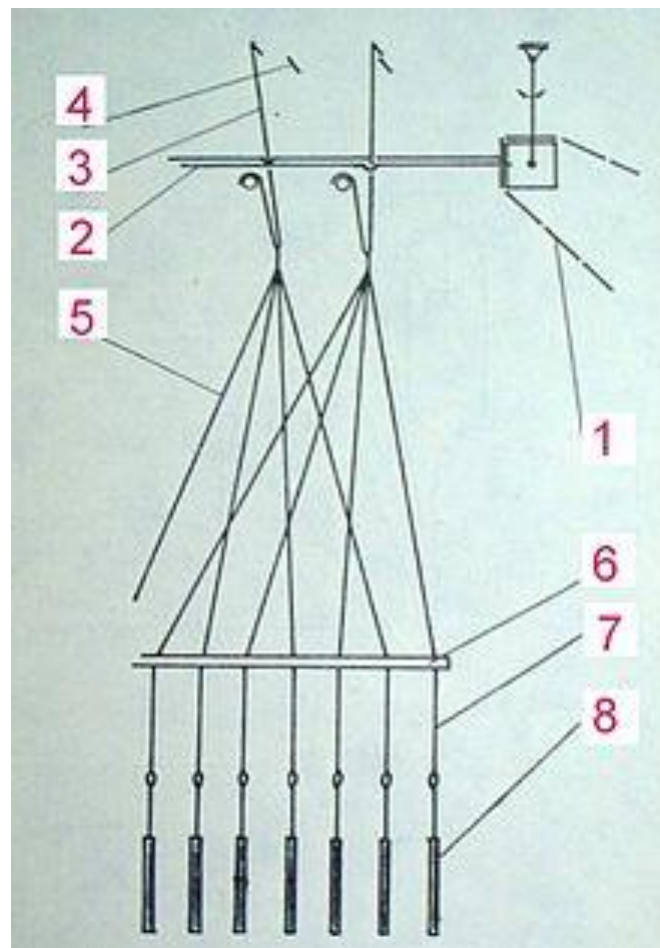
**Difference Engine and Analytical Engine:**

Difference Engine:

Difference Engine, an early calculating machine, verging on being the first computer, designed and partially built during the 1820s and '30s by **Charles Babbage**.

- It was invented by **Charles Babbage** in **1823**.
- **Automatic mechanical calculating machine.**
- **It could solve the equations by calculating the differences between them.**

  How It Works:

  Difference engines are so called because of the mathematical principle on which they are based, namely, the method of finite differences. In general, **calculating the value of a polynomial** can require any or all of addition, subtraction, multiplication and division.

  An advantage of the method of finite differences is that it eliminates the need for multiplication and division, and allows the values of a polynomial to be calculated using simple addition only. Adding two numbers using gear wheels is easier to implement than multiplication or division and so the method simplifies an otherwise complex mechanism.
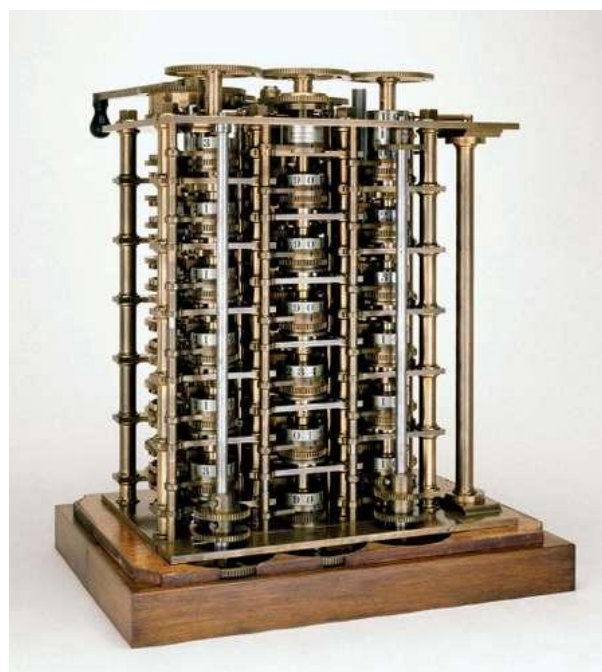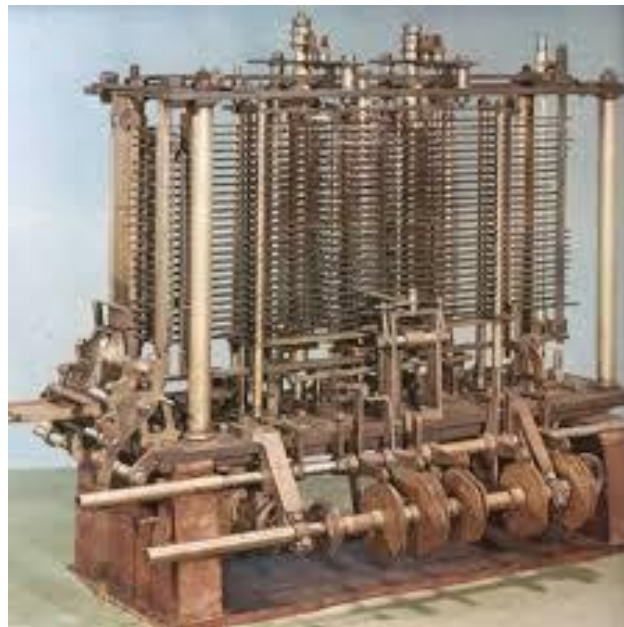
Analytical Engine:

