Qno. 2 (Special CSS)

a) The age of universe is estimated to be 13.8 billion years. How was it estimated?

b) Explain the phenomenon of Solar Eclipse.

c) Describe James Webb Telescope, its principle of ~~creation~~ operation, construction and importance.

d) Explain the Global Positioning System and its application.

Section A   Qno 2 (a)

i What is Universe:

The universe is a all space, time, matter, and energy that exist. It includes galaxies, stars, planets and everything in between, encompassing the entirety of existence.

2 Methods to estimate age of universe.

The age of universe can be estimated using various methods such as:

a- Hubble's Law;

Universe is constantly expanding, by measuring how fast it is getting bigger. Scientist can work backword to find out when it started.

b Galaxy Ages:

Just like observing the oldest observable galaxy, Scientist can figure out the age of oldest galaxy and can estimate the age of universe.

c Nucleosynthesis:

The study of elements of universe, the abundance of light elements, (hydrogen, helium, Lithium, etc.) By studying these elements in the universe, scientist can estimate the age of universe.

Globular Clusters:

Some of the oldest globular clusters in our milky way galaxy provides insight into universe age.

These methods when combined and refined have lead to the current estimate of the universe's age which is approximately. 13.8 billion years.

Qno2(b)

Eclipse Definition

The obscurity of one astronomical object by another astronomical object is called eclipse.
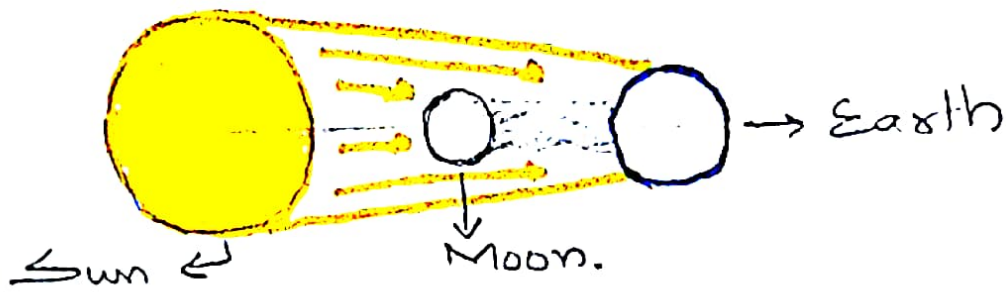
Solar Eclipse Definition

When the Moon is in between the sun and the Earth, such an eclipse is called Solar Eclipse.

Types of Solar Eclipse

a Total Solar Eclipse (Umbra)
b Partial Solar Eclipse (Penumbra)
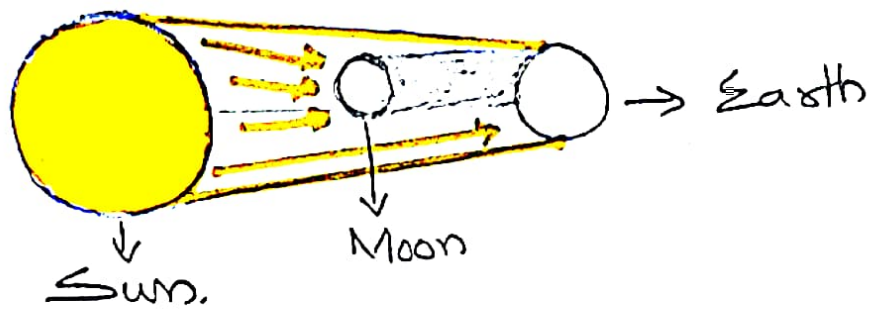c Annular Solar Eclipse

Total Solar Eclipse

Def: When Moon exactly alligned on the same line jouning the centres of the Earth and the sun such an eclipse is called total solar eclipse.

Sun ↙   Moon.

b | Partial Solar Eclipse
Def. When Moon is above or below
the central line joining the centres
of the sun and the Earth such
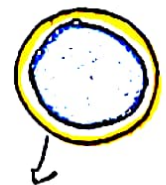an eclipse is called Partial Solar
Eclipse.
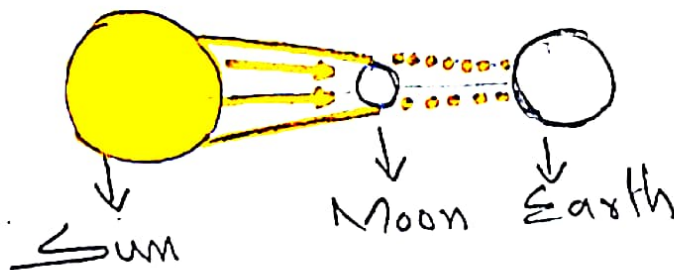
Partial Solar Eclipse

Sun.   Moon   → Earth

c | Annular Solar Eclipse
Def. Due to smaller size Moon.
Sun light escapes sideways and
makes a beads like pattern on
Earth.

