

Q1 (CSS-2021)

Briefly describe the most popular and accepted theory about the origin of Universe.

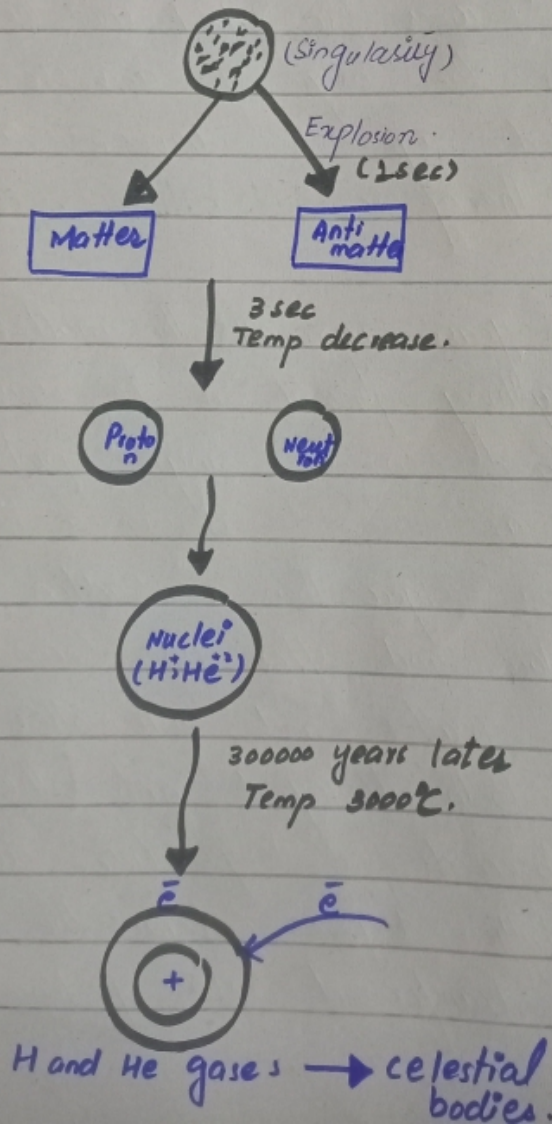
Big Bang Theory

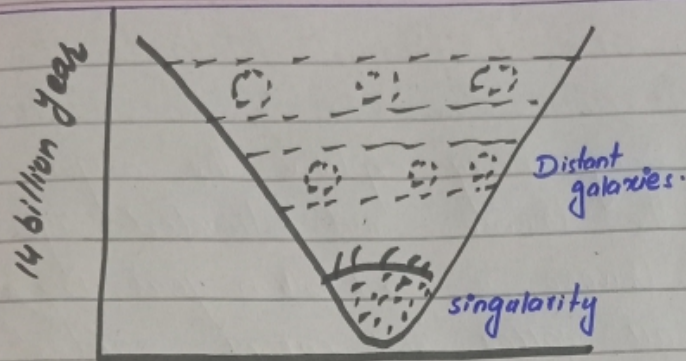
Big Bang Theory was put forward by George Lemaître in 1927. This theory explains the origin of universe and estimated age of universe according to this theory is **13.7 billion years**.

13.7 billion years ago, all the matter, energy and everything present in the universe was confined in a single pinhead known as "Singularity." It was a hottest and denser object. Then a sudden explosion took place and after one second of explosion matter and anti-matter were created. Both destroyed each other and after 3 seconds as temperature decreased to 1 billion degree celcius, the stable matter transformed into proton and

Neutrons, which combined together and resulted in the formation of Hydrogen and Helium nuclei.

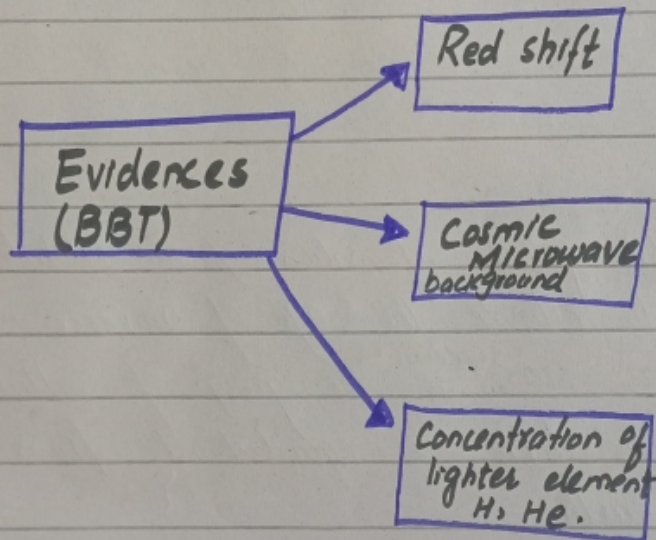
After 300,000 years, when temperature reached 3000°C these nuclei were able to capture electrons and formed hydrogen and Helium gases. These gases gave rise to the all celestial bodies present in the universe.





Expanding Universe
(Big Bang Theory)

Evidences of Big Bang



These three evidences support Big Bang Theory and make it the widely accepted and popular theory about origin of the universe.

Q#2 (CSS-2018)

Describe Different Methods to determine the age of the Universe.

Big Bang Theory explains the origin of the Universe and estimated age of Universe is 13.7 billion years. Before this all matter and energy existed in the form of a hottest and dense singularity.

Two methods used widely for determination of the age of universe are:

- (i) By age of oldest stars
- ii) By Universe expansion concept of Hubble's law.

(i) By age of oldest stars

Scientists gather information from Globular star to estimate the age of Universe.

Globular stars/cluster is the group of millions of stars which are equidistant from the Earth.

Studies reveal that mass of all other stars is 0.7 less than mass of the sun.

It means they are burning about 11-14 billion years ago. Because mass of the stars gives idea about age of the star and is useful in determination of

age of universe.

(ii) By Hubble's expansion Law

This method is based on expansion of Universe Theory. Hubble's law states that there is direct relation between intergalactic distance (d) and the recessional velocity (v)

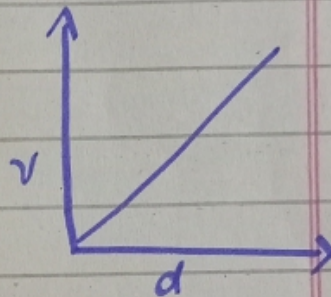
$$v \propto d$$

$$v = Hd$$

H = Hubble's Constant

v = recessional ~~frequency~~ ^{velocity}

d = Intergalactic distance.



Inverse of Hubble's constant gives time
or age of universe

$$t = \frac{1}{H}$$