

Section - 1

Q. No. 3

a:

Big Bang Theory:

The term "big bang" was coined by Sir Fred Hoyle in 1950. According to this theory, the early universe came into being around 13.8 billion years ago with a large, single and extremely hot & dense point. That point suddenly began to expand and universe came into existence.

Explanation:

Big bang released a large amount of energy which resulted in the formation of gravity, electrons and protons. Following are the key stages of Big bang expansion.

i. At first it was a linear expansion for

10^{-43} to 10^{-32} seconds

- ii- Protons were formed after 10^{-6} seconds after big bang
- iii- Deuterium and Helium synthesized after 100 seconds
- iv- After 100 million years, first star was formed
- v- Known galaxy came into being after 500 million years of Bigbang

Role of Dark Matter and Energy:

Universe is divided into two kinds of matter and energy

- 1- Known Universe
- 2- Unknown Universe

Known Universe:

It comprises almost 5% of the total universe. It consists of both visible and invisible matter and energy. Its properties are known and can be controlled and utilized

Unknown Universe

It comprises almost 95% of total universe. It is composed of :

dark matter and dark energy.

- a- Dark matter is invisible and non-luminous matter present within galaxies but can't be approached, controlled or utilized.
- b- Dark Energy, is actually responsible for expansion of Bigbang because it is present between galaxies.

Evidences of Bigbang:

There are three approaches to support Bigbang Theory

1. Redshift Galaxies:

According to this approach

The red shift between galaxies tells us that universe is expanding

2. Microwave Background Radiations:

After

Bigbang, there was heat left ~~by~~ in universe which is now filling the entire universe.

3. Mixture of Elements,

Some chemical elements are found to be created soon after

Bigbang e.g Hydrogen and Helium.

Conclusion:

The Bigbang Theory explains that universe was created from a single powerful point and is now expanding continuously.

b:

Galaxy:

A galaxy can be defined as, "Massive collection of billions of stars, gravitationally attracting each other and orbiting around common centre is called galaxy".

Astronomers say that there are almost 125 billion galaxies in the universe.

Some galaxies are dwarfs i.e. with few stars while some are giant with trillions of stars.

Classification of Galaxies.

Galaxies are

divided into various shapes.

1. Spiral Galaxies.

It is disc-shaped with a bulge in centre and contain arms which surround the bulge. They contain middle aged stars with dust and gases. Milky way is a spiral galaxy.

2. Elliptical Galaxies.

They appear as luminous discs with smooth distribution of light. It contains aged stars, with little gas and dust.

3. Irregular Galaxies.

These galaxies have undefined structure. These have lots of young stars. Irregular galaxies contain stars that are under the influence of gravitation.

Milky Way:

It is a large, disc-shaped galaxy. It contains Earth's solar system and many other stars which are visible.

It's diameter is estimated upto 100k light years. Its form is spiral and has a bulge in the centre and the nearest galaxy to it is Andromeda.

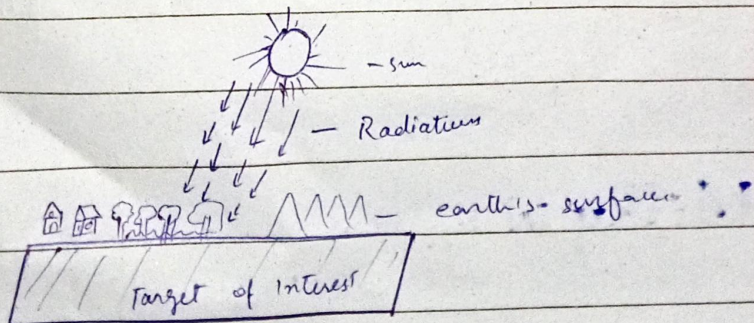
C :

Remote Sensing:

The term contains two words "Remote" means "distant object" and 'sensing' means "information". It is defined as:

"It refers to a science used to get information about any area or geographical region by using sensors."

Principles of Remote sensing:



1. A source of energy is needed to make object visible. Sun in the day and

artificial light at the night

2. When radiations of ~~sun~~ interact with atmosphere they start to reach the target of interest.
3. On interacting with target object some energy is reflected back while some of it is absorbed.
4. When the absorbed energy is received, it is transmitted into other form to make image of target through sensors. This image is interpreted and used for various causes.

