



# Time Zone for Moon

[Source: LM](#)

## Why in the News?

Recently, the [European Space Agency](#) is planning a universal timekeeping system for the moon.

## What is Timekeeping on the Moon?

### ▪ About:

- The Moon (the only natural Satellite of earth) has its own day and night cycle, which lasts about **29.5 Earth days**.
- Currently, the time on the Moon is measured using **Universal Time Coordination (UTC)**, which is the same timekeeping system used on the Earth.
- '**Coordinated Lunar Time (LTC)**' will be the unified time standard for the Moon.
  - To decide LTC, there will be a **need to place at least three atomic clocks on the lunar surface** that will tick at the Moon's natural pace, and whose output will be combined by an algorithm to generate a more accurate virtual timepiece.

### ▪ Need of LTC:

- LTC will provide a **time-keeping benchmark** for lunar spacecraft and satellites that require extreme precision for their missions.
- It will also **synchronise** the communication between satellites, astronauts, bases and the Earth.
- Because the **Moon's day is much longer than Earth's day**, it would be difficult to use UTC for day-to-day activities on the Moon.
  - The [International Space Station](#), being in low Earth orbit, will continue to use coordinated universal time (UTC).
- Moon has a **lesser gravitational force than Earth**. Compared to Earth, **time on the Moon moves 58.7 microseconds quicker every day**.
  - An [atomic clock](#) on the moon will tick at a different rate than a clock on Earth.
- To address this issue, researchers have proposed creating a **lunar time zone** that would be based on the **Moon's day and night cycle**.
- This would make it easier for lunar settlers **to keep track of time and coordinate activities**.
- Having a lunar time zone would also make **it easier for researchers to conduct experiments and collect data on the Moon**.
- It would also help **to prevent confusion and errors** that could arise from using different timekeeping systems on Earth and the Moon.

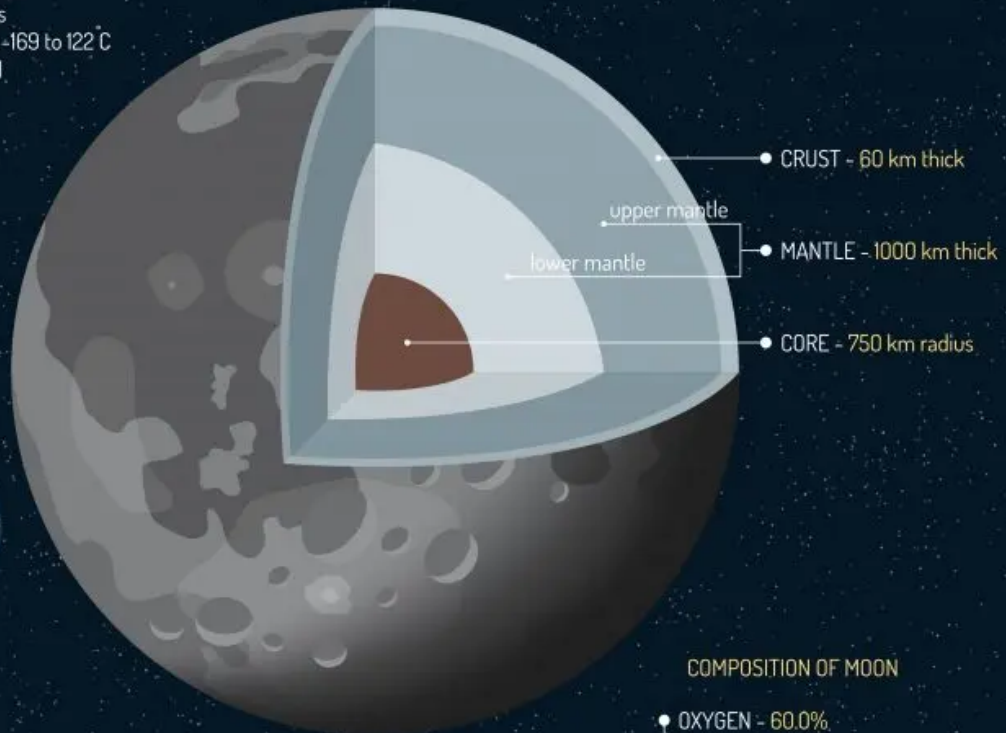
### ▪ Challenges:

- Implementing a unified time standard for the Moon **requires extensive global cooperation and consensus on the scientific intricacies of timekeeping**.