Annular Solar Eclipse

Sun   Moon Earth

Sun's view from
Earth.

Annular Solar eclipse occur few seconds before or after the total Solar eclipse. This eclipse is also known as "Bailly Beads" or "lovely Diamond Ring effect."

Q no. 2 (c)

Definition:

The James webb Telescope is a large advanced space telescope designed to observe the universe in the infrared spectrum.

Principle of operation:

The James Webb Telescope operates by capturing the faint infrared light from celestial objects. It uses a large segmented primary mirror to collect and focus this light onto highly sensitive detectors.

Construction of James webb Telescope:

The James webb Telescope is a colossal and complex observatory built through international collaboration led by National Aeronautical Space Administration (NASA). It was launched in December, 2021.

Importance of James Webb Telescope: s

This telescope immense significance as it promises to revolutionize our understanding of the universe. By studying the cosmos in the infrared spectrum. It will unveil the early universe's secrets, peer into the birth of stars and planetary systems, and investigate the atmosphere of exoplanets. This telescope represents a milestone in space exploration, with the potential to make groundbreaking discoveries and reshape our knowledge of the cosmos.

Qno. 2 (D)

Definition:

Global Positioning System (GPS) is a satellite-based navigation system that provides location and time information to users anywhere on Earth surface.
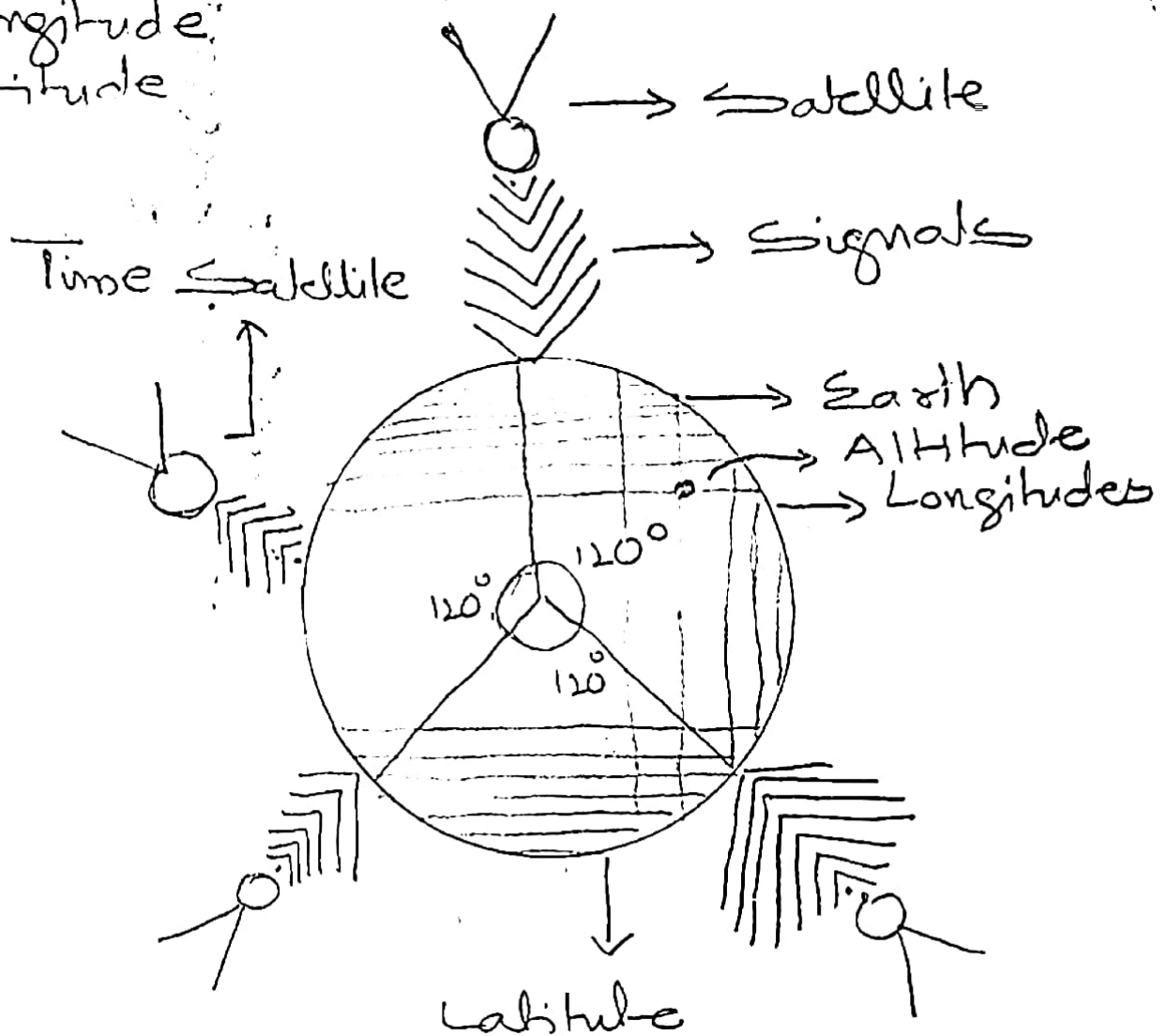
Operation of GPS:

