What is universe? Explain its origin with theoretical perspective?

Universe

Definition

The universe is everything that exists - all of space matter, time, energy and physical laws that govern them. It includes: galaxies, stars and planets, atoms and subatomic particles, Time and space themselves

Origin of the universe

The Orign of the universe is one of the most fundamental questions in science. Over time, several theories have been proposed to explain how the universe began. Some are well supported with evidence, while other remain speculative. Below are the most notable ones.

Big Bang Theory

Most astronomers believe that the universe began in a Big Bang about

13.7 billion years ago. At that time the entire universe was inside a bubble that was thousands of time smaller than a pinhead and it was named as "singularity" which was extremely hot and dense. In less than a second with a massive explosion called the Big Bang. Before this, there was no- time space or matter.

Rapid Expansion

In less than a second, the universe expanded from than an atom to larger then a galaxy. It kept growing at very fast rate and is still expanding today.

Evidence for the Big Bang:

1. **Cosmic Microwave Background (CMB)**

- Faint radiation left over from the early universe, discovered in 1965. It confirms that the universe began as a hot and dense state and has been cooling ever since.

Redshift of Galaxies

Light from distant galaxies is redshifted meaning their wavelengths are stretched. This shows that galaxies are moving away which supported the idea that the universe is expanding

Abundance of light Elements

Large amount of hydrogen, helium and traces of lithium are found in the universe.

Their presence matches what scientists predicted would form in the first few minutes after the Big Bang.

Steady state theory (Now outdated)

This theory claimed the universe has no beginning or end. It is eternal and unchanging in appearance, even as it expands

How it works:

As galaxies move apart, new matter is continuously created to maintain a constant density of the universe.

It was rejected:

It could not explain the discovery of the CMB which strongly supports the Big Bang. It lacked observational evidence and failed to explain galaxy formation and evolution.

Oscillating universe Theory

(cyclic Model)

This theory ~~posses~~ proposes that the universe goes through endless cycles of expansion (Big Bang) and contraction (Big Crunch)

How it works

After expanding for billions of years gravity eventually causes the universe to contract. Once it collapses into a singularity a new Big Bang begins, starting the next cycle.

Current Status:

Although it's an interesting concept. It lacks strong observational evidence. So far we see no sign of contraction that would lead to a Big Crunch.

Inflation Theory (Refinement of Big Bang)

Inflation theory is not a separate origin theory but an addition to the Big Bang Theory. It suggests that a rapid exponential expansion, happened just a tiny fraction of a second. after the Big Bang.

Purpose

Inflation helps solve certain problems in the original Big Bang model.

Horizon Problem:

why the universe looks the same in every direction.

Flatness problem:

why space appears geometrically flat.

Scientific Standing:

This theory is widely accepted and supported by precis measurement of the CMB and cosmic structure.

Multiverse Theory

(Speculative Idea)

The multiverse theory suggests that our universe may be just one of many in a vast system called the multiverse

- Each universe in the multiverse could have different physical laws dimentions or constants.

- Not fully rejected or accepted but remains a theoretical idea.

Conclusion:

Many theories have been proposed to explain the origin of the universe, including the Big Bang, inflation, oscillating universe steady state, and Multiverse Theory. Each offers a different perspective but the Big Bang theory remains the most widely accepted due to strong scientific evidence such as the cosmic microwave background radiation, redshift of galaxies and the abundance of light elements. Other remains speculative

and the true origin of universe is still a mystery that science continues to explore.

Define Galaxy • Explain its types.

Galaxy:

word derivation.

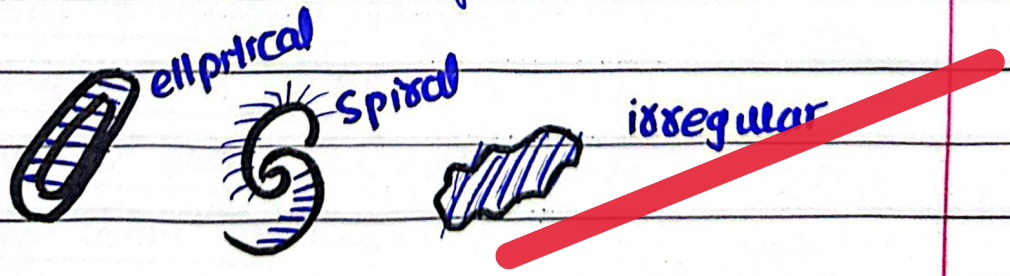
The word 'galaxy" is derived from the Greek word "galaxias", which comes from "gala" meaning 'milk"

Definition

A galaxy is a large system of stars, gas, dust and dark matter held together by gravity It can contain millions to trillions of stars. Our Solar system is part of the Milky Way Galaxy.

