Prelim Bits 11-05-2022 | UPSC Daily Current Affairs

NASA’s MAVEN Project

The Emirates Mars Mission (EMM) has announced a data analysis collaboration initiative with NASA’s MAVEN Mars mission.

- Launched in 2013, the Mars Atmosphere and Volatile EvolutioN (MAVEN) mission is part of NASA's Mars Scout program.
- The MAVEN’s orbit insertion happened in 2014.
- Funded by NASA Headquarters, MAVEN is the first Mars mission managed by the Goddard Space Flight Center.
- The mission will explore Mars’ upper atmosphere, ionosphere and interactions with the sun and solar wind in order to glean insights into how the red planet’s climate has changed over time.
- MAVEN data is used to determine the role that loss of volatiles from the Mars atmosphere to space has played through time.
- This will give insight into the history of Mars’ atmosphere and climate, liquid water, and planetary habitability.

Emirates Mars Mission - Hope

- The Emirates Mars Mission’s (EMM’s) Hope Probe is the United Arab Emirates’ (UAE) first mission to Mars. It entered Mars orbit in 2021.
- Its mission is to study the relationship between the upper layer and lower regions of the Martian atmosphere.
- EMM’s Hope probe carries three instruments - EXI, EMIRS and EMUS.

Instruments	**Purpose**
Emirates eXploration Imager (EXI)	It is a digital camera that captures images of Mars with a resolution of 2 to 4 km. It measures the lower atmosphere’s amount of water, ice and ozone through the UV bands.
Emirates Mars Infrared Spectrometer (EMIRS)	It measures the emitted energy from the martian surface and atmosphere to derive the global distribution of dust, ice clouds and water vapour in the Martian lower atmosphere.
Emirates Mars UV Spectrometer (EMUS)	It measures oxygen and carbon monoxide in the thermosphere and the variability of hydrogen and oxygen in the exosphere.

- EMM is designed to orbit Mars and study the dynamics in the Martian atmosphere on a global scale, and on both diurnal & seasonal timescales.
- It will provide a set of measurements fundamental to an improved understanding of circulation and weather in the Martian lower and middle atmosphere.
- Combining such data with the monitoring of the upper layers of the atmosphere, EMM

measurements will reveal
    1. The mechanisms behind the upward transport of energy and particles, and
    2. The subsequent escape of atmospheric particles from the gravity of Mars.
- **Related Links** - Mangalyaan; JAXA's Mars Mission; Mars Missions of NASA, China, UAE

Reference

1. https://indianexpress.com/article/technology/science/emirates-mars-mission-to-collaborate-and-share-data-with-nasa-maven-project-7867638/
2. https://www.emiratesmarsmission.ae/mission/about-emm/
3. https://www.nasa.gov/mission_pages/maven/overview/index.html

Space Launch System

NASA is reportedly preparing to rehouse its Space Launch System (SLS) rocket after three failed attempts to complete wet dress rehearsal testing.

> The wet dress rehearsal consists of a series of key trials designed to show that Artemis 1's SLS rocket, Orion spacecraft and their associated ground infrastructure are ready to go.

- The Space Launch System (SLS) is a super-heavy non-reusable launch vehicle that will provide the foundation for human exploration beyond Earth's orbit.
- The SLS is being prepared for the Artemis I mission, NASA's first exploration-class rocket built for human space travel since the Saturn V.
- Once tested, SLS will see its first deployment in the Artemis 1 mission which will send the uncrewed Orion on a journey around the moon.
- [The primary aim of the Artemis program is to return humans to the moon for the first time since 1972.]
- Once completed and successfully tested, it would be the most powerful rocket ever built by NASA.
- SLS is the only rocket that can send Orion spacecraft, astronauts, and cargo directly to the Moon on a single mission.

Reference

1. https://indianexpress.com/article/technology/science/nasa-will-roll-sls-back-to-storage-could-potentially-delay-artemis-1-mission-7885119/
2. https://www.nasa.gov/exploration/systems/sls/fs/sls.html

Reason for Water in Moon

A new study suggests that the Earth's magnetic field could be involved in how our moon has got its water.

- This new theory has suggested that the hydrogen and oxygen from the Earth combine to form water on the Moon.
- This process may have created up to 3,500 cubic kms of surface permafrost (water ice) or subsurface liquid water on the Moon.
- The theory has its roots in the earth's **magnetic field**.

- As the moon orbits the Earth, it passes through the magnetosphere, a vast comet-sized bubble around the Earth created by the magnetic field of the Earth. It keeps the solar material from entering the earth.
- Some of Earth's magnetic field lines break and trail off into space.
- The magnetosphere vigorously flaps like a flag in the wind in response to the pressure from the solar wind. It compresses on the dayside of Earth and stretches into a long tail on the night side.
- The Moon, during its transit, is completely submerged inside the Earth's magnetic field.
- As it passes through the long tail, some of these broken field lines reconnect with their opposing broken counterpart.
- During this time, oxygen and hydrogen ions in the upper parts of the atmosphere (ionosphere), between 80 km and 600 km above the surface, move towards the reconnected lines.
- Some of these water-forming ions return to the earth and are likely to fall on the moon. It is like the moon is in a shower of water ions coming back to Earth, falling on the moon's surface.
- These ions may combine to form lunar permafrost.
- Alternatively, they may be pushed below the surface to form liquid water.
- This approach allows for a new source of water that may be applicable not only for our Moon but also for moons around other planets with magnetic fields like Jupiter, for example.

