

GSA QUESTION # 01 PART (A)

What is eclipse? Distinguish between solar & lunar eclipse?

ECLIPSE:

Eclipse is define as:

"The obscuring of one solar object or astronomical object by another"

Types

There are 2 Types of eclipse

1. Solar eclipse

2. Lunar eclipse

Solar eclipse.

Solar eclipse occur when the moon is between the earth & sun.

Lunar eclipse occur.

Lunar eclipse occur when the earth is between the sun and moon.

DIFFERENCE BETWEEN SOLAR AND LUNAR ECLIPSE:

SOLAR ECLIPSE

Definition: "Solar eclipse occur when the moon is between the earth and sun and Rays from the sun partially or fully block to moving towards the earth."

LUNAR ECLIPSE:

Lunar eclipse occur when the earth is between the sun and the moon and light of sun fully or partially block while moving towards the earth.

Types: Three types of solar eclipse

- Total solar eclipse
- Annular solar eclipse
- Partial solar eclipse

Three types of solar lunar eclipse

- Total lunar eclipse
- Partial lunar eclipse
- Penumbral lunar eclipse

Duration: It appear for 7 and half minutes longest duration

longest duration of lunar eclipse is an hour

Frequency of occurrence: It occur one time in eighteen month

It occur twice in a year

Phase of moon: The solar eclipse occur in a new moon

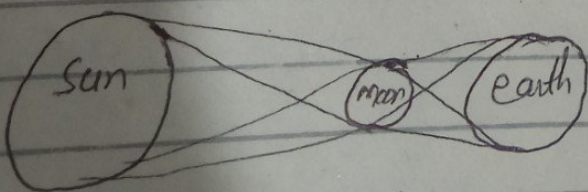
Lunar eclipse occur when moon is full

Appearance: In this large circle around moon appear because of sunlight & rays

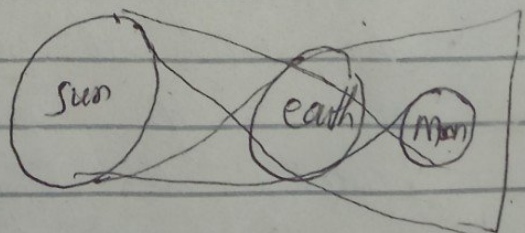
In this moon appear in reddish colour

effect: It is dangerous while direct eye contact cause loss of eye vision

It is not much dangerous direct eye contact is possible



Solar eclipse



Lunar

• Annular solar eclipse

It occurs when the partial light are fall moon not fully hides the rays of sun

Penumbral lunar eclipse

It occurs when partial light appear and earth not fully hides the moon

Part (b)

What is the origin of universe, how age of universe can be calculated

ANSWER:

ORIGIN OF THE UNIVERSE

There are no. of evidence for the expansion of the universe, but the most accepted among all is "expansion of universe" or Big Bang Theory explain by "George Lemaitre", a well known mathematician and astronomer.

BIG BANG THEORY:

Big Bang theory explain the origin of the universe which result in the expansion of universe from a single point & continuously expanding.

Main points:

There are following main points for the expansion of universe.

1. SINGULARITY:

Before the creation of universe our universe is present in the single point called

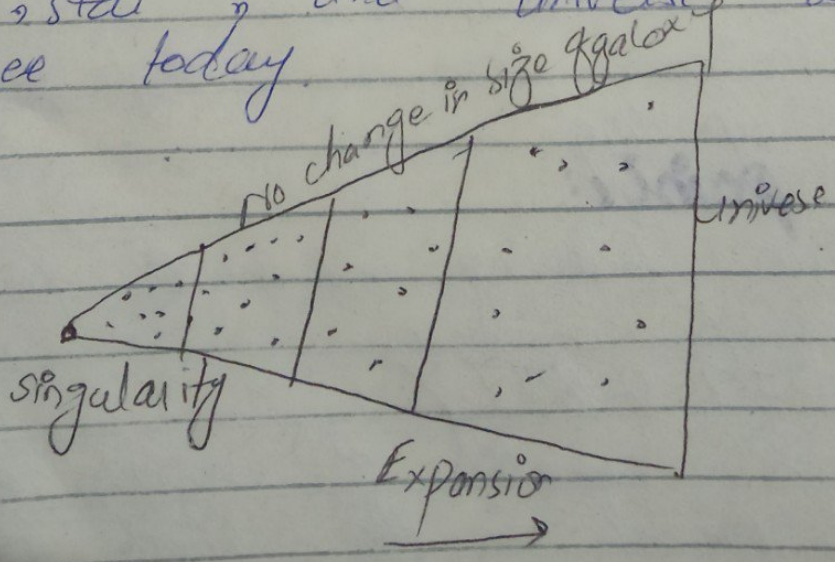
singularity in which the universe is present in a single point with zero temperature. and universe was a hot dense single point. Similarly, the matter and energy had the same state temperature 10^{32} . Further, energy dominate the matter.