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# THE MOON

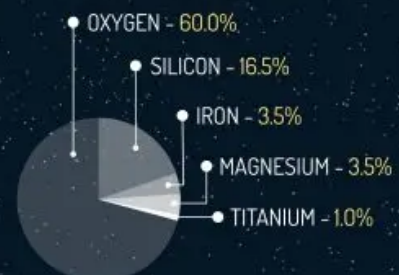
DISTANCE FROM THE EARTH: 384 400 km  
RADIUS: 1737 km  
SURFACE AREA: 37 960 000 km<sup>2</sup>  
DAY LENGTH: 29d 12h 44min  
ORBITAL PERIOD: 27.3 days  
SURFACE TEMPERATURE: -169 to 122 °C  
REVOLVE AROUND: EARTH



THE MOON IS  
MOVING  
APPROXIMATELY

3.8 CM AWAY FROM OUR PLANET EVERY YEAR

## COMPOSITION OF MOON



IN THE ENTIRE HISTORY OF MANKIND



MOON HAVE BEEN VISITED ONLY 12 PEOPLE

## What is Universal Time Coordinated (UTC)?

- Universal Time Coordinated (UTC) is a **time standard** used to keep time consistent around the world.
- UTC is **based on International Atomic Time (TAI)**, which is maintained by **atomic clocks around the world**.
- It is the **primary time standard** used by many countries, international organisations, and scientific research institutions.
- UTC is **expressed as a 24-hour clock** and is used to indicate the time offset from Coordinated Universal Time (UTC+0).
- Time zones are defined as an **offset from UTC**, with some time zones being **ahead of UTC (UTC+1, UTC+2, etc.)** and others being **behind UTC (UTC-1, UTC-2, etc.)**.
- UTC is **adjusted periodically** to account for changes in the Earth's rotation, which can cause variations in the length of a day.
- These **adjustments are made by adding [leap seconds](#)** to UTC, which helps keep the time

standard synchronised with the Earth's rotation.

## What are Atomic Clocks?

- An atomic clock, is a **clock, known for its exceptional accuracy**, and functions by utilising specific resonance frequencies of atoms, typically [cesium or rubidium](#).
  - In atomic time, **a second is defined as the period in which a caesium atom vibrates 9,192,631,770 times.**
- It was **invented in 1955 by Louise Essen.**
- The extreme precision levels of the atomic clocks can be interpreted by the fact that they **will lose one second approximately every 100 million years.**
- Currently, atomic clocks in India are operational in Ahmedabad and Faridabad.

Read more: [2 Time Zones in India](#)

## UPSC Civil Service Examination, Previous Year Questions(PYQs)

**Q.1 Selene-1, the lunar orbiter mission belongs to which one of the following? (2008)**

- (a) China
- (b) European Union
- (c) Japan
- (d) USA

**Ans: (c)**

**Q.2 What is the purpose of the US Space Agency's Themis Mission, which was recently in the news? (2008)**

- (a) To study the possibility of life on Mars
- (b) To study the satellites of Saturn
- (c) To study the colourful display of high latitude skies
- (d) To build a space laboratory to study the stellar explosions

**Ans: (c)**

**Q. Which one of the following planets has largest number of natural satellites or moons? (2009)**

- (a) Jupiter
- (b) Mars
- (c) Saturn
- (d) Venus

**Ans: (a)**

**Q. Tides occur in the oceans and seas due to which among the following? (2015)**

1. Gravitational force of the Sun
2. Gravitational force of the Moon
3. Centrifugal force of the Earth

**Select the correct answer using the code given below:**

- (a) 1 only

- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

**Ans: (d)**

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