Previous Theories

- Previously, scientists speculated that the water reached the Moon through **icy comets** that crashed into its surface.
- Another popular theory suggested that interactions of **lunar dust with the solar wind** - charged particles from the sun's upper atmosphere - could have created this essential resource.
- Each of these theories formulates a possible pathway for how the water can be deposited on the Moon, and they are all based on realistic models.
- **Related Links** - SOFIA discovers water on Sunlit Surface of Moon

Reference

1. https://www.downtoearth.org.in/news/science-technology/how-did-our-moon-get-its-water-a-new-study-suggests-earth-s-magnetic-field-could-be-involved-82735
2. https://www.nasa.gov/press-release/nasa-s-sofia-discovers-water-on-sunlit-surface-of-moon/

Sin Goods

The Centre offers to subsume a part of the levy on aerated drinks, cigarettes and cars into the GST rate after March 2026 to appease states. This cess levied may be a bargaining chip in Centre-state talks on GST compensation.

> Subsuming the cess into GST will mean that the states will get half of the proceeds as state GST (SGST) in addition to getting 41% of the Centre's GST collections.

- Sin goods are goods that are considered to be harmful or costly to society, due to their ability or perception.
- Example: Alcohol and Tobacco, Candies, Drugs, Soft drinks, Fast foods, Coffee, Sugar, Gambling and Pornography.

Sin Tax

- A sin tax is an **excise tax** (now GST) levied by the government on sin goods and services at the **time of purchase**.
- It seeks to deter people from engaging in socially harmful activities and behaviors, but they also provide a source of revenue for governments.
- Two claimed purposes are usually used to argue for such taxes.
- **In contrast to Pigovian taxes**, which are to pay for the damage to society caused by these goods, sin taxes are used
    1. To increase the price in an effort to reduce their use, or failing that,
    2. To increase and find new sources of revenue.
- Increasing a sin tax is often more popular than increasing other taxes.
- However, these taxes have often been criticized for burdening the poor, taxing the physically and mentally dependent, etc.
- **Revenue** generated by sin taxes supports many projects imperative in accomplishing social and economic goals.
- American cities and counties have utilized funds from sin taxes to expand infrastructure, while in Sweden the tax for gambling is used for helping people with gambling problems.

Reference

1. https://www.livemint.com/news/india/govt-may-subsume-sin-goods-cess-into-gst-to-pacify-states-11651605808262.html
2. https://howtoexportimport.com/Meaning-of-Sin-Goods-Sin-Tax-9384.aspx
3. https://www.investopedia.com/terms/s/sin_tax.asp

ASI Rules on Allowing/ Disallowing Worship at Some Monuments

After prayers were held at the ruins of the 8th-century Martand Sun Temple in Jammu and Kashmir, the Archaeological Survey of India (ASI) has deemed the incident to be a violation of its rules.

- According to ASI, prayers are allowed at its protected sites only if they were 'functioning places of worship' at the time it took charge of them.
- No new religious rituals can be started or conducted at non-living monuments where there has been no continuity of worship when it became an ASI-protected site.
- This is mentioned under Rule 7(2) of the Ancient Monuments and Archaeological Sites and Remains Act, 1959.
- Of the 3,691 centrally-protected monuments and archaeological sites maintained by the ASI, only 820 have places of worship, while the rest are considered non-living monuments.
- **Living monuments** - The best-known example of a living ASI monument is the Taj Mahal in Agra, where namaz is held every Friday.
- Other living monuments include the remains of an old Hindu temple inside the Dayaram Fort in Hathras, three mosques in Kannauj, Roman Catholic Church in Meerut, etc.

Martand Sun Temple

- The Martand Sun Temple of the Jammu and Kashmir is the oldest of the Sun temples in India.
- It was commissioned by Lalitaditya Muktapida in the 8th Century AD.
- It was once a thriving place of worship, but was destroyed by Sikandar Shah Miri in the 14th century.

- It is an ASI-protected “site of national importance”. It falls under the ASI’s Srinagar Circle.
- As such, at the time the ASI took over the temple ruins in the 20th century for conservation, no puja or Hindu ritual was being held there. So, it is a non-living monument.

Reference

1. https://indianexpress.com/article/explained/when-prayers-are-allowed-not-allowed-at-protected-archaeological-sites-martand-sun-temple-in-jammu-and-kashmir-7910452/
2. https://www.tribuneindia.com/news/j-k/asi-fuming-as-lt-governor-manoj-sinha-holds-prayers-at-martand-sun-temple-393277