2. Expansion:

About 13.5 billion years ago some forces suddenly expanding from the singularity and resulting in the formation of time & space. As the space expanded and temperature slowly cool down gradually resulting in conversion of energy and formation of quarks.

3. Formation.

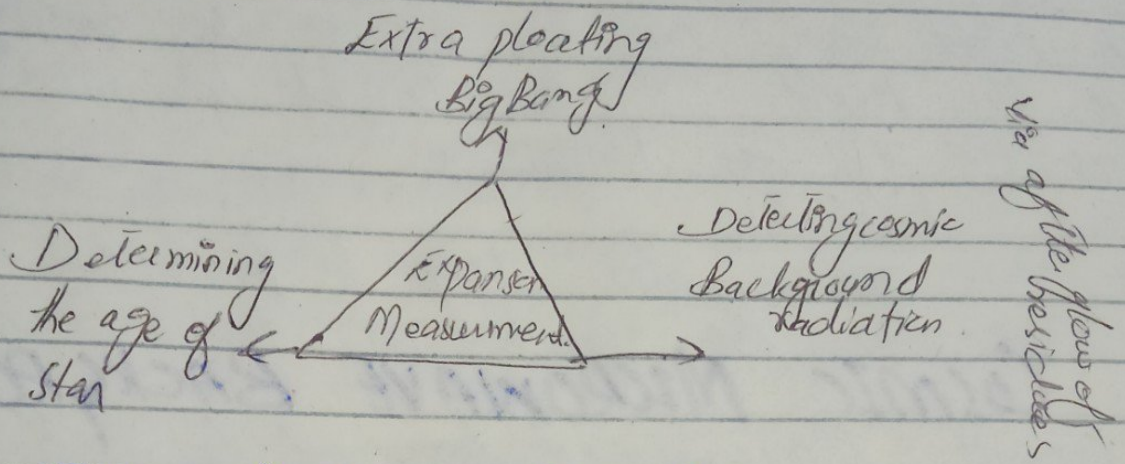
Eventually quarks start making atoms, particles and sub atomic particles which resultingly grow with passage of time & formation of proton, electron sub atomic particles which result in the formation of planet, star, and universe, which we can see today.



METHODS TO MEASURE THE AGE OF UNIVERSE:

There are following methods to measure the age of the universe via Hubble constant

via luminosity spectrum



Extrapolating Big Bang:

According to scientist age of universe is about 14 billion years old which can be measured by using the Hubble constant H_0 .

Hubble noted that the galaxy is directly proportional to the speed of the universe. The further the galaxy was, it was moving away.

$$d = vt$$
$$t = d/v \quad v = H_0 d$$
$$t = d/H_0 d$$
$$t = 1/H_0$$

BY DETERMINING THE AGE OF THE STAR:

The age of universe can be determined by the age of the star.

SPECTRUM

by the help of star spectrum blue star has low freq & tend to die faster as compare to red star.

LUMINISITY

A bright star has less energy as compare to less bright and less bright have greater luministy exist for longer time.

Mass,

The star mass also help to find life the massive star die quickly as less massive.

COSMIC MICROWAVE BACKGROUND.

Cosmic Microwave background help to find the life of the universe. Arno penzias & wilsons detect the cosmic radiation.