Analytical Engine was a proposed **mechanical general-purpose computer** designed by English mathematician and computer pioneer **Charles Babbage**.

- It was invented by **Charles Babbage** in **1833**.
- **Designed to tabulate logarithms and trigonometric functions by evaluating finite differences to create approximating polynomials.**
- **Input and output unit to read the data and display the result.**
- **Store to hold data and results of processing.**
- Mill a mechanical unit for calculations.
- A system of gears and leavers to transfer the data between the store and the mill.

Charles Babbage provided the basic idea of computers and hence, he is regarded as "**the father of modern computers**".

Augusta Ada Byron:

- In **1840**, **Augusta Ada Byron** suggested to Babbage that **he use the binary system**.
- **She writes programs for the Analytical Engine.**
- **First computer programmer.**

Turning Machine:

- **Invented by Alan Turning in 1936**.
- Alan Turing presents the notion of a universal machine, later called the Turing machine, **capable of computing anything that is computable.**
- **The central concept of the modern computer was based on his ideas.**
- **The Turing machine mathematically models a machine that mechanically operates on a tape.**

Hollerith's Tabulating Machine:

- Invented by **Herman Hollerith** in **1887**.
- To assist in **summarizing information** and **accounting**.
- **To speed up the process of assimilating census data into a usable form that would meet the needs of a country that was experiencing a significant growth in population from one decade to the next.**
- He founded **Tabulating Machine Company** in **1896** and later in **1924** it was renamed as **IBM**.

Harvard Mark I:

- Also known as **IBM Automatic Sequence Controlled Calculator (ASCC)**.
- Invented by **Howard H. Aiken** in **1937**.
- The **Mark - I** was completed in **1944**.
- The **first automatic electro-mechanical computer**.
- It is considered to be "**the beginning of the era of modern Computer**" and "**the real dawn of the computer age**".
- It was used by the **US Navy for gunnery and ballistic calculations**.
- It was built using **7,65,000** components and **hundreds of miles of wire**, amounting to a size of **51 feet in length**, **8 feet in height** and **2 feet deep**.
- It weighed about **4500 kg**.

Atanasoff Berry Computer:

- **Invented by John Vinncent Atanasoff and Clifford Berry at Iowa State University in 1937-38.**
- **First Electronic Digital Computer.**
- **Vacuum tubes were used for storing and for arithmetic logic functions.**
- Designed for **solving simultaneous linear equations.**
- It could handle **systems consisting of twenty-nine equations.**
- It was used by the **military to compute ballistic data.**
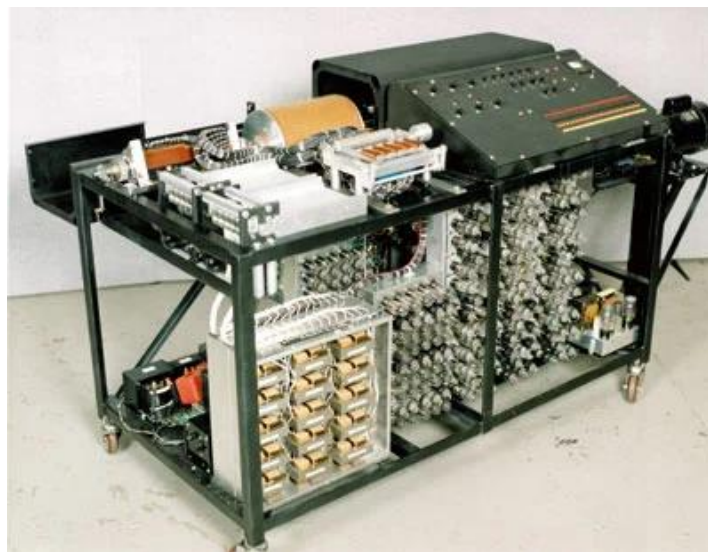
Electronic Numerical Integrator and Calculator:

