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Question # 3

- a) Write a note on prevailing generation of computers in use and discuss its characteristics in detail.

The history of computer development is a computer science topic that is often used to reference the different generations of computing devices.

Each one of the five generations of computers is characterized by a major technological development that fundamentally changed the way computers operate.

Five Generations Of Computers :

- o Getting started : Key Terms to know
- o First Generation : Vacuum Tubes
- o Second Generation Transistors
- o Third Generation Integrated Circuits
- o Fourth Generation Microprocessors
- o Fifth Generation Artificial Intelligence

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Getting Started: Key Terms To Know:

The following Technology definition will help you to better understand the five generations of Computing.

- o Computer
- o microprocessor
- o ~~many~~ magnetic drums
- o binary
- o integrated circuit
- o Semiconductor
- o Nanotechnology
- o machine language
- o assembly language
- o artificial intelligence

First Generation: Vacuum Tubes (1940-1956)

The first Computer systems used vacuum tubes for circuitry and magnetic drums for memory, and were often enormous, taking up entire rooms.

These computers were very expensive to operate and in addition to using a great deal of electricity, the first computers generated a lot of heat, which was often the cause of malfunctions.

First generation computers relied on machine language, the lowest-level programming language understood by computers, to perform operations,

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and they could only solve one problem at a time. It would take operators days or even weeks to set-up a new problem's input was based on punched cards and paper tape, and output was displayed on printouts.

The UNIVAC and ENIAC computers are examples of first-generation computing devices. The UNIVAC was the first commercial computer delivered to business client, the U.S. Census Bureau in 1951.

Second Generation: Transistors (1956-1963):

The world would see transistors replace vacuum tubes in the second generation of computers. The transistor was invented at Bell Labs in 1947 but did not see widespread use in computers until the late 1950s.

The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable than their first-generation predecessors. Though the transistors still generated a great deal of heat that subjected the computer to damage, it was a vast improvement

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over the vacuum tube. Second-generation computers still relied on punched cards for input and printouts for output.

Third Generation: Integrated Circuits (1964-1971)

The development of the integrated circuit was the hallmark of the third generation of computers. Transistors were miniaturized and placed on silicon ~~strips~~ chips, called semiconductors, which drastically increased the speed and efficiency of computers.

Instead of punched cards and printouts, users interacted with third generation computers through keyboards and monitors and interfaced with an operating system, which allowed the device to run many different applications at one time with a central program that monitored the memory. Computers for the first time became accessible to a mass audience because they were smaller and cheaper than their predecessors.

Fourth Generation: Microprocessors (1971-Present)

The microprocessor brought the fourth generation of computers, as thousands

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of integrated circuits were built onto a single silicon chip. What in the first generation an entire room could now fit in the palm of the hand. The Intel 4004 chip, developed in 1971, located all the components of the computer - from the central processing unit and memory to input/output controls - on a single chip.

In 1981 IBM introduced ~~its~~ its first computer for the home user, and in 1984 Apple introduced the Macintosh. Microprocessors also moved out of the realm of desktop computers and into many areas of life as more and more everyday products began to use microprocessors.

As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the internet. Fourth generation computers also saw the development of GUIs, the mouse and handheld devices.

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Fifth Generation : Artificial Intelligence (Present & Beyond) :

Fifth generation computing devices, based on artificial intelligence, are still in development, though there are some applications, such as voice recognition, that are being used today. The use of parallel processing and superconductors is helping to make artificial intelligence a reality. Quantum computation and molecular and nanotechnology will radically change the face of computers in years to come. The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self-organization.

b) Multiply the given binary numbers
10001001 with 10010011.

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$$\begin{array}{r} 10001001 \\ \times 10010011 \\ \hline \textcircled{1} 10001001 \\ \textcircled{1} 10001001 \times \\ 00000000 \times \times \\ 00000000 \times \times \times \\ 10001001 \times \times \times \times \\ 00000000 \times \times \times \times \times \\ 00000000 \times \times \times \times \times \times \\ 10001001 \times \times \times \times \times \times \times \\ \hline 100111010101011 \end{array}$$

Question # 2

a) Machine Learning :

Machine Learning gives Computers the ability to learn without being explicitly programmed. It is a subfield of Computer Science. The idea came from work in artificial intelligence. Machine learning explores the study and construction of algorithms which can be learned and make predictions of data. Such algorithms follow programmed instructions, but can also make predictions or decisions based on

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data. They build a model from sample inputs. Machine learning is done where designing and programming explicit algorithms cannot be done. Examples include spam filtering, detection of network intruders or malicious insiders working towards a data breach, Optical character recognition (OCR), Search engines and Computer Vision.

b) 5G TECHNOLOGY :

Fifth generation (5G) wireless broadband is the latest advance in cellular technology. 5G will greatly increase the speed and responsiveness of wireless networks and expand them to enable hundreds of thousands of connections. 5G offers greater capacity, higher data rates and much lower latency - and it will support further innovations such as the internet of things (IoT) and network slicing, creating a smarter, more connected world.