SEMI CONDUCTORS:

Semi conductors are the type of material that exist between the conductor & insulators. and has electrical resistance b/w metals & insulators. as the name indicate semiconductor of sometime refered as the integrated circuit made of up from pure element of Silicon and Germanium or compound like gallium or arsenide.

SEMI CONDUCTOR IN MODERN ELECTRONIC:

It is the matter of the fact that semi conductors are made up of million.

of electronic devices and used in computer, health care, transport security, machines.

Computing:

Microchip are used in computing are the first modern means of computation. Depending on the type of Microchip semi-conductors use binary chip.

Telecommunication:

The principle is same as in computer. It is used for navigation, 4G reception, battery use and a lot of features in mobile phone.

House hold Appliances:

Also used in Refrigerator, Microwave, washing machines and other security purpose. The ship control temperature, heat and other automated features.

Banking:

Consider the banking sector banks are major investors in microchip deal with digital banking, ATMs, and security camera, docking machines.

In short semi-conductors revolutionized the modern world.

Part 1).

GLOBAL WARMING:

Global warming is the long term heating effect of earth surface observed since the pre-industrial period (between 1850-1900) due to human activities.

Global warming occur when the CO₂ and other air pollutant react with sunlight and change the temperature of earth.

Main Components

Main components of global warming are CO₂, SO_x, NO_x, CO etc

Major component of global warming is CO₂ which result in reaction with air particle & radiation & change earth temperature.

EFFECT OF GLOBAL WARMING:

Because of Green house effect earth temperature change which result in the different problems.

MELTING OF GLACIERS:

Glaciers start melting because with the passage of time earth temperature become high and resulting floods, and many other disasters.

Depletion of Ozone layer.

Because of Global warming earth temperature decrease gradually & many particle like CFC's originate from

refrigerator, AC, and Cars can react with molecule of ozone cause depletion.

Effect on human:

pollution of cause by GHGs and depletion directly affect human & in the form of different diseases & different disaster.

Measures:

Some Remedial measure must be taken to solve the problem:

Reduce the emission of CO₂

Reduce emission of CFC's

Reduce use of Fais.

Industrial waste must dispose off properly

Q# 02
Part (a)

OPTICAL FIBRE:

Fibre optics is a bundle of thin strands made of glass or plastic, which uses light (photon particle) to transmit signals. Therefore, the transmission capacity of fibre optics is far greater than other modes of communication, such as copper wire and metallic wire. As a result, it is used in the form of different cables and is being utilized in numerous fields of life.

HOW OPTICAL FIBRE WORKS:

The propagation of light in the optical fibre requires that light should be totally confined within the fibre and not escape from it.

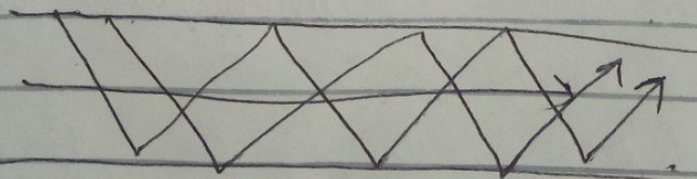
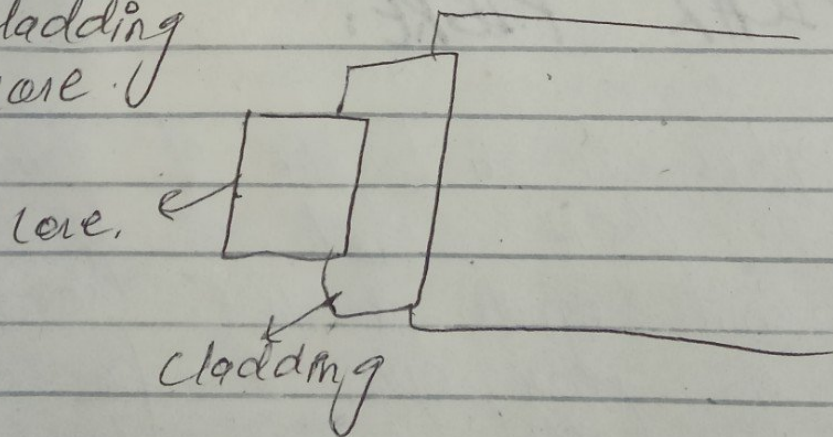
This can be done by

- Total internal reflection
- Continuous Refraction

Since light rays travel in the straight lines, optical fibres are designed in the way that they bend all light rays inwards. Light rays travel continuously, bouncing off the optical fibre walls and transmitting end to end data. Although light signals do degrade over progressing distances, depending on the purity of the material used, the loss is much compared to using metal cables.

