Date: 7 August 2023

VOYAGER PROGRAM

This article covers "Daily Current Affairs" and the topic details "Voyager Program". The topic "Voyager Program" has relevance in the "Science and Technology" section of the UPSC CSE exam.

For Prelims:

What is the Voyager Program?

For Mains:

GS3: Science and Technology, Awareness in Field of Space

Why in the news?

Over a week following the loss of communication between Voyager 2, NASA's enduring space probe, and Earth, the space agency identified a "heartbeat" signal emanating from the spacecraft on Tuesday, August 1st.

Voyager Program

- The Voyager spacecraft were sent into space because NASA's original plan to explore the outer planets with four complex spacecraft was canceled due to budget constraints. Instead, they decided to send Voyager probes to study Jupiter and Saturn, with the possibility of redirecting one to Uranus and Neptune later.
- The spacecraft were launched in the late 1970s to take advantage of a rare alignment of Jupiter, Saturn, Uranus, and Neptune that minimized the fuel needed for their journeys.
- Voyager 1 and Voyager 2 are identical and equipped with instruments for various experiments. They carry TV cameras, sensors for different types of radiation, and a large antenna for communication with Earth. Unlike solar-powered spacecraft, they use a small nuclear power source fueled by plutonium's decay.
- Each Voyager carries a golden record, like a time capsule, with images, sounds, and greetings from Earth. These records are intended for any potential extraterrestrial discoverers.
- Overall, the Voyagers' missions were a cost-effective way to explore the outer planets and gather valuable data about our solar system.

Notable achievements of the Voyager spacecraft

Voyager's Jupiter Discoveries:

- Voyager 1 embarked on its Jupiter mission in 1979, followed closely by Voyager 2 in July of the same year.
- During its exploration of Jupiter, Voyager 1 made a groundbreaking revelation by detecting the presence of active volcanoes on Io (one of Jupiter's moons) where material was being spewed into space through these volcanic activities.
- This observation deemed Io one of the most, if not the most, geologically active bodies within our solar system, as indicated by a NASA report.
- Both Voyager 1 and Voyager 2 were instrumental in discovering three hitherto unknown moons of Jupiter, namely Thebe, Metis, and Adrastea.

Saturn Discoveries

- Voyager 1 conducted a fascinating analysis of Titan, Saturn's largest moon. This analysis shattered a prevailing assumption that Titan was the largest moon in our solar system.
- Instead, Voyager 1's radio signals revealed that Titan's solid core was dwarfed by the size of Jupiter's moon, Ganymede, effectively reshaping our understanding of celestial bodies.
- Voyager 1 detected a nitrogen-rich atmosphere on Titan, suggesting the possibility of methane-based clouds and rain, which introduced intriguing prospects for planetary compositions beyond Earth.

Journey to Uranus and Neptune:

- Having completed their investigation of Saturn, the Voyager 1 and 2 embarked on a remarkable voyage to Uranus, with Voyager 2 leading the way in 1986.
- Voyager 2's encounter with Uranus brought to light several significant findings, including a confirmation of the planet's primary composition of hydrogen and helium.
- Voyager 2 discovered a remarkable ten new moons and unveiled the existence of two previously unknown rings, supplementing the pre-existing nine.