Application:

1. Geographic Area:

It helps in finding any macro-pattern located onto a specific area.

2. Urban Management:

It is used for management purposes like infrastructure and development.

3. Environmental Monitoring:

It helps to recognize the causality like floods or fire in

an area

4. Forest Conservation:

Since remote sensing is used for taking pictures, it can help if a fire breaks out in forest.

5. To Monitor Glaciers:

One of the biggest problems of present day is increasing temperature and risk for glaciers to melt rapidly. Through remote sensing we can monitor melting & rising of sea level.

6. Agriculture Land Monitoring:

To monitor lands crops, remote sensing can be used. It will help in better crops and less loss of yield.

7. Access to Tough Areas:

Tough areas like higher mountains or glaciers which are too cold to handle physically can be monitored and explored through remote sensing.

Types:

1. Satellite Imaging:-

Capturing images of earth using sensors through satellites is called satellite imaging.

It is very high and cover wide area thus used for weather forecast, agriculture and disaster management etc.

2. Aerial Photography:-

Use of aircrafts or drones to take pictures of a target point of earth is aerial photography. It covers smaller area and its resolution is high so it is used for urban planning or mapping etc.

3. Ground-based Remote Sensing.

It is done through sensors mounted on the ground like towers or vehicles. e.g. weather stations and traffic cameras etc.

4. Thermal Remote Sensing.

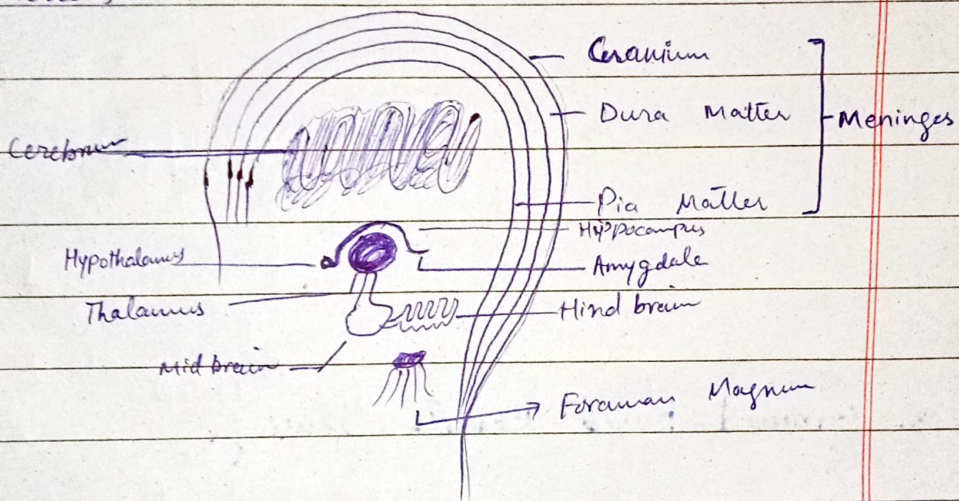
Detection of heat emitted by object is called thermal remote sensing e.g. volcano monitoring can be

done through this.

d.

Human Brain:

Brain is the major part of central nervous system of human. It controls whole system of the body and plays a supervisory role in performing actions.



Division of Brain,

1. Fore brain,

It is the frontal part of the brain and is further divided into:

a- Thalamus

It contains sensory information. It collects and transfers memory.

b Limbic System:

Limbic system consists of

- Hypothalamus; like a seed and manage Temperature, hunger, Thirst and menstrual cycle etc.
- Hippocampus; stores memory especially short-term
- Amygdala is the emotional part of brain and controls emotions like happiness, sadness & punishment etc.
- Cerebrum is the largest part of brain and controls thinking, intelligence, judgement, decision making & learning etc.

2. Mid-brain:

It is middle part of brain and connects forebrain to hind-brain

3. Hind brain:

Last part of brain and is further divided into:

- a- Medulla Oblongata which controls all involuntary actions like heart rates, breathing, blood pressure etc.

b. Cerebellum,

It stores long term memory and helps in coordination of body like walking and balance of body.

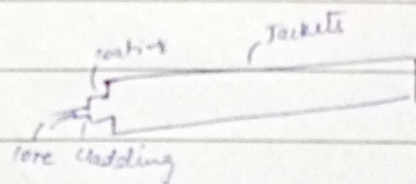
Q. # 4

a.