Structure.

- cladding
- core



Uses:

used for Telecommunication for transmitting
and receiving process
Used in medical devices
Used to transmit images
Used in wiring in air craft hydrophones
for SONARS & seismic application.

Q # 02 Part (b)

GPS:

Global positioning System:

Geo positioning sys, GPS is a space based navigation technology that provides the pinpoint location, velocity and time 24 hours a day of any thing on the earth with ultra high accuracy. Although the GPS project has been started by the US Defense Dept in 1973 for military operation, it has not been in main stream until 2007.

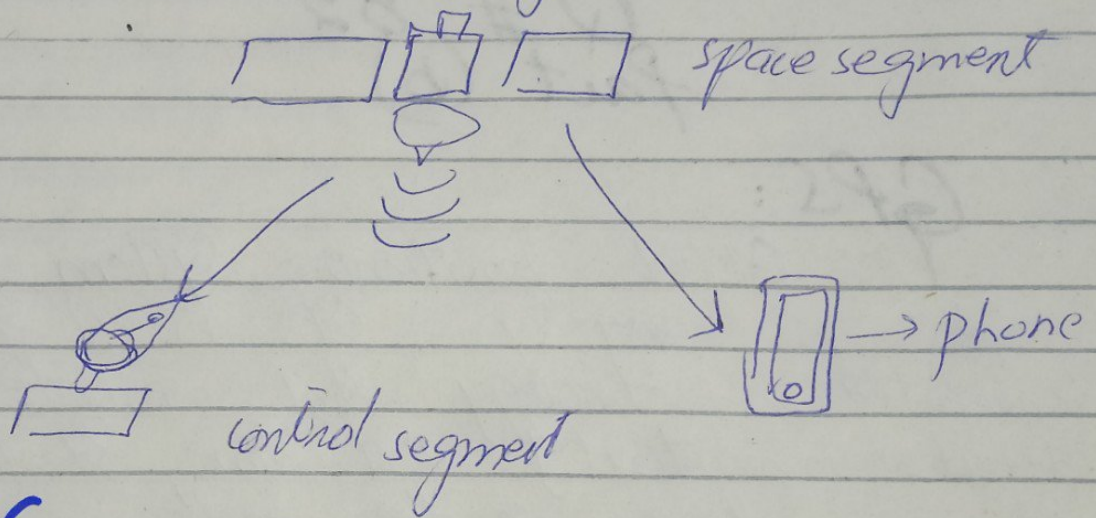
WORKING OF GPS:

3 main fundamental segments

- Satellites
- Receiver
- Control system

Almost 31 satellite orbit around the earth at different angles collecting data from all over the earth, they continuously emit radio signals.

in response to approaching signals, the portable receiver for instance, your mobile phone becomes actively and measure location of the satellites. The distance then measured by triangulation, tri referring to three, as the three minimum satellites are always required to produce accurate signals.



GIS:

GIS full form Geographical Information System. It takes data collected from many sources in many forms as input and convert it into information depending the process adopted by the user. GIS provide information related to geographic data.

USES

It widely used for preparing different types of map for

cartographic studies.

Application
And also in environmental application
used in transportation, road network.
planning, used by military used
in aeroplanes etc

SOLID WASTE MANAGEMENT

The disposal of domestic refuse, commercial, and industrial solid wastes or semi-solid material is studied under the title. The domestic municipal solid waste mostly consists of garbage, waste treatment plants, commercial refuse, air pollution control, construction debris, sludge from the water supply and other discarded material.