Neptune Mission

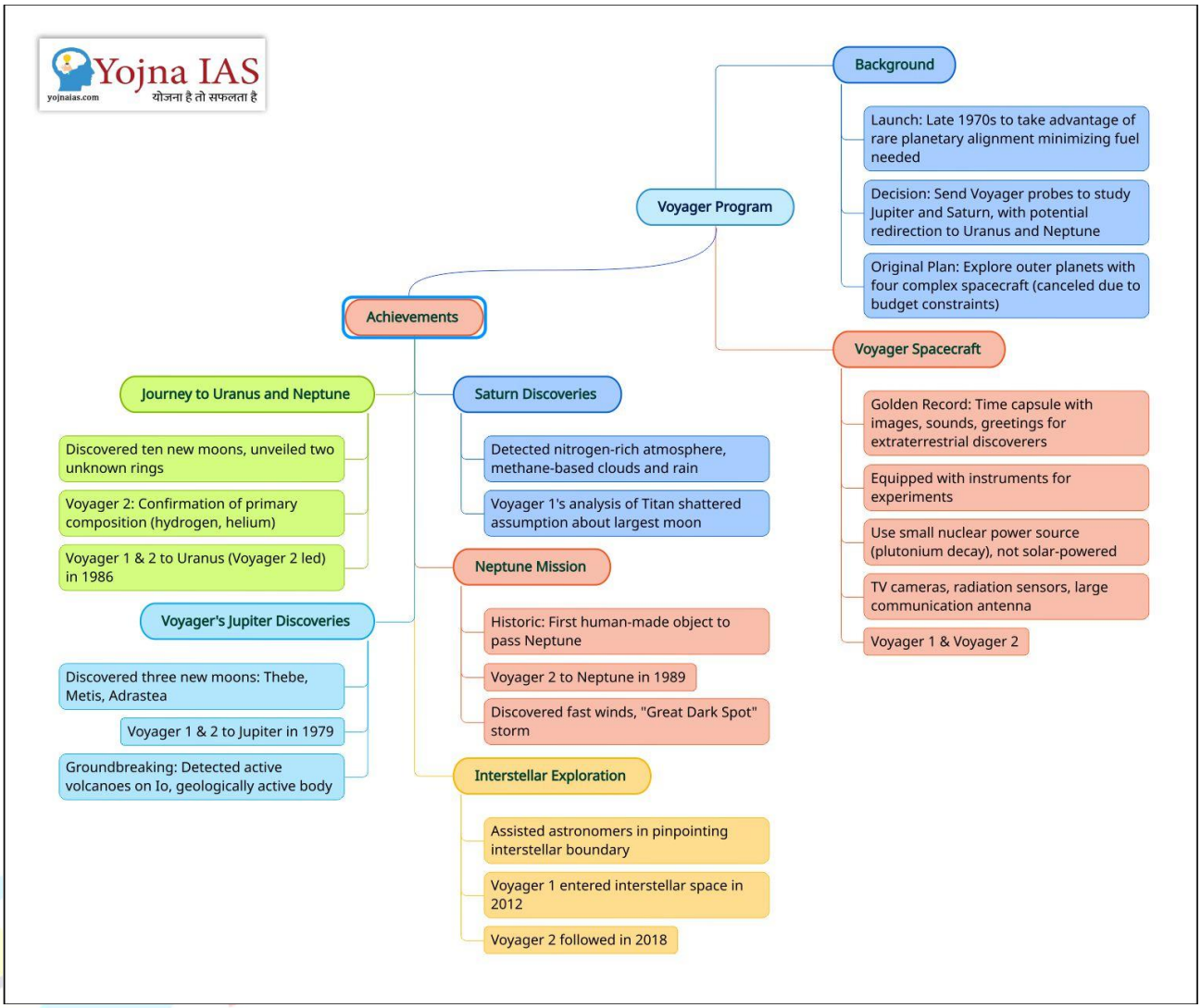
- Both Voyagers voyaged towards Neptune, where Voyager 2 achieved the historic feat of becoming the first human-made object to pass by this captivating aquamarine planet in 1989.
- As it explored Neptune, Voyager 2 uncovered a fascinating revelation: Neptune's winds rage at an astonishing speed of approximately 1,100 kilometres per hour.
- The spacecraft observed a colossal spinning storm in Neptune's southern atmosphere, appropriately named the "Great Dark Spot," which astonishingly spanned an area equivalent to the size of our entire Earth.

Interstellar Exploration:

- Subsequent to their profound contributions within our solar system, both Voyager 1 and Voyager 2 embarked on a new chapter of their odyssey — the journey beyond the confines of our sun's gravitational influence.
- In 2012, Voyager 1 became the pioneer, officially marking its entry into interstellar space. Voyager 2 followed suit in 2018, and these momentous achievements significantly assisted astronomers in pinpointing the precise boundary of interstellar space, an endeavor otherwise challenging from within our solar system.

Conclusion

- Despite the passage of time and the limited functionality of certain instruments, the Voyagers continue to dutifully transmit valuable data back to Earth, serving as emissaries of exploration and discovery.
- Recent setbacks, such as the temporary halt in data transmission from Voyager 2 due to a glitch, have not dampened the spirits of the scientific community. Efforts are underway to restore full communication with the spacecraft, reaffirming the resilience and determination inherent in our pursuit of knowledge.
- In the future, it is unavoidable that the mission will run out of power, ultimately rendering both Voyagers silent. However, their silent journey among the stars will be remembered as a testament to human ingenuity, curiosity, and the insatiable desire to unravel the mysteries of the cosmos.



Sources:

The legacy of the Voyager mission | Explained News – The Indian Express

Q1. With reference to Voyager Program, consider the following statements:

1. The Voyager spacecraft were sent into space due to budget constraints that led to the cancellation of NASA's original plan for four complex spacecraft to explore the outer planets.
2. Voyager 1 and Voyager 2 carry a golden record, like a time capsule, containing images, sounds, and greetings from Earth, intended for potential extraterrestrial discoverers.
3. The Voyagers' missions provided valuable data about the outer planets and assisted in defining the boundary of interstellar space.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1, 2 and 3 only
(d) None

Answer: (c)

Q2. Consider the following :

1. Voyager 1 detected active volcanoes on Jupiter's moon Io, revealing it to be one of the most geologically active bodies in the solar system.
2. Voyager 2's analysis of Titan confirmed it to be the largest moon in the solar system, larger than Jupiter's Ganymede.
3. Voyager 2 discovered new moons and previously unknown rings around Uranus.
4. Voyager 1 and Voyager 2 achieved interstellar travel simultaneously in 2012.

