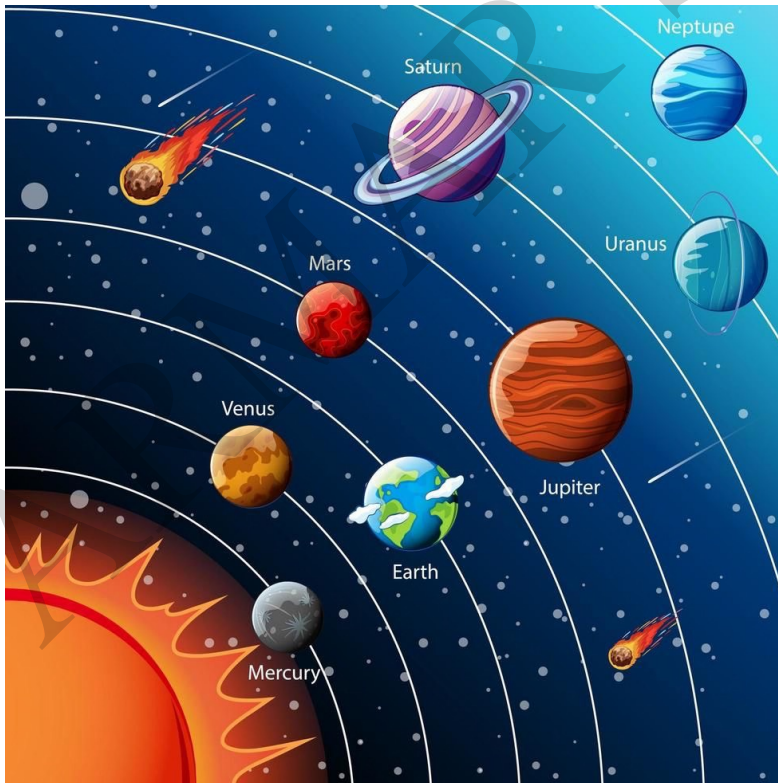


SOLAR SYSTEM





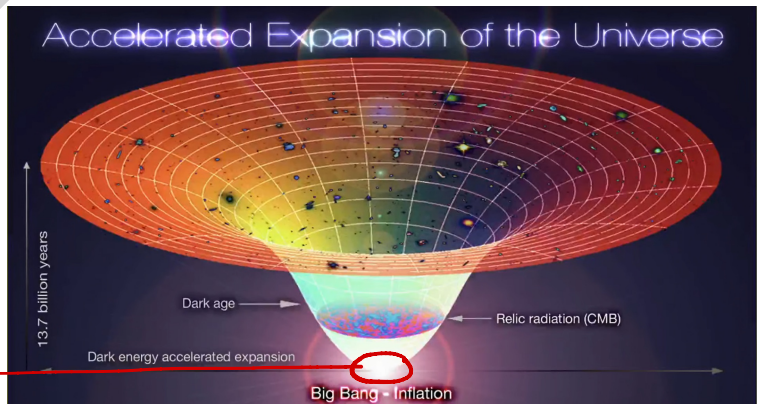
- Nearest galaxy: Andromeda Galaxy
- Study of Universe: Cosmology



ORIGIN OF UNIVERSE

Theories given:

- BIG BANG THEORY



Infinitely hot and dense single point → Exploded

George Lemaitre: 1931

Edwin Hubble

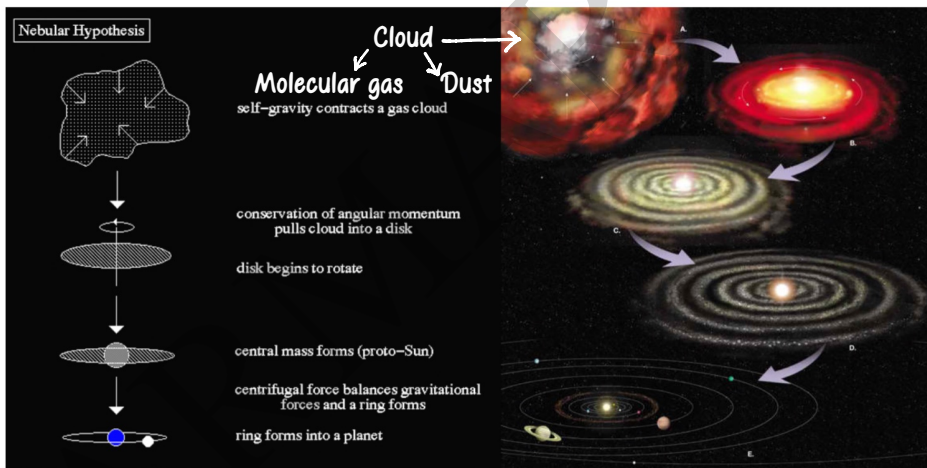
→ Increase in distance of celestial bodies

Origin of Big Bang Theory. Also, → Explosion → 13.6 billion years ago known as Big Bang Explosion

4.5 billion years ago

FORMATION OF OUR SOLAR SYSTEM

- **Nebular Theory, 1755:** by Immanuel Kant
1796: modified by Laplace
- **Nebula:** A giant cloud of dust and gas



• $H_2 + He \rightarrow$ Nuclear Fusion

• $H + H \rightarrow He \rightarrow$ Formation of Sun (mostly made of H_2 and He)

$H_2 \rightarrow 70\%$

- **Indian Institute of Astrophysics HQ: Bangalore**



CELESTIAL BODIES

Two types:

- **Luminous:** Self-glowing, eg: stars
- **Non-Luminous:** Not self-glowing, but can reflect light from other sources. Eg: Moon

1. **Asteroids:** they are small, rocky objects that orbit the Sun
2. **Meteoroids/Meteors:** enters Earth's atmosphere and burn up in Mesosphere (shooting stars)
3. **Comet:** Small icy dirt balls that orbit the Sun, burn upon reaching Sun
4. Stars

- **Stars:** luminous bodies
- **Colour:** Depends on temperature
- **Group of stars:** Constellation

- ↓
- **Largest:** Hydra
 - **Urja Major:** Sapta Rishi

- **Brightest star in Orion Constellation:** Rigel
- **Brightest star in night sky (overall):** Sirius (Dog Star)
- **Closest star to Earth:** Sun → **Distance from Earth:** 150 million km (1.5×10^8 km)

↓

After Sun, it is Proxima Centuri

- **Light Year/Parsec:** celestial distances
- **1 LY:** 9.46×10^{12} km
- **1 Parsec:** 3.26 LY

Sun

• **India's first Solar Mission**

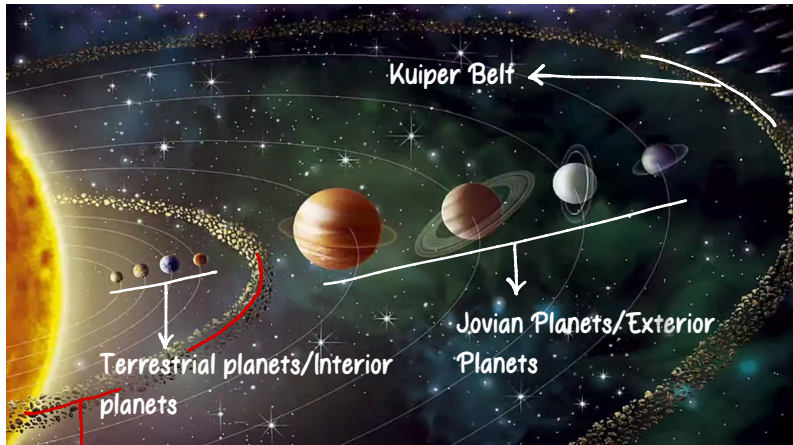
- ↓
- **ADITYA L1 mission** ISRO, India

- **The only star in our solar system** and powerhouse of solar system
- **Composed of Hydrogen (73%), Helium (25%) and other metals**
- **Carries 99% mass of our solar system**
- **Approx 109 times of Earth**
- **Takes 8 minutes 30 seconds for light at speed of 3 lakh km/sec to reach Earth**
- **Temperature at surface = 5800 K/5600 C**
- **Temperature at centre = 15.7 million K**
- **Outer layer: CORONA**

Moon

- Earth's natural satellite
- Non-Luminous
- Radii: 1.74×10^6 m
- Time of Moon's light, takes to reach Earth: 1.26 secs
- Distance b/w Earth and Moon: 3,84,000 km
- Gravity = Earth's gravity
6
- Rotation = Revolution (same)
↓
27.3 days → Only one side of the Moon is visible (far side)
- Rotation: object's spinning motion about its axis
- Revolution: object's orbital motion around another object
- All planets rotates from **West to East** (anti-clockwise) **except Venus and Uranus** (clockwise)





