

Date: ___/___/20___

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Q How a Satellite is launched?
Define the working principle of GPS

Introduction:

A satellite is an artificial object ~~was~~ placed in orbit around the earth or another celestial body. The moon is earth's original, natural satellite, and there are many man-made (artificial) satellites, usually closer to earth. The purposes of satellites are usually communication, navigation, weather monitoring, research, or defense. The process of launching a satellite into space is a complex scientific operation involving advanced engineering, physics, and precise calculations.

How Satellites are Launched?

• Launch Vehicle:

A launch vehicle is used to propel the satellite from the Earth's surface into its designated orbit. It provides the necessary thrust to overcome Earth's gravitational pull.

Add Diagrams for Understanding Better

Stages of Satellite Launch.

1- Preparation.

The satellite is attached to the rocket and enclosed in a protective shell.

2- Lift-off:

Engines ignite and produce upward thrust greater than Earth's gravity.

3- Stage Separation:

Lower stages drop off as upper stages continue pushing the satellite upward.

4- Orbital Velocity:

The rocket tilts horizontally to achieve the speed needed to stay in orbit.

5- Deployment:

The satellite separates from the rocket and begins operating in orbit.

Ground Control:

After deployment, ground stations track the satellite, adjust its orbit, and monitor its data transmission throughout its mission.

Working Principles of GPS:

Introduction:

The GPS is a satellite-based navigation system developed by the United States. It provides accurate information about position, speed, and time anywhere on Earth.

Components of GPS:

1. Space Segment.

At least 24 satellites orbiting Earth that send continuous signals.

2. Control Segment.

Ground stations that monitor and manage the satellites.

3. User Segment.

GPS receivers in phones, vehicles, and other devices that decode satellite signals.

Conclusion:

Launching a satellite and the working of GPS show the advancement of modern space technology. Satellite launches make global communication and navigation possible, while GPS has become an essential tool for everyday life, connecting the world with precise location and timing services.

Q What is Optical Fiber:

Introduction:

An optical fiber is a thin, flexible strand of glass or plastic that transmits data in the form of light signals instead of electrical signals. It is widely used in ~~for~~ telecommunication, internet connection, ~~or~~ medical instruments, and defense systems because it allows very fast data transmission over long distances with minimal loss. ✓

Structure of Optical Fiber:

An optical fiber consists of three main parts:

1- Core: ✓

the central part of the fiber where light travels, made of high-quality high-purity glass or plastic.

2- Cladding:

A layer surrounding the core with a slightly lower refractive index. It reflects the light back into the core and prevents loss of signal. ✓

3- Protective Coating

the outer layer made of plastic. It protects the fiber from physical damage, moisture, and bending. ✓

Working Principle of Optical Fiber:

The optical fiber works on the scientific principle of Total Internal Reflection (TIR).

Step 1: Light Transmission:

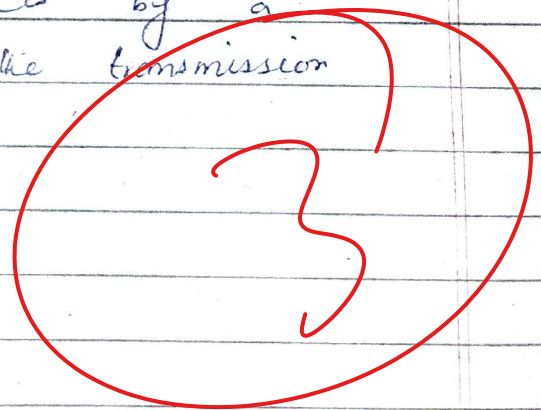
A beam of light (usually from a laser or LED) is sent into fiber's core at a specific angle.

Step 2: Total Internal Reflection:

When the light hits the boundary between the core and cladding, it reflects completely back into the core instead of escaping. This happens because the core has a higher refractive index than the cladding, causing light to bounce repeatedly along the length of the fiber. As a result, the light signal travels through the fiber even if it bends or twists.

Step 3: Signal Reception:

At the other end of the fiber, the light signals are converted back into electrical signals by a receiver, completing the transmission process.



Q Explain the working of a cell phone.

Introduction.

A cell phone is a wireless communication device that allows users to make calls, send messages, and access the internet without physical connections. It operates through radio waves and a network of cell towers.

Basic Components of a Cell Phone:

- ✓ 1 **Microphone:** Converts voice into electrical signals.
- ✓ 2 **Antenna:** Sends and receives radio signals.
- ✓ 3 **Speaker:** Converts received electrical signals back to sound.
- ✓ 4 **SIM Card:** Stores identity and network information.
- ✓ 5 **Processor:** Manages all operations.
- ✓ 6 **Battery:** Provides the power required to run the phone.

Working Principles of a Cell Phone:

Voice Conversion and Transmission:

The microphones in cell phone converts voice into electric signals. These signals are then changed into digital data and transmitted as radio wave through the antenna to the nearest cell tower.

Role of Cell Towers:

The tower that receives signals send it to the Mobile Switching Center (MSC)

that manages communications between towers.

Receiving the Call:

The receiver's cell tower converts the signal back into radio waves and transmits it to the receiver's phone antenna. The phone then changes the digital data back into sound through the speaker, allowing the person to hear voice.

Data and Internet Communication:

When users browse the internet or use apps, data packets are sent through the same process. From users' phone to the nearest tower, then to the user's service provider's servers, and finally to the internet. The return data follows the same path in reverse.

Write Short notes on following:

a- RAM and ROM:

RAM (Random Access Memory) is a temporary memory of a computer that stores data and instructions currently being used. It is a volatile memory, meaning all its contents are lost when the power is turned off. The more RAM a computer has, the faster it can process information.

ROM (Read only memory) is a permanent memory that stores essential programs required to start the computer, such as the BIOS. It is non-volatile, so its data remains even when the computer is switched off. ROM data is written once and usually cannot be modified.

b. Software and Hardware:

Hardware refers to the physical components of a computer system that can be touched and seen, such as the CPU, monitor, keyboard, and hard drive. It performs tasks according to the instructions given by software.

Software, on the other hand, is a collection of programs and instructions

that control the operation of hardware and enable the computer to perform specific tasks. There are two main types of software: system software, like operating systems, which manage hardware resources, and application software, like MS Word or browsers which help users perform specific functions.

Computer Bus: Bus:

A computer bus is a communication system that transfers data between various components of a computer, such as the CPU, memory, and input/output devices. It acts as a data pathway that connects all parts of the computer, ensuring smooth communication and coordination. There are mainly three types of buses: the data bus, which carries information; the address bus, which specifies the location of data; and the control bus, which carries signals to manage and control other components.

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