SOURCES OF SOLID WASTE

Solid domestic garbage
Solid waste material from various industries
Solid agricultural waste
plastic, glass, metal, e-waste
medical waste
Construction waste.

DISPOSAL OF WASTE

The process of waste handling & disposal varies in diff countries.

They are classified as
Municipal solid waste
Hazardous solid waste.

From homes and from industries.

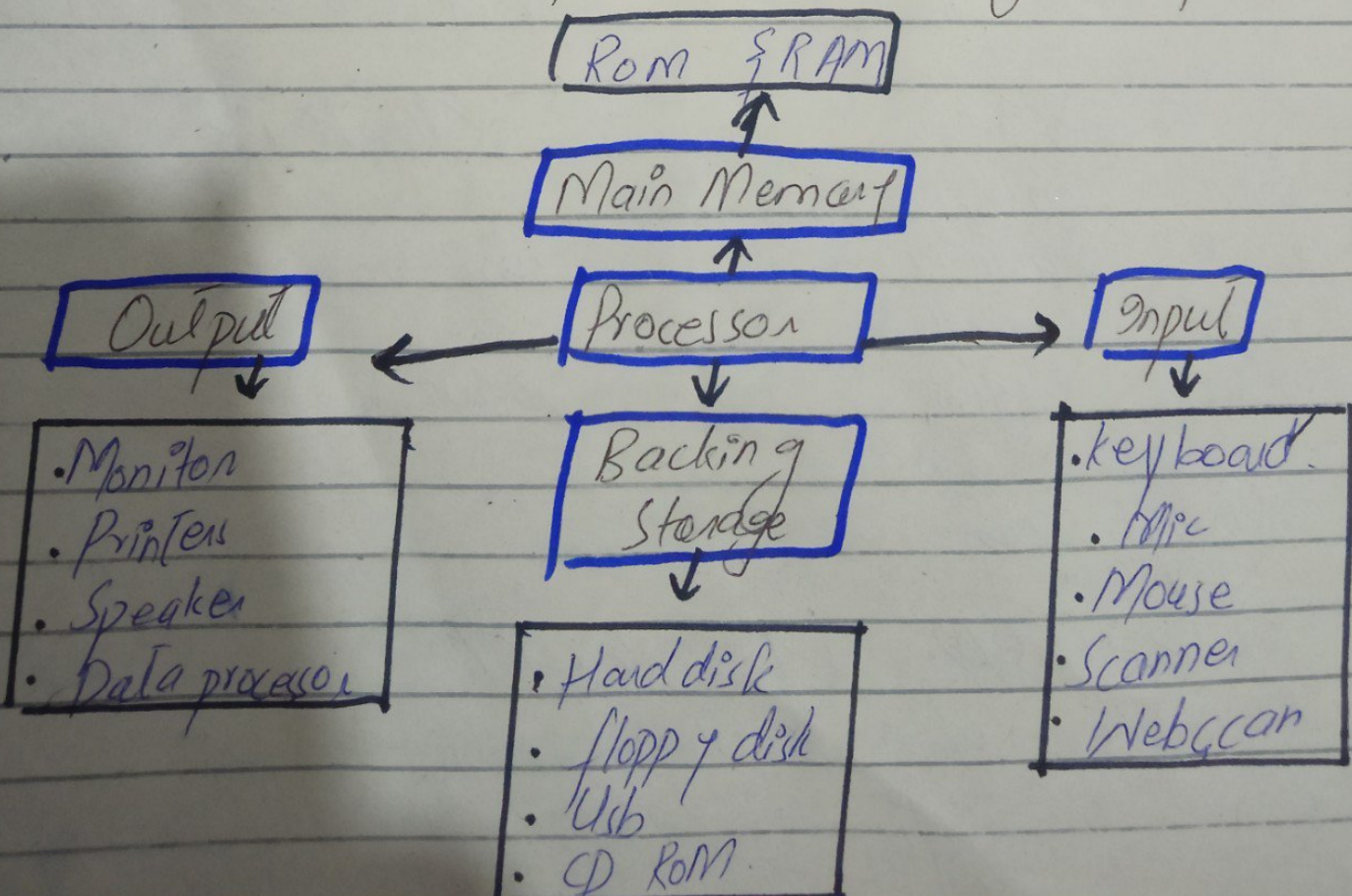
EFFECT:

Due to poor solid management cause many environmental problem.

