Topics - MINDS MAPS included (Daily current affairs 22nd December 2024

- Target UPSC CSE Prelims 2025
- India's Forest and Tree Cover Overview
- Kandanar Kelan Theyyam
- India's National Quantum Mission and Its Upcoming Satellite
- Hydroxychloroquine
- California Ground Squirrels
- Denali Fault
- Nature-Inspired Ammonia Production
- Mains





By saurabh Pandey



Target Mains -2025/26 -

Essay topic - "Digital spread will bring both inclusion and exclusion"

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send your answer - Saurabh pandey upsc telegram channel

Q. Chancay port has recently been in news on account of Chinese involvement in its development through Border and Road Initiative. In this context the given port is located in which among the following Country. (Tol)

- A) Ethiopia
- B) Argentina
- C) Venezuela
- D) Peru

TEST 11 UPDATE

CSE_

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UPSC CSE PRELIMS 2025

Syllabus

Cover Set 10 study material uploaded + polity + History

TEST SCHEDULE -- Monday 9:30 am

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25% of India's total area under green cover, says survey report

The Hindu Bureau

CHENNAI

India's forest and tree cover has reached a quarter of the country's total geographical area, according to the India State of Forest Report (ISFR) 2023, released by the Government of India on Saturday.

The increase of 25.17% breaks down to 21.76% of forest cover (7.15 lakh sq. km) and 3.41% of tree cover (1,289 sq. km).

The Forest Survey of India (FSI) defines "forest cover" as land with tree canopy density exceeding 10% and covering at least one hectare. Thus "forest" in ISFR includes plantations. The FSI counts trees outside forests towards the 'tree cover' if they occupy less than one hectare and if they also lie outside reserve forest areas. FSI Director-General Anoop Singh said bamboo cover is also included in the tree cover.

Union Environment Minister Bhupender Yadav singled out the report's finding that India has augmented its carbon sink by 2.29 billion tonnes over 2005 levels.

India's Nationally Determined Contributions to-



Sea of green: The India State of Forest Report 2023 was released by the Government of India on Saturday. M. SATHYAMOORTHY

wards the Paris Agreement's targets require it to create an additional carbon sink of at least 2.5 billion tonnes by 2030.

The FSI's inclusion of plantations in "forests" has been controversial, howev-

er, as they lack the deadwood and underground biomass development that also sequester carbon.

The FSI has been assessing forest cover since 1987 and tree cover since 2001. The current report estimated green cover using data from the Resourcesat series of satellites operated by the Indian Space Research Organisation.

Since 2021, Madhya Pradesh has had the largest area under forest and tree cover (85,724 sq. km).

The largest increase in forest and tree cover in this period was recorded in Chhattisgarh (684 sq. km).

The overall increase in tree and forest cover means a net gain after accounting for losses. Among other places, losses have been recorded in the Western Ghats and Eastern States Area (58.22 sq. km less forest cover) and the Northeast (327.30 sq. km less forest cover) – both highly biodiverse regions.

Likewise, while "very dense" forests expanded by 3,465.12 sq. km, 'moderately dense' and 'open' forests have shrunk by 1,043.23 sq. km and 2,480.11 sq. km, respectively.

(With agency inputs)

Topic → **India's Forest and Tree Cover Overview**



Forest and Tree Cover 🌳

Current Status: India's forest and tree cover now makes up 25.17% of the total geographical area, as per the ISFR 2023 report.

Breakdown of Coverage 📏

Forest Cover: Constitutes 21.76% (7.15 lakh sq. km).

Tree Cover: Accounts for 3.41% (1,289 sq. km).

Definition of Forest Cover

Criteria: Land with a tree canopy density exceeding 10% and covering at least one hectare, including plantations.

Carbon Sink Increase 🌍

Progress: India has enhanced its carbon sink by 2.29 billion tonnes since 2005, aligning with its Paris Agreement commitments.

Controversy Over Plantations

Debate: The inclusion of plantations in forest cover is controversial due to their lack of certain carbon-sequestering features.

State Contributions 📊

Madhya Pradesh: Largest area under forest and tree cover.

Chhattisgarh: Recorded the largest increase in this period.

.

Losses in Biodiverse Regions



Concern: Notable losses in forest cover in the Western Ghats and Northeast regions, despite overall gains.

