**Name: Richa Pagare**

**1000 number: 1001873138**

**Date: 03/02/2022**

**Homework 2**

**1.** Describe the Difference engine.

**Ans 1:** Designed in the 1820s by Charles Babbage, the difference engine is an automatic [mechanical calculator](https://en.wikipedia.org/wiki/Mechanical_calculator) which was used to tabulate [polynomial functions](https://en.wikipedia.org/wiki/Polynomial). Its design describes a machine to calculate a series of values and print results automatically in a table. The difference engines were named after the mathematical principle of the method of finite differences. This method for the difference engine is designed such that it does complex calculations by making use of only subtraction and addition. Thus, this invention eliminated the need for multiplication and division which are more difficult to implement mechanically. The difference engine was way ahead of other calculators of its time. It was capable of performing not just a calculation but a whole series of calculations on different variables of a rather problem. It also consisted of a temporary storage area where some data could be held.

**2.** From the following list, which can be considered as a “general purpose computer”?

a. Step Reckoner

b. Difference Engine

c. Analytical Engine

**Ans 2:** Only option c

Analytical Engine can be considered as a general purpose computer for the following reasons: -

An analytical engine has the memory to store data. Additionally, an analytical engine can also schedule multiple operations in a queue.

**3.** What were the limitations of Harvard Mark 1? How does current technology deal with those problem?

**Ans 3:** Harvard Mark 1 has the following limitations:

* Time Consuming Design: One of the Harvard Mark 1’s biggest limitations were that it was significantly slower. This made completing calculations a time-consuming task. HM1 used relays for circuit switching, which weren’t fast enough to compute complex problems (3 additions/subtractions per second, Multiplication - 6 seconds, Division - 15 seconds, Trigonometric problems - more than a minute)
* Mechanical Wear and Tear :- HM1 had 3500 relays which made it a high maintenance computing device which could average around changing one faulty relay everyday making it unreliable to solve problems on a daily basis.

Other disadvantages were its loud noise while working, its immense size, and the need for large amounts of energy. Because the Mark 1 was programmed using tape, there was also no way to jump around in the program. Instead, programmers had to stick to relatively simple sets of instructions that could be read in a linear fashion.

Modern day computing is electronic computing instead of electro-mechanical like HM1, decreasing the time complexity by faster circuit switching and making it low maintenance as there is no movement based mechanical aspect to it.

**4.** Why is Silicon Valley so called?

**Ans 4:** The Santa Clara Valley had a huge industry for manufacturing transistors and semiconductors, which were mostly created using Silicon. Hence it got the name of Silicon Valley.

**5.** Make boolean logic tables for AND, OR, and XOR (A XOR B).

**Ans 5:** Logic Tables for AND, OR, and XOR :-

(1 = TRUE, 0 = FALSE)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A** | **B** | **AND** | **OR** | **XOR** |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 1 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 1 | 1 | 1 | 0 |

**6.** Can we implement XOR gate using only NOT, AND, and OR gates? If yes, how?

Ans 6: Yes, we can implement XOR gate using only NOT, AND, and OR gates.