How many of the abovementioned statements are correct ?
(a) Only one
(b) Only two
(c) Only three
(d) All Four
Answer: (b)

Q3. Describe the historic achievements of Voyager 1 and Voyager 2 as they ventured into interstellar space. How did these accomplishments contribute to our understanding of the solar system and its planets?

Gaurav Nikumbh

CITY INVESTMENTS TO INNOVATE, INTEGRATE AND SUSTAIN (CITIIS) 2.0

This article covers "Daily Current Affairs" and the topic details "City Investments to Innovate, Integrate and Sustain (CITIIS) 2.0". The topic "City Investments to Innovate, Integrate and Sustain (CITIIS) 2.0" has relevance in the Development section of the UPSC CSE exam.

For Prelims:

About of CITIIS 2.0?

For Mains:

GS 3: Development
Smart Cities Mission?

Why in the news:

The Union Cabinet, chaired by the Prime Minister, has granted approval for the implementation of the City Investments to Innovate, Integrate, and Sustain 2.0 (CITIIS 2.0) program.

Objective:

- CITIIS 2.0, an integral component of the Smart Cities Mission, is designed to provide comprehensive support to projects that foster a circular economy, with a specific emphasis on integrated waste management at the city level. Additionally, it seeks to facilitate climate-oriented reform actions at the State level while bolstering institutional capacity and knowledge dissemination at the National level.
- It seeks to leverage and scale up the successes of CITIIS 1.0, which was launched in 2018.

Themes:

- CITIIS 2.0 will consider Smart City Projects in the following four themes:
- Sustainable Mobility.
- Public Open Spaces.
- Urban E-governance and ICT.
- Social and Organisational Innovation for Low-Income Settlements.

Duration:

The program will run for four years, from 2023 till 2027.

Components:

- **Financial and Technical Support for Smart Cities:** Up to 18 Smart Cities will receive financial and technical support for projects promoting circular economy, with a specific focus on integrated waste management.
- **Support to States/Union Territories (UTs) for Climate Action:** All States and UTs will receive support for climate-oriented reform actions.
- **Interventions at National Level:** National-level interventions will be carried out to support the scale-up of initiatives across all cities and towns.

Funding: The funding for CITIIS 2.0 will include a loan from Agence Française de Développement (AFD) and KfW (Kreditanstalt für Wiederaufbau), and a technical assistance grant from the European Union (EU).

Significance:

- CITIIS 2.0 aligns with and reinforces the climate actions of the Government of India undertaken in parallel with existing national programs like the National Mission on Sustainable Habitat, AMRUT 2.0, Swachh Bharat Mission 2.0, and Smart Cities Mission.
- It also contributes positively to India's Intended Nationally Determined Contributions (INDCs) and commitments made at the Conference of the Parties (COP26).

Smart Cities Mission

The Smart Cities Mission is a pioneering initiative by the Government of India aimed at driving economic growth and improving the quality of life for citizens through technology-enabled local development. Smart cities are equipped with basic infrastructure to ensure a decent quality of life, a sustainable environment, and the application of smart solutions. The mission focuses on core infrastructure, urban mobility, housing, e-governance, and ICT to create positive outcomes for people.

Objectives:

- The primary objective of the mission is to foster cities that offer essential infrastructure and ensure a satisfactory standard of living for their citizens. The focus is on achieving sustainable and inclusive development while establishing models that can be replicated by other aspiring cities.
- Smart Cities Mission aims to set examples that can be replicated within and outside the smart city concept, catalyzing the development of similar smart cities in different regions of the country.

Smart Cities Mission Strategy:

- Pan-city initiative with one city-wide Smart Solution.
- Three models for area-based developments: Retrofitting, Redevelopment, and Greenfield.

Core Infrastructure Elements:

- The Smart Cities Mission focuses on providing sufficient water supply, reliable electricity supply, and effective sanitation, including proper management of solid waste.
- Efficient urban mobility and public transport.
- Affordable housing, robust IT connectivity, and digitalization.
- Good governance and citizen participation through e-governance.
- Sustainable environment, safety, security, and health and education.

Coverage and Duration:

- The Smart Cities Mission encompassed 100 cities within a duration of five years,from FY2015-16 to FY2019-20.
- Continuation beyond the initial five years will depend on an evaluation by the Ministry of Urban Development.