Fiber Optics

Technology used to transmit information through pulses through strands of glass or plastic thread is called fiber optics

Structure:



Core, Light propagates through it.

Cladding: It is usually Glass or Plastic. It reduces loss of light from core and reduces scattering loss as well.

Coating protects fiber from physical damage.

Jackets bundle all fiber in one cable.

Uses:

- 1- It is used in telecommunication
- 2- Widely used in broadcast and streaming
- 3- Banking and financial transactions are done through it
- 4- Underwater and submarine communication is done through it.
- 5- Used in power & energy sector
- 6- In remote sensing & env. monitoring.

Q. # 6

a:

Suppose two numbers as 'x' & 'y'

$$xy = 120$$

$$x^2 + y^2 = 289$$

$$\begin{aligned}(x+y)^2 &= x^2 + y^2 + 2xy \\ &= 289 + 2(120) \\ &= 289 + 240\end{aligned}$$

$$(x+y)^2 = 529$$

Taking squareroot

$$\sqrt{(x+y)^2} = \sqrt{529}$$

$$x+y = 23$$

23 is the sum of two numbersb

Kamran's present age = A

Salman's present age = B

6 years ago

$$\frac{A-6}{B-6} = \frac{6}{5}$$

$$5(A-6) = 6(B-6)$$

$$5A - 30 = 6B - 36$$

$$5A = 6B - 6 \quad \text{--- (i)}$$

$$A = (6B - 6)/5 \quad \text{--- (i)}$$

4 years hence condition

$$\frac{A+4}{B+4} = \frac{11}{10}$$

$$10(A+4) = 11(B+4)$$

$$10A + 40 = 11B + 44$$

$$10A = 11B + 4 \quad \text{--- (ii)}$$

$$A = (11B + 4)/10 \quad \text{--- (ii)}$$

Substituting (i) into (ii)

$$(6B - 6)/5 = (11B + 4)/10$$

$$10(6B - 6) = 5(11B + 4)$$

$$2(6B - 6) = 11B + 4$$

$$12B - 12 = 11B + 4$$

$$12B - 11B = 4 + 12$$

$$B = 16$$

B (Salman's present age) 16

(A) Kamran's age

$$A = 6(16) - 6/5$$

$$= 96 - 6/5$$

$$5A = 6B - 6 \quad \text{--- (i)}$$

$$A = (6B - 6)/5 \quad \text{--- (i)}$$

4 years hence condition

$$\frac{A+4}{B+4} = \frac{11}{10}$$

$$10(A+4) = 11(B+4)$$

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$$2(6B - 6) = 11B + 4$$

$$12B - 12 = 11B + 4$$

$$12B - 11B = 4 + 12$$

$$B = 16$$

B (Salman's present age) 16

(A) Kamran's age

$$A = 6(16) - 6/5$$

$$= 96 - 6/5$$

$$A = 90/5 = \boxed{18}$$

Q. # 7.

b

Missing Terms

i.

53, 53, 40, 40, 27, 27, ...

Ans: 53, 53, 40, 40, 27, 27, 14, 14

ii.

14, 28, 20, 40, 32, 64, ...

Ans: 14, 28, 20, 40, 32, 64, 56

iii

8, 6, 9, 23, 87, ...

Ans: 8, 6, 9, 23, 87, 273

iv B, F, R...Ans: B, F, R, B

B is the answer

(2, 6, 18, 54)
x3 x3 x3

V- V, U, W, V, X, W...

V, U, W, V, X, W, Y

(2, 2, 21, 23, 22, 24, 23)
(-1 +2 -1 +2 -1 +2)d.Father's age = $F - 10$ Son's age = $S - 10$

$$F - 10 = 3(S - 10)$$

$$F - 10 = 3S - 30$$

$$F = 3S - 20 \quad \text{--- (1)}$$

Ten years hence

$$F + 10$$

$$S + 10$$

$$F + 10 = 2(S + 10)$$

$$F + 10 = 2S + 20$$

$$F = 2S + 10 \quad \text{--- (2)}$$

Solving (1) & (2)

$$3S - 20 = 2S + 10$$

$$3S - 2S = 10 + 20$$

$$S = 30$$

Age of son is 30

$$\text{Father's age} = 2S + 10$$

$$= 2(30) + 10$$

$$= 70$$

$$F : S = 70 : 30$$

$$\boxed{= 7 : 3}$$