Summary: India's forest and tree cover has reached 25.17% of its geographical area, with significant increases in carbon sink and coverage, but also notable losses in biodiverse regions

Ritualistic frenzy





'Kandanar Kelan Theyyam', a deity based on the legend of an archer-farmer, braves the blazing, gnawing flames during an hour-long Kaliyattam festival at Kooveri Tharavadu Dharma near Pazhayangadi in Kannur. THULASI KAKKAT

Topic → **Kandanar Kelan Theyyam: A Cultural Extravaganza**



% Cultural Significance

Kandanar Kelan Theyyam is a traditional ritualistic performance in Kerala, India. It showcases the rich cultural heritage of the region.

Mythological Roots

The Theyyam is deeply rooted in local mythology and folklore. It often depicts stories of deities and legendary figures.

№ Performance Elements

Features vibrant costumes, intricate makeup, and rhythmic music. Creates a captivating visual and auditory experience.

Spiritual Aspect



More than just a performance, it is a form of worship. The performer embodies the spirit of the deity.

Seasonal Festivals

Typically performed during specific festivals and temple rituals. Attracts large audiences.

Community Involvement

Involves the participation of local communities.

Fosters a sense of unity and cultural identity.





Ongoing efforts to preserve and promote Theyyam performances.

Considered an essential part of Kerala's cultural heritage.

Summary: 'Kandanar Kelan Theyyam' is a vibrant and spiritual ritualistic performance in Kerala, deeply rooted in mythology and community traditions

What are India's plans for a quantum satellite?

What is its function? When is it expected to be launched? Which are the fields in which this communication device will help? What about security issues? What is quantum cryptography? What are the pros and cons of quantum key distribution?

protection,

satellites are

expected to

Vasudevan Mukunth

The story so far:

n December 13, Ajai Chowdhry, chairman of the Mission Governing Board of the National Quantum Mission, said India plans to launch a quantum satellite in "2-3 years for quantum communications".

What is the National Quantum Mission?

The National Quantum Mission (NQM) is a Department of Science & Technology programme to accelerate the use of quantum physics to develop advanced communications and sensing systems.

The development of computers changed the course of human history from the mid-20th century onwards. Advances in this sector gave humankind satellites, telecommunications, weather forecasts, drug-discovery programmes,

But these advances are reaching a saturation point because the physics phenomena on which they are based, called classical physics, are hitting a performance upper-limit. So scientists around the world are developing new technologies to solve the same problems but using phenomena of quantum physics. Because the rules of quantum physics allow for the outcomes of classical physics as well as new 'bonus' ones, the new devices are expected to be more versatile problem-solvers.

The Union Cabinet approved the NOM in April 2023 at ₹6,000 crore, to be implemented from 2023 to 2031. The planned quantum satellite is part of this package.

What is a quantum satellite?

A quantum satellite is a term for a



communications satellite that uses quantum Quantum physics to secure its signals. physics has payed the way for new

Communications is a broad term that refers to technologies that send and receive signals. An important part of these technologies is security: forms of data preventing bad actors from intercepting a message being transmitted across large and quantum distances, through multiple networks. The advent of quantum computers threatens

the technologies currently being used to secure messages. Fortunately, quantum physics has facilitate them also paved the way for new forms of protection. and quantum satellites are expected to facilitate them.

How are messages secured?

Say two people, Anil and Selvi, are standing at two ends of a playground and wish to speak to each other. They could shout or wave their hands. However, Anil composes his message, encrypts it, and writes the encrypted text on a piece of paper. He ties it to the foot of a messenger pigeon and sends it to Selvi. If Selvi knows how Anil encrypted the message, she can decrypt it to access the original text.

Encryption is the task of concealing information. The manner is called the cipher. A simple example is the Caesar cipher, where the letters of the alphabet are offset by a fixed number. If the number is 5, the words BIRDS FLY AWAY become GNWIX KQD FBFD.

Say there is a third person, Kaushik, standing in the middle of the ground and trying to eavesdrop on the conversation. If he intercepts the pigeon, he can't crack the text unless he knows the manner of encryption.

This security paradigm is called cryptographic security. It works by hiding the secret code, or key, behind an extremely difficult mathematical problem. A bad actor like Kaushik can solve the problem with a powerful computer to reveal the code – but the harder the problem, the more time (and/or more computing resources) he will need.

Even the most powerful supercomputers have difficulty cracking the best Advanced Encryption Standard ciphers in use today - but quantum computers may be able to do better.

How can quantum physics protect messages? Ouantum cryptography uses the tenets of quantum physics to secure messages. Its most famous type is quantum key distribution (QKD).