Financing of Smart Cities:

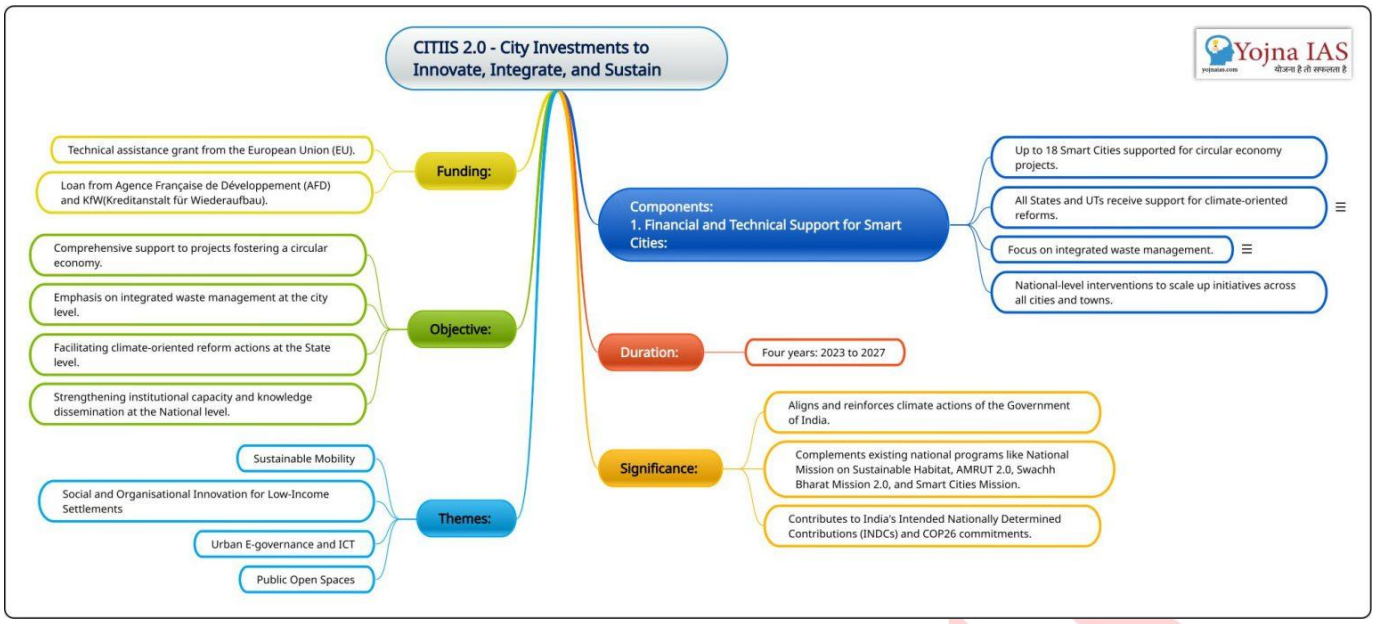
- The mission operates as a Centrally Sponsored Scheme (CSS) with financial support from the Central Government (Rs. 48,000 crores over five years).
- States/ULBs will contribute an equal amount on a matching basis.

Progress and Concerns:

- After three years, 89 cities have been selected, but some struggle with urban transformation.
- Private investment identification and definition are lacking.
- Smart cities may create isolated developments instead of inclusive progress.
- Weak interventions in priority areas and inadequate emphasis on urban local bodies.

Way Forward:

- Data-driven understanding of problems and evidence-based decision-making are crucial.
- Private sector involvement and government facilitation for affordable housing and modern transportation.
- Environmental protection while developing smart cities is essential.
- Citizen participation and smart leadership from all levels of government are necessary for successful development.
- In conclusion, the Smart Cities Mission has shown progress in some cities, but there are concerns to address. Data-driven planning, private sector participation, environmental consciousness, and citizen engagement are pivotal for the way forward to build inclusive and sustainable smart cities in India.



SOURCE:
https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1928598

Q.1 Consider the following statements regarding CITIIS 2.0:

1. The program will run for three years, 2024-2027.
2. The funding for CITIIS 2.0 will include a loan from Agence Française de Développement.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

ANSWER: B

Q.2 Consider the following statements regarding CITIIS 2.0:

1. The funding for CITIIS 2.0 will be entirely in the form of grants only.
2. CITIIS 2.0 will provide support for climate-oriented reform actions to all States and Union Territories (UTs).

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

ANSWER: B

Q.3 Explain the objectives and significance of the City Investments to Innovate, Integrate, and Sustain 2.0 (CITIIS 2.0) program. How does it align with India's climate actions and contribute to the country's commitments on the international stage? Discuss its potential impact on urban development and sustainable growth in the country.

Rishabh