- effect on human → cause diseases
- Environment → cause pollution
- Ocean → effect aquatic life
- Water pollution
- Atmospheric pollution

Part (d)

Draw block diagram of input and output device of computer.



There are nine students in a group having ages 15, 15, 16, 16, 16, 17, 17, 18, 19. Calculate mean, median, mode & range of their ages also.

$$\text{Mean} = \frac{\text{Sum of values}}{\text{Total no of values}}$$

$$= \frac{15 + 15 + 16 + 16 + 16 + 17 + 17 + 18 + 19}{9}$$

$$= \frac{149}{9}$$

$$= 16.55$$

$$\text{Median} = \frac{n+1}{2}$$

$$= \frac{9+1}{2} = \frac{10}{2}$$

$$\text{Median} = 5$$

$$\text{Mode} = 16$$

Range = difference between maximum value & minimum value.

$$\text{Range} = X_m - X_0$$
$$= 19 - 15$$

$$= 4$$

Part B:

A card is drawn at random from a box containing 12 cards numbered 1, 2, 3, ..., 12

1. probability of an event E + Probability of event not $E = 1$

ii 2. probability of an event that can't happen is 0
an even number:

$S = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12$

Let A be the event selecting even no. then $n(A) = 2, 4, 6, 8, 10, 12$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{6}{12} = \frac{1}{2}$$

∴ probability of even no is $\frac{1}{2}$

i. (8)

$S = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12$

Let A be the event selecting 8 then $n(A) = 8$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{1}{12}$$

ii. Perfect square:

(1), (4), (9)

$$P(A) = \frac{n(A)}{n(S)} = \frac{3}{12} = \frac{1}{4}$$

Negative no:

Let A be event selecting -ive no. $n(A) = 0$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{0}{12}$$

$$P(A) = 0$$

No less than 13:

$$n(A) = 1, 2, 3, \dots, 12$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{12}{12}$$

$$P(A) = 1$$

of brother language Brother \rightarrow Q D G S N Q A

Sister \rightarrow

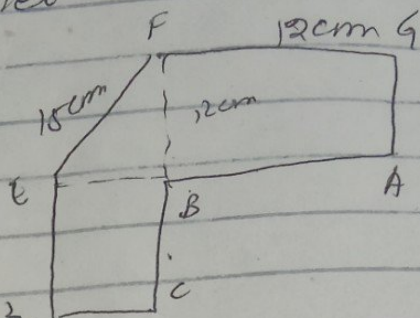
B R O T H E R Q D G S N Q A

S I S T E R Q I D S R H R

Calculate area of perimeter.

Square

$$AB = GF = AG = BF = 12\text{cm}$$



$$\text{Area of ABFG} = 12 \times 12 = 144\text{cm}^2$$

Triangle

Pythagorean theorem

$$(EF)^2 = (BE)^2 + (BF)^2$$

$$(BE)^2 = (EF)^2 - (BF)^2$$

$$(15)^2 - (12)^2$$

$$225 - 144$$

$$= 81$$

$$\sqrt{BE^2} = 9$$

$$BE = 9$$

$$\text{Area of BFE} = \frac{\text{Length} \times \text{Width}}{2}$$

$$= \frac{12 \times 9}{2} = \frac{108}{2}$$

$$= 54\text{cm}.$$

$$BC = DE = DC = BE = 9\text{cm}.$$

ABFG

$$9 \times 9 = 81\text{cm}.$$

$$ABFG + BFE + BCDE$$

$$144 + 54 + 81 = \text{cm}^2$$

$$\begin{aligned} \text{Perimeter} &= AB + BC + CD + DE + EF + FG + GA \\ &= 12 + 9 + 9 + 9 + 15 + 12 + 12 \\ &= 78 \text{ cm} \end{aligned}$$