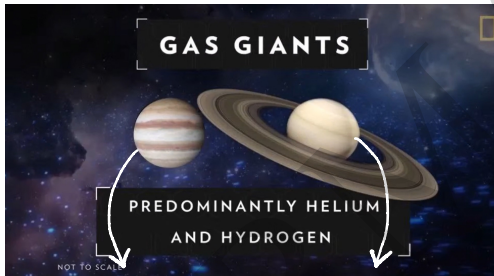
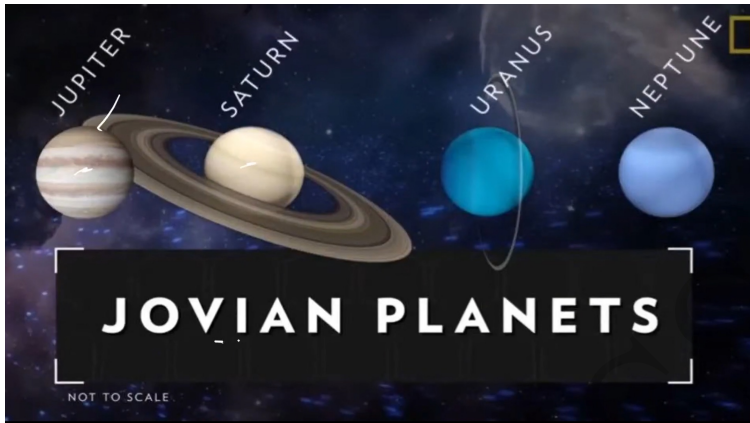
Asteroid Belt: b/w Mars and Jupiter

- Pandit Jasraj becomes the first Indian musician to have a minor planet named after him: Panditjasraj (300128) → Derived from his date of birth, 28 Jan 1930

• Characteristics of Terrestrial Planets



Revolves around planets



Jupiter Saturn



Uranus Neptune

1st Planet: Mercury

- Closest planet to Sun
- Smallest planet in solar system
- Diameter: 4900 km
- Fastest planet, takes 88 days to complete revolution around Sun
- Planet with no satellite
- Planet with no water and gases like Nitrogen, Hydrogen, Oxygen, and Carbon Dioxide



2nd Planet: Venus

- Hottest planet in solar system: traps the gas easily, has thick clouds of H_2SO_4 and CO_2
- Brightest planet in Solar System, also known as "Evening Star" and "Morning Star"
- No satellite/Moon
- Also known as "Earth's Twin" due to similar mass and size
- Rotates clockwise

3rd Planet: Earth

- the only planet to give support to life
- Also known as "Blue Planet": 70% water
- It has one satellite: Moon
- Densest in the entire solar system

4th Planet: Mars

- Known as "Red Planet": rich in iron oxide (red soil)
- Second smallest planet in solar system
- Two natural moons: Phobos and Deimos
- Largest Volcano and tallest mountain of Mars: Olympus Mons

5th Planet: Jupiter

- Largest planet with shortest rotation- 10 hours
- Atmosphere filled with: Hydrogen, Helium, other gases
- Third brightest after Moon and Venus
- At present total moons: 95 moons at present
- Largest satellites: Io, Europa, Ganymede (largest among all), Callisto (all discovered by Galileo)
- Has unclear ring around it

6th Planet: Saturn

- **Second largest planet**
- Has bright and concentric rings made of tiny rocks, gas, dust, ice
- It is the **least dense planet**
- Has **146 moons** at present (the maximum)
- Largest satellite: **Titan**
- **1655: Huygenes** (discover Saturn's rings)
- **1675: Cassini** (discovered gap b/w rings)

↙
Cassini divisions

7th Planet: Uranus

- It is greenish in colour: "**Green Planet**" due to presence of **Methane (CH_4)**
- Discovered by **William Herschel** in **1781**
- Known as "**Ice Giant**"
- Atmosphere has: **Hydrogen, Helium, Water, Ammonia, Methane**
- **Rotates clockwise** like Venus
- **Coldest planet**
- Its is tilted to **98°** at its axis- **Rolling/Lopsided Planet**

8th Planet: Neptune

- **Farthest planet**
- It is also "**Ice Giant**"
- Atmosphere composed of: **Hydrogen, Helium**
- **Bluish in colour** due to **Methane**
- **Fourth largest planet** and **third most massive planet**
- Discovered by: **Johann Galle and Urbain Le Verrier** in **1846** (only planet found by **Mathematical Predictions**)
- Has **14 satellites**, famous moon: **Triton**

Pluto

- No more a planet in 2006 by International Astronomical Union (IAU)
- It is known as dwarf planet and is a member of Kuiper Belt
- Kuiper Belt is a spherical boundary outside the orbit of Neptune containing a number of asteroids, rocks and comets

