When countries moonwalk

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"There is renewed global interest in the moon. India must leverage its space legacy to gain lunar advantage."

India's most ambitious space mission to date, Chandrayaan 2, is set for lift off next week and promises to make India the fourth country to soft-land a vehicle on the moon. Only the US, Russia and China have done that before. For India, more than symbolism is at stake in the success of Chandrayaan 2.

As outer space re-emerges as an arena for exciting scientific exploration and major technological innovation, India, as one of the earliest spacefaring nations, must necessarily be in the vanguard. At the same time, Chandrayaan is also about India carving out a potential niche for itself in the unfolding geopolitical scramble for the moon.

The launch of Chandrayaan 2 coincides with the 50th anniversary of the first man landing on the moon. In the five decades following America's Apollo 11 mission that got astronauts Neil Armstrong and Buzz Aldrin walking on the moon, just 10 others have roamed the surface of earth's satellite. All of them have been American men.

The next few years are likely to see men returning to the moon and women joining them. A lot of them will be non-Americans. Many of them will be Chinese and, hopefully, some of them Indian. The Europeans, Russians, Japanese and many others are also joining the moon scrum.

Soon after the first landing, the exorbitant costs of the Apollo programme led to its shut down. The last human (and American) landing was by Apollo 17 in December 1972. Recent years, however, have seen the revival of the worldwide interest in the moon.

During the Cold War, scientific prestige and claims for superior soft power drove America and Russia towards the moon. Today, commercial and strategic objectives are among the reasons propelling a new moon race among the nations. The race is not about repeating what Americans did half a century ago on the moon. It is about establishing a sustainable human presence on the moon. A lot of the hard work will be done by robots.

Finding water resources on the moon, then, has become the key to a credible long-term engagement with the Earth's satellite. Some of the most inviting real estate from that perspective are near the moon's north and south poles. Most of the current moon-landing missions are aiming for the poles. So is India's Chandrayaan 2. If all goes well, Chandrayaan 2 will deliver India's Vikram lander and Pragyan rover to the moon's south polar region.

While Indians will be proud to see their national flag on the moon, the world's missions to the moon are increasingly collaborative. Space is one arena that saw America and Russia collaborate even during the worst years of the Cold War. Although the logic of international cooperation on the moon is more compelling than ever, competition too is becoming an unfortunate reality as countries jockey for unilateral gains on the moon.

Meanwhile, many private corporations have big plans to exploit the moon for commercial profit. To make matters worse, there are many ambiguities in the current international law on outer space that could encourage nations and companies to seek first-mover advantage on the moon.

At present, Beijing has one of the most advanced moon programmes. Its Chang'e missions, named after the Chinese moon goddess, began in 2007. Since then, China has put two spacecraft in lunar orbit (Chang'e 1 and 2) and landed two rovers on the moon (Chang'e 3 and 4). Chang'e 4 had the distinction of being the first landing on the far side of the moon that can't be seen from the earth.

Beijing has sent a prototype capsule (Chang'e 5 T1) to rehearse brining lunar material back to the earth. Chang'e 5, set for launch later this year, will do precisely that. China is expected to land crews to the moon in the early 2030s. The US, which turned its back on the moon in the early 1970s, has announced plans to return. In a major speech earlier this year, the US vice-president Mike Pence, declared the intent to land Americans back on the moon in 2024. Many experts believe that might be an unrealistic ambition. The plans of US National Aerospace Administration had been looking at 2028 for such a mission.

Pence's motivation in accelerating American moon plans is based on the sense that China might be about to capture the pole position in the Moon race. "Urgency must be the watchword", Pence told the US National Space Council in March this year. Like in so many other areas of technology, Washington is now trying to push back against China's challenge to the extended American dominance in outer space.

But the US private companies, which have brought great innovation to outer space technologies, are ramping up their ambitions for the moon. Amazon's Jeff Bezos wants to land crews on the Moon in the next five years. Tesla, Moon Express and Astrobotic Technology are other US companies aiming for the moon. While the target dates might slip, there is no doubt about the direction. The moon will see more and more of humans, from states as well as corporations. India played an important role in the 1960s in drafting modern international law applicable to outer space and the moon. That role was rooted not in India's weight as a space power. Strong interest in issues relating to technology and international law, political enthusiasm for international scientific cooperation and some diplomatic influence in the United Nations helped India insert itself into the global debate on outer space. Today India needs something more — an ambitious and successful lunar programme — to shape the new rules of the road for the moon.

GS World Team...

Chandrayaan-2

What's in the discussion?

- Recently ISRO has announced the date and time of launch of Chandrayaan-2.
- Chandrayaan-2 will be launched on July 15.
- According to ISRO, the GSLV Mark 3 rocket will set the orbiter in the polar orbit of the Earth in 15 minutes
- It is known that in Chandrayaan-2 there is not even a single foreign payload. All its parts are completely indigenous, while Chandrayaan-1's orbiter has 3 Europe and 2 US Payloads.
- ISRO has hoped that Chandrayaan-2 will land near the of the moon on 6th September. à Chandrayaan-II is the second moon mission and has three modules in Orbiter, Lander (Vikram) and Rover (Pragyan).
- India launched Chandrayaan-1 on October 22, 2008, after a decade later which of Chandrayaan-2 will be launched at a cost of 800 crores.

About mission

- **Orbiter:** Chandrayaan-2's orbiter will be installed at a distance of 100 km from the moon. It will send the information from Lander and Rover to the ISRO Center while circling.

- There are 8 payloads in it. It will also bring the GS World Team... command sent from ISRO to the lander and the rover. It was made by Hindustan Aeronautics Limited and handed to ISRO in 2015.
- **Lander (Vikram):** Lander named is named after ISRO's founder and father of Indian space program Vikram Sarabhai. There are 4 payloads in it.
- It will conduct scintific recearch for 15 days. Its initial design was made by ISRO's space application center Ahmedabad. Later it was developed by the URSC of Bengaluru.
- **Rover (Pragyan):** This is a robot and will be the responsibility of the whole mission will be on this conduct robot, weighing 27 kilograms. This robot has two payloads.
- It will cover a distance of 400 meters On the surface of the moon. During this, it will use various scientific experiments. Then send this information from the moon to Vikram Lander.
- Lander will send data to orbiter from there. Thenthe orbiter will send it to the ISRO center.
- This whole process will take about 15 minutes. Thatmeans the information sent from Pragyan Robot will take about 15 minutes to reach the ISRO center in India

Expected Questions (Prelims Exams)

1. In the context of Chandrayaan-2, consider the following statements-

1. India will become fourth country to make soft landing on moon through chandrayaan-2.
2. It is fully indigenous mission.
3. VIKRAM (Lander) and PRAGYAN (Rover) will be landed in the north polar region of moon in this mission.

Which of the above statement are correct?

(a) 1 and 2 (b) 2 and 3

(c) 1 and 3 (d) All of the above

Expected Questions (Mains Exams)

Q. Why is moon mission important for humankind? Discuss the attempts made by global powers in this direction. **(250 Words)**

Note: Answer of Prelims Expected Question given on 8 July. is 1(d).