- **J. Presper Eckert** and **John Mauchly** at the University of Pennsylvania in Philadelphia in **1946**.
- **First operational electronic digital computer**, ENIAC for the US Army.
- **Used 18,000 vacuum tubes, weighing 30 tons and took up the space of 1,800 square feet.**
- **Used to prepare artillery-shell trajectory tables and perform other military and scientific calculations.**
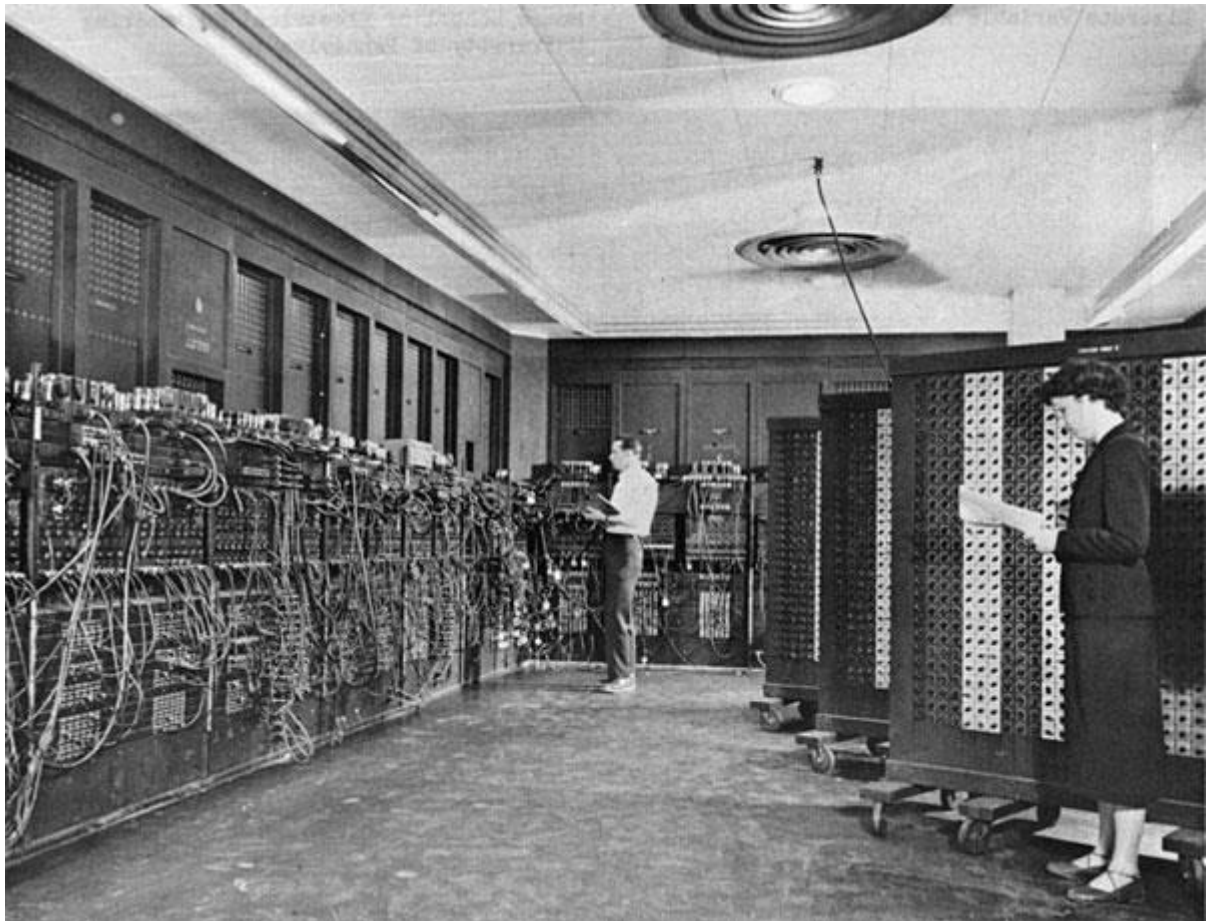
Electronic Discrete Variable Automatic Computer:

- **John Mauchly** and **J.P Eckert** designed in **1946**.
- **Brought in use in 1951**.
- One of the **earliest electronic computers**.
- It has almost **6,000 vacuum tubes** and consumes **56 KW power.**
- It covered **490 square feet** of floor space and **weighed 7,850 kilogram.**
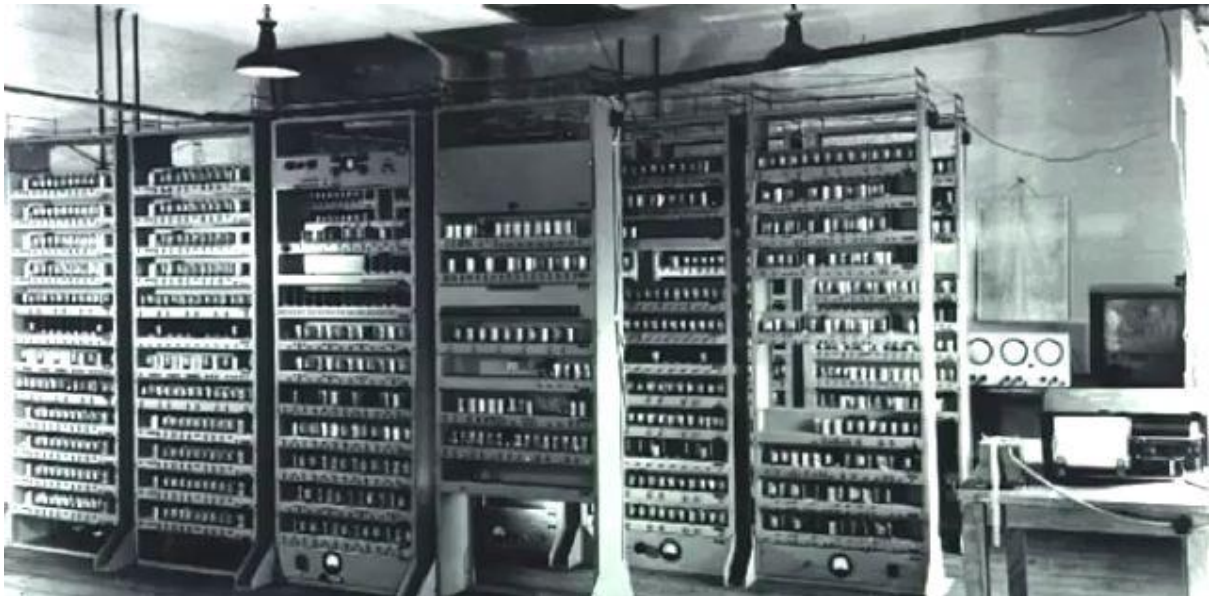
Electronic Delay Storage Automatic Calculator:

- **Maurice V. Wilkes** and **his team** constructed the **first practical stored-program electronic computer**, EDSAC in **1949**.
- At University of Cambridge.
- It had **3,000 vacuum tubes** and used **30 KW of electric power**.
- **Input of programs were done using paper tape** and **output results were printed on a teletype page printer.**
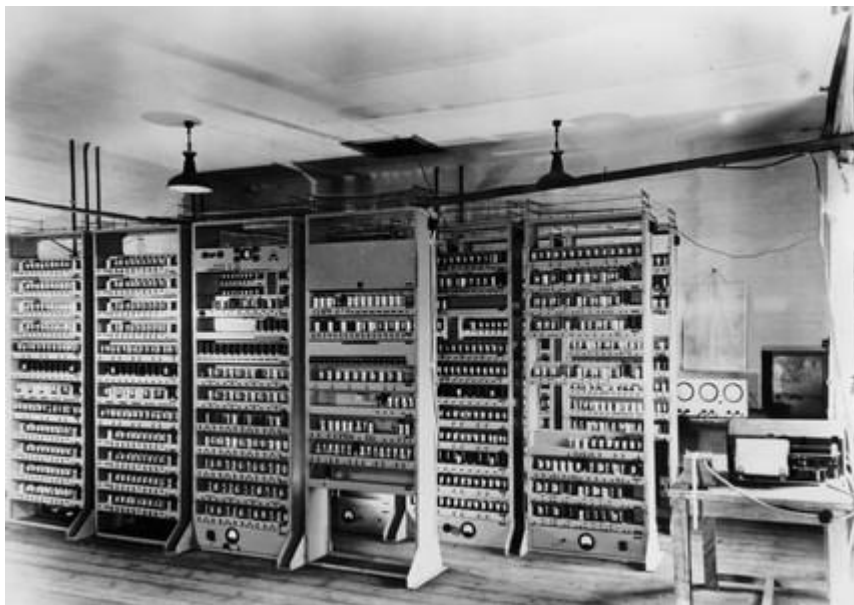
Universal Automatic Computer-I:

- Designed principally by **John Mauchly** and **J.P. Eckert**.
- **First commercial computer produced in the United States**.
- UNIVAC-I was **started in 1946 and completed in 1951.**
- **Magnetic tapes were used as input and output mediums.**
- **It was used by the Census Bureau in early 1951 for taking census.**