In the example before, Anil used a key to encrypt his message and Selvi, who knew the key, used it to decrypt the message. QKD is concerned with sharing this key with both Anil and Selvi such that if Kaushik is eavesdropping on the transmission, everyone will find out and the sharing will be aborted.

Quantum physics can protect against eavesdropping in different ways. One is quantum measurement - the act of measuring the properties of a quantum system, like a photon (the particle of light). According to the rules of quantum physics, a quantum measurement changes the state of the system. If information about the key is encoded in a stream of photons and Kaushik traps and measures them to look for it, the state of the photons will change and Anil and Selvi will know the key has been compromised.

Another way is to use quantum entanglement: when two photons are entangled, any change to one particle will instantaneously change the other, (This is a simplistic description,)

Has QKD been implemented?

Ravindra Pratap Singh of the Physical Research Laboratory, Ahmedabad, wrote in 2023 that standards for different OKD implementations are still a decade away. This said, China currently operates the world's largest QKD network with three quantum satellites and four ground stations.

Experts are also trying to implement QKD across longer distances. Since the early 1990s, the distance of reliable transmissions has increased to several hundred kilometres, either through fibre-optic cables or free space.

In an October 2024 study, researchers at the Raman Research Institute, Bengaluru, reported the Indian Astronomical Observatory in Hanle, Ladakh, offers the best atmospheric conditions through which to transmit data for a satellite-based QKD system. The paper's lead author Satya Ranjan Behera said the beam distance would be 500 km.

Does OKD have drawbacks?

QKD on paper can be different from that in the real-world. This is why the U.S. National Security Agency has recommended the use of post-quantum cryptography rather than quantum cryptography. Its criticism is focused on five technical limitations: "OKD does not provide a means to authenticate the QKD transmission source"; "since QKD is hardware-based", OKD networks can't be upgraded or patched easily; "QKD increases infrastructure costs and insider threat risks" that "eliminate many use cases from consideration": "the actual security provided by a OKD system is not the theoretical unconditional security from the laws of physics... but rather the more limited security that can be achieved by hardware and engineering designs"; and since eavesdroppers can cause a transmission to stop, they can deny the use of a transmission by its intended users (a.k.a. a denial-of-service attack).

The no-cloning theorem of quantum physics also disallows quantum information from being amplified to compensate for losses during transmission.







Introduction to the National Quantum Mission

Announcement: Ajai Chowdhry, chairman of the Mission Governing Board, announced India's plan to launch a quantum satellite in 2-3 years. Objective: Part of a broader initiative to leverage quantum physics for advanced communication and sensing systems.

What is the National Quantum Mission?

Initiation: Launched by the Department of Science & Technology, India.

Budget: ₹6,000 crore approved by the Union Cabinet in April 2023.

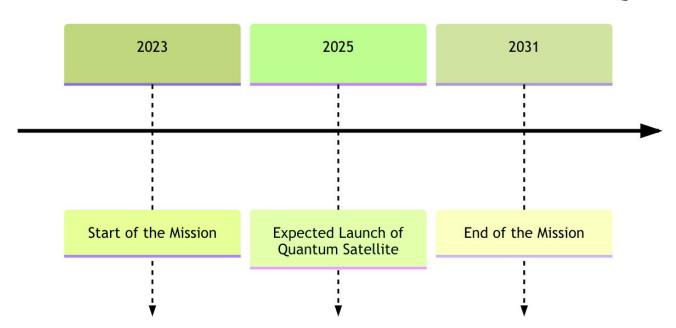
Duration: 2023 to 2031.

Goal: To transcend the limitations of classical physics with quantum

technology.

Timeline of the National Quantum Mission:

Timeline of India's National Quantum Mission



The Need for Quantum Technology



Evolution: From mid-20th century computers to modern innovations like satellites.

Limitations: Classical physics is reaching its limits.

Advancement: Quantum physics offers solutions to existing technological challenges.

The Quantum Satellite: A Game Changer

Definition: Not your average communication satellite; uses quantum physics for security.

Importance: Vital in combating cyber threats.

What is a Quantum Satellite?



Function: Enhances security using quantum physics.

Benefit: Protects communications from data breaches.

How Quantum Satellites Enhance Security

Mechanism: Uses quantum properties to prevent eavesdropping.

Advantage: Ensures secure message transmission over vast distances.

Understanding Message Security

Encryption Basics: Anil encrypