China Mars mission Tianwen-1

Part of: GS-III- S&T Space (PT-MAINS-PERSONALITY TEST)

Aiming to catch up with India, U.S., Russia and the European Union to reach the red planet, China’s Mars mission plans to complete orbiting, landing and roving in one mission. China named its first Mars exploration mission to be launched later this year as Tianwen-1 as it celebrated Space Day to mark the 50th anniversary of the launch of the country’s first satellite Dong Fang Hong-1 in 1970.

China in recent years has emerged as a major space power with manned space missions and landing a rover in the dark side of the moon. It is currently building a space station of its own.

However, China’s attempts to send an exploratory probe to Mars called Yinghuo-1, in a Russian spacecraft in 2011 failed as shortly after the launch and it was declared lost and later burnt during re-entry.

The U.S., Russia, the EU besides India so far succeeded in sending missions to Mars regarded as the most complex space mission.

India became the first Asian country to have successfully launched its Mars orbiter mission, Mangalyaan which has entered the orbit of the red planet in 2014. India also became the first country to have entered the Martian orbit in its first attempt.

About MARS (PT SHOT)

Mars is the fourth planet from the Sun and the second-smallest planet in the Solar System after Mercury. In English, Mars carries the name of the Roman god of war and is often referred to as the ‘Red Planet’. The latter refers to the effect of the iron oxide prevalent on Mars’ surface, which gives it a reddish appearance distinctive among the astronomical bodies visible to the naked eye. Mars is a terrestrial planet with a thin atmosphere, having surface features reminiscent both of the impact craters of the Moon and the valleys, deserts, and polar ice caps of Earth.

Facts:

1. The days and seasons are likewise comparable to those of Earth, because the rotational period as well as the tilt of the rotational axis relative to the ecliptic plane are very similar.
2. Mars is the site of Olympus Mons, the largest volcano and highest known mountain on any planet in the Solar System.
3. Valles Marineris, one of the largest canyons in the Solar System.
4. The smooth Borealis basin in the northern hemisphere covers 40% of the planet and may be a giant impact feature.
5. Mars has two moons, Phobos and Deimos, which are small and irregularly shaped. These may be captured asteroids, similar to 5261 Eureka, a Mars trojan.

Explorations

1. Mariner 4, launched by NASA on November 28, 1964, was the first spacecraft to visit
Mars, making its closest approach to the planet on July 15, 1965. Mariner 4 detected the weak Martian radiation belt, measured at about 0.1% that of Earth’s, and captured the first images of another planet from deep space.

2. On July 20, 1976, Viking 1 performed the first successful landing on the Martian surface.

3. Although the Soviet Mars 3 spacecraft achieved a soft landing in December 1971, contact was lost with its lander seconds after touchdown.

4. On July 4, 1997, the Mars Pathfinder spacecraft landed on Mars, and on July 5 released its rover, Sojourner, the first robotic rover to operate on Mars.

5. Pathfinder was followed by the Mars Exploration Rovers, Spirit and Opportunity, which landed on Mars in January 2004 and operated until March 22, 2010 and June 10, 2018, respectively.

6. The Mars Express orbiter, the first European Space Agency spacecraft to visit Mars, arrived in orbit on December 25, 2003.

7. On September 24, 2014, the Indian Space Research Organization became the fourth space agency to visit Mars, when its maiden interplanetary mission, the Mars Orbiter Mission spacecraft, successfully arrived in orbit.

There are ongoing investigations assessing the past habitability potential of Mars, as well as the possibility of extant life. Future astrobiology missions are planned, including the Perseverance and Rosalind Franklin rovers. Liquid water cannot exist on the surface of Mars due to low atmospheric pressure, which is less than 1% of the Earth’s, except at the lowest elevations for short periods. The two polar ice caps appear to be made largely of water. The volume of water ice in the south polar ice cap, if melted, would be sufficient to cover the entire planetary surface to a depth of 11 meters (36 ft). In November 2016, NASA reported finding a large amount of underground ice in the Utopia Planitia region of Mars. The volume of water detected has been estimated to be equivalent to the volume of water in Lake Superior.

India’s Mission

Mars Orbiter Mission (MOM) or Mission Mangalyaan is the first interplanetary space mission of Indian Space Research Organisation (ISRO). It was successfully launched on 5th November 2013. The space probe of this mission has been orbiting the Mars since 24th September 2014. Some of the highlights of this successful mission was

1. ISRO is the 4th space agency to reach the orbit of Mars after Roscosmos, NASA, European Space Agency (ESA).
2. India is the first nation to reach the orbit of Mars on the very first attempt.
3. India is the first Asian country to reach the orbit of Mars.

Which was the Launch Vehicle used for Mars Orbiter Mission?

Mars Orbiter Mission (MOM) was launched using Polar Satellite Launch Vehicle (PSLV XL – C25) from Satish Dhawan Space Centre, Sriharikota, Nellore District of Andhra Pradesh. It took 298 days for the Mars probe to reach the orbit of Mars. The probe is being tracked from ISRO centres located in Bangalore.

What were the Objectives of Mars Orbiter Mission (MOM)?
The primary objective was to develop the necessary technologies for interplanetary space missions. The other objectives were

1. Explore the surface features of Mars planet.
2. Morphology
3. Mineralogy
4. Atmosphere of Mars.

What were the Scientific Instruments Carried on the MOM mission?

Payload in the Mars Orbiter Mission (MOM) was made of 5 scientific instruments.

1. LAP (Lyman-Alpha Photometer)
2. MSM (Methane Sensor for Mars)
3. MENCA (Mars Exospheric Neutral Composition Analyser)
4. TIS (Thermal Infrared Imaging Spectrometer)
5. MCC (Mars Colour Camera)

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