Shapes:

Galaxies comes in different shapes and size like Spiral epllptical or irregular



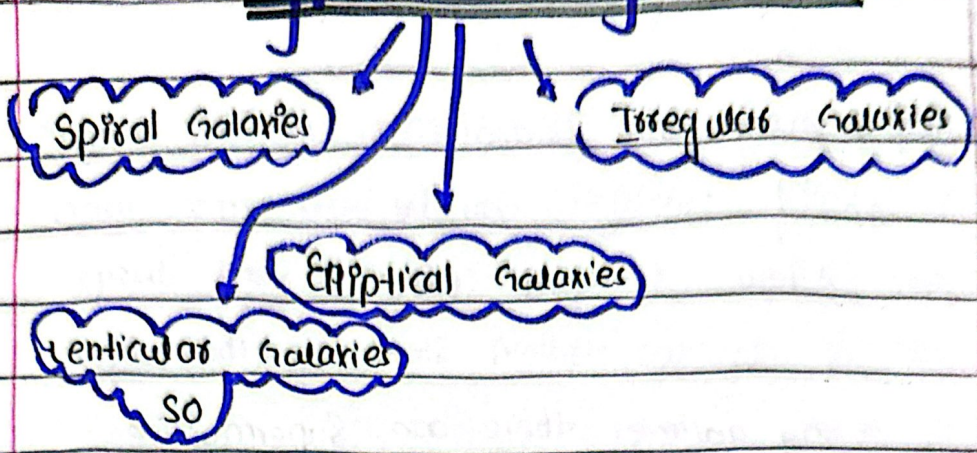
Astronomers estimate that there are about 100 to 200 billion galaxies exist in the observable universe

Milky way and Andromeda are the example of galaxy. Galaxies can be very small with just a few thousand stars or very large with up to 100 trillion stars. In the center of many galaxies there are supermassive "black hole" which are very dense areas in space where ~~gravity.~~ gravity is so strong that nothing can escape from them not even light.

How galaxies are formed

1. Big Bang created hot, dense energy about 13.8 billion years ago.
2. cooling led to the formation of atoms (mainly hydrogen and helium)
3. Gravity pulled atoms into gas clouds.
4. Stars formed inside these clouds
5. Groups of stars clustered into protogalaxies.
6. protogalaxies merged to form larger galaxies
7. Galaxies ~~as~~ evolved over time through star formation and collisions.

Types of galaxies



Spiral Galaxies

Spiral galaxies are galaxies that have a flat, rotating disk with a central bulge and well-defined spiral arms.

Key features:

- contain large amounts of gas and dust.
- Active star formation, especially in the spiral arms
- Bright appearance due to young blue stars.

Example:

Milky way Galaxy
Andromeda Galaxy (M31)

Elliptical Galaxies

Elliptical galaxies are rounded or oval-shaped galaxies with a smooth, featureless

appearance and no spiral arms.

Key Features:

Contain mostly old stars

Very little gas and dust

Little or no star formation.

Example

Messier 87 (M87)

Centaurus A

Irregular Galaxies:

Irregular galaxies are those galaxies that lack a regular shape or structure.

Features

- Often formed due to collisions or gravitional forces
- Rich in gas and dust.
- Active regions of star formation

Example

- Large Magellanic cloud
- IC 10

Lenticular Galaxies (S0)

Lenticular Galaxies are disk-shaped

galaxies like spirals but without visible spiral arms, often appearing as a blend of spiral and elliptical types

Features

contain mostly older stars

Limited gas and dust

very little or no new star formation

Example

NGC 5866

Conclusion

Galaxies are classified based on shape and structure into spiral, elliptical, irregular and lenticular types. Each type reflects a different stage of evolution and composition helping us understand how galaxies form and change over time.

Good
You have got potential
Try and add diagrams
Also, try to manage time
3 sides are enough for one 5 mark part