GPS relies on a network of satellites to enable accurate positioning and navigation. In GPS 3 geostationary satellites are enough to cover whole earth at 120°. These are

three essential things required to 6
know the position, know as coordinates
those are:

1. Latitude
2. Longitude
3. Altitude

→ Satellite

→ signals

→ Earth
→ Altitude
→ Longitudes

Time Satellite

$120°$

$120°$

$120°$

Latitude

In GPS fourth satellite is used
to inform the time. Time satellite helps
in informing live location.

2. Applications of GPS
    Here are five applications of
Global Positioning System.

a. Navigation:

GPS is widely used for precise location and navigation in vehicles, ships, aircrafts and smart devices.

b. Mapping:

GPS plays an important role in creating accurate maps and geographic information system.

c. Agriculture:

GPS helps farmers optimize planting, harvesting and resource management by providing precise location data.

d. Search and Rescue:

GPS aids in locating and rescuing individuals in emergency situations such as lost hikers or distress boaters.

Qno. 4 (Speciall C.S.S)

a) Write a note on data storage in a USB. How it is different from hard disk?

b) Describe how a solar cell converts light into electricity. Describe its construction, operations and applications.

c) Write a comprehensive note on Food cycle in our body.

d) What is Artificial Intelligence? How it is helpful for humanity?

Qno 4 (a)

Definitions:

Universal Serial Bus (USB) is a widely used hardware interface that allows the connection of various devices such as computers, printers, and smartphones for data transfer and power supply.

1 How USB is different from Hard Disk.

USB and Hard-disk are different in following ways.

a Function:

USB is a hardware interface that allows various devices to connect to a computer for data transfer and power supply, while hard disk is a storage device used to store and retrieve data.

b Portability:

USB devices are typically small and portable, making them easy to carry and connect. Hard disks are larger and less portable

c Data storage

USB devices are usually used for temporary data transfer and storage, while hard disks are long term data storage.

d Capacity:

Hard disks generally offer larger storage capacity compared to USBs. USBs have limited storage space

e Speed:

Hard disks have faster data transfer speeds compared to USB devices.

Qno 4 (b)

Definition:

Solar cells, also known as photovoltaic cells, are semiconductor devices that convert sunlight into electricity; providing renewable source of power.

1 Process of converting light into electricity.

There are four steps in which solar cells converts light into electricity

a. Light absorbtion:

Solar cells are made of semiconductor materials, typically sillicon... When sunlight hits the solar cell, it is absorbed by the semiconductor.

b Electron Excitation:

The absorbed light energy excites electrons in the semiconductor material creating an electrical voltage.

c Electron Flow

Excited electron start to flow as an electric current through the material, creating an electrical voltage.

d Electricity Generation

This flow of electrons creates an electric current, which can be captured and used as electricity. It can be used immediately or stored in batteries for later use.

2 Application of Solar Energy

a Solar Farming

Large scale solar farms generate electricity for communities and industrial contributing to renewable energy production on a broader scale.

b Solar Powered Vehicles

Solar panels integrated into vehicles, particularly in the form of solar cars and solar-powered drones can extend travel distances and reduce dependence on fossil fuels

c Off-Grid Power.

Solar energy is used to provide electricity in remote or off grid areas where traditional power sources are unavailable.

Residential Solar Panels:

Solar panels installed on rooftops provide homes with clean and renewable electricity, reducing utility bills and environmental impact.

Qno. 4 (c)

Definition:

It is a system through which complex molecules of food are broken down into simpler molecules that are capable of cellular absorption.

Process of Food Cycle in Human Body:

Food cycle goes through 4 steps

a Ingestion
b Digestion
c Absorption
d Elimination.

(i)

1 Mouth.

Ingestion of food is the first process, main component of food ingestion is oral cavity or mouth. Oral cavity performs the mechanical digestion, which is chewing or grinding of the food. Saliva in the mouth contains Amalyase. It helps in carbohydrates digestion.

Food from mouth starts journey towards stomach through esophagus that movement is called Peristosis.