The launch of 5G was officially slated for 2020, but its development has been well underway for some time with many companies having already introduced early versions

of 5G devices, applications and networks. However it still may take a few years before we see the full potential and benefits of 5G.

Top Three Consumer Benefits Of 5G

1) Connected Vehicles :

With 5G comes unprecedented speed and connectivity - the kind needed to make autonomous, or self-driving, cars a reality. 5G networks have what it takes to allow faster-than-ever communication and data processing between vehicles; networks, infrastructure and even pedestrians. In other words, 5G networks will facilitate communication between everything on the road - from lampposts to gas stations - in the interest of safety and traffic management.

2) Smartphones :

Big changes are on the horizon for smartphones - and 5G devices will soon become the norm. The main advantage of 5G over 4G for users is better coverage i.e., signal will hit previously hard-to-reach places with connection guaranteed.

as part of service plans. What's more, subscribers will finally get the extraordinary quality they expect on their devices, with downloads predicted to have no perceptible delay.

3) Streaming AND Entertainment :

5G offers a striking advantage over previous technologies with virtually unlimited capacity and short lag times. In addition to better quality and considerably faster streaming, 5G promises revolutionary immersive experiences, including multisensory digital content thanks to increased capacity that will support technologies like virtual reality, augmented reality and 3D.

C) VIRTUAL REALITY :

Virtual Reality (VR) is a simulated experience that can be similar to or completely different from the real world. Applications of virtual reality can include entertainment (i.e. video games) and educational purposes (i.e. medical or military training) other, distinct types of VR style technology

include augmented reality and mixed reality.

Currently standard virtual reality systems use either virtual reality headsets or multi-projected environments to generate realistic images, sounds and other sensations that simulate a user's physical presence in a virtual environment. A person using virtual reality equipment is able to look around the artificial world, move around in it, and interact with virtual features or items. The effect is commonly created by VR headsets. Consisting of a head mounted display with a small screen in front of the eyes, but can also be created through specially designed rooms with multiple large screens. Virtual reality typically incorporates auditory and video feedback, but may also allow other types of sensory and force feedback through haptic technology.

d) ROBOTICS ♂

Robotics is an interdisciplinary research area at the interface of computer science and engineering.

Robotics involves design, construction, operation, and use of robots. The goal of robotics is to design intelligent machines that can help and assist humans in their day-to-day lives and keep everyone safe. Robotics draws on the achievement of information engineering, computer engineering, mechanical engineering, electronic engineering and others.

Robotics develop machines that can substitute for humans and replicate human actions. Robots can be used in many situations and for lots of purposes, but today many are used in dangerous environment (including inspection of radioactive materials, bomb detection and deactivation), manufacturing processes, or where humans cannot survive (e.g. in space, underwater, in high heat, and clean up and containment of hazardous materials and radiation). Robots can take on any form but some are made

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to resemble humans in appearance. This is said to help in the acceptance of a robot in certain replicative behaviors usually performed by people. Such robots attempt to replicate walking, lifting, speech, cognition or any other human activity. Many of today's robots are inspired by nature, contributing to the field of bio-inspired robotics.

Question # 1

Watch animated movie "Incredible 1" and discuss the technologies used by characters of the movies. Further, take note of the technologies used in making of this movie.

Ans) The omniscroids are programmed with an artificial intelligence that allows them to learn as it fights its opponents & to solve any problems they encounter. Syndrome in the training sessions of operation Kronos, would pit retired supers against a prototype version of the robot, collecting data on the fight as it progressed. If that version was defeated, he would use the collected battle data to develop a new,

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improved model to use against the Super that had defeated the previous unit, thereby repeating the cycle. This process killed off many potential threats to Syndrome's plans and allowed him to perfect the robot for the final phase of the operation. He also intended to make the omnidroid strong enough to fight and defeat Mr. Incredible who was the biggest threat to his scheme. The omnidroids are the secondary antagonists of The Incredibles. They are series of superhero-killing battle robots created by the supervillain Syndrome as part of Operation Kronos.