ISRO'S SPACE EXPLORATION MISSIONS

►ASTROSAT

- India's 1st dedicated multi-wavelength space observatory.
- Studies outer space objects in X-ray, limited optical and UV spectrum.
- The 1500-odd kg satellite is launched into a 650 km orbit.

MAIN OBJECTIVES

- To estimate magnetic field of neutron stars
- Study of binary star system
- Study of regions where stars are born

►EXPOSAT

- ExpoSAT is a multi-wavelength space observatory to study the deep space.
- It is planned as the successor to ASTROSAT.
- It will explore X-ray sources in the universe.
- It will study neutron stars, supernova remnants, pulsars, black holes in multiple wavelengths.

►MANGALYAAN

- Also called Mars Orbiter Mission, it is India's 1st interplanetary mission.
- Main Objective: Exploration of Martian surface features, morphology, mineralogy and atmosphere

IMPORTANT PAYLOADS

1. Lyman-Alpha Photometer: Measures the deuterium and hydrogen concentration in the upper atmosphere to estimate the water loss to outer space.
2. Methane Sensor: To measure methane in Martian atmosphere and to map its sources.
3. Thermal Infrared Imaging Spectrometer: To study the composition and mineralogy of Martian surface by creating a temperature map by recording the emission radiation.

- Note: ISRO is also planning a Lander mission to Mars under Mangalyaan-2 by 2024. The main objective is to study the surface geology, magnetic fields and interplanetary dust.

►CHANDRAYAAN 1

- ISRO's 1st mission to the moon.
- It is a lunar orbiter best known for helping to discover evidence of water molecules on the moon.
- Orbited the moon for almost a year (between October 2008 and August 2009).
- Major goals: to collect data on moon's geology, mineralogy and topography.

►CHANDRAYAAN 2

- 2nd lunar exploration and 1st lander and rover mission of ISRO.
- Lunar Orbiter-Lander-Rover mission of India.
- India's 1st inter-planetary mission to land a rover on any celestial body.
- Chandrayaan 2 is the world's 1st lunar mission to the South Pole of the Moon's near side.

KEY COMPONENTS

- Orbiter: Placed in an orbit 100km above the moon.
- Orbiter payload
  - Large Area Soft X-ray Spectrometer (CLASS) for mapping of elements.
  - Synthetic Aperture Radar to collect evidence confirming the presence of water ice below the shadowed regions of the Moon.
  - Imaging IR Spectrometer for mapping of lunar surface for the study of minerals, water molecules and hydroxyl
  - Neutral Mass Spectrometer (ChACE-2) to study the lunar exosphere.
  - Terrain Mapping Camera-2 for preparing a 3-d map for mineralogical and geological studies.

LANDER: 'VIKRAM' AND ROVER NAMED 'PRAGYAN'

- The lander-rover integrated module was supposed to soft-land near south pole (about 600 km) of the moon
- The 6-wheeled rover was planned to spend one lunar day or 14 Earth days on the moon's surface and walk up to 150-200 km.
- However, a last-minute software glitch led to crash-lading of Vikram and Pragyan.

LANDER PAYLOAD

- A seismometer to study moonquakes
- Langmuir probe to measure characteristics of plasma on the moon surface.

ROVER PAYLOAD