2 Stomach

Stomach has two main functions. Stomach contains Hydrochloric Acid (HCL). HCL kills germs of food, and maintains ph level. Stomach releases pepsin. Pepsin is an enzyme that helps digest the protein in stomach.

3 Small intestine

Food digesle in small intestine. Small Intestine in human body has 3 important components.

a Deudenum
b Jejunum
c Illeum.

a Deudenum
When food enters into the deudenum, pancraes secrets juices into deudenum. Pancratic juice containe 3 enzymes

i Amaylase
ii Lipase
iii Sodium Bi-Carbonate

i Amaylase
   Amaylase helps in formation of maltose

ii Lipase
    Lipase reacts on lipids and convert them into fatty acids.

iii Sodium Bi-carbonate
     Sodium Bi-carbonate balances the acidity in stomach.
           Liver secrets its special product known as Bile. Bile reacts on lipids and convert them into fatty acids. Basically both liver and pancreas perform same function on duedonum.

b Jejunum.
        Second part of small intestine where digestion completes. Jejunum is not dependepent upon any other part of body.

c Illeum
        Third part of small intestine. Absorbtion of food starts from here. Illeum has blood caplaries, nutrition absorbs into blood through capbrjes.
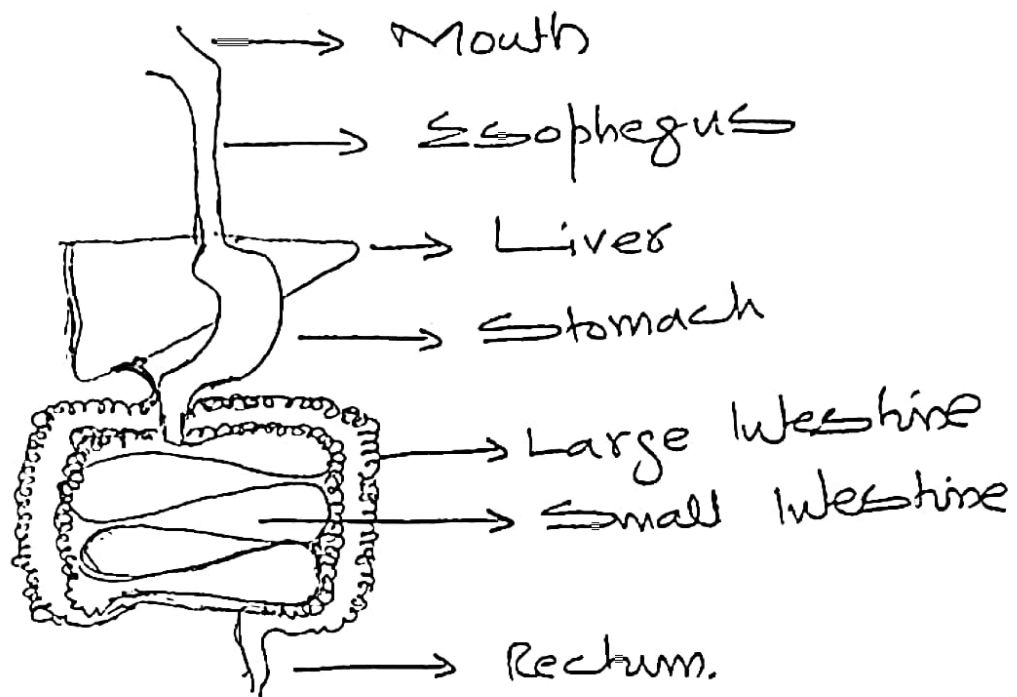
4 Large Intestine
        Undigestive food goes into large intestine. Large intestine further

sucks out the water and minerals from the undigestive food and send. the waste towards rectum.

5 | Rectum.

Rectum stores the waste timperoraly before elimination.

→ Mouth
→ Esophegus
→ Liver
→ Stomach
→ Large Intestine
→ Small Intestine
→ Rectum.

Qno. 4 (d)

Artificial Intelligence (A.I) refers to the simulation of human intelligence in machines or computer system, enabling them to perform task that typically require human thinking, such as learning, problem solving and decision-making.

Applications of A.I

1 Virtual Personal Assistants:

A.I - powered virtual assistants like Siri, Alexa, Google Assistant etc help users with tasks, provide information and control smart devices through natural language interactions.

2 Medical Diagnostics:

A.I assistants in medical imaging and diagnosis, helping healthcare pro-fessionals, identify diseases and con-ditions in X-rays, MRIs, and other medical scans.

3 Natural Language Processing (NPL)

NPL technology is used in chatbots, language translations and sentiments analysis to understand and respond to human language, making it useful customer support, content generation and language translation services.

4 Personalized Learnings

A.I can analyze students learning patterns and preferences to tailor educational content and pace, enable more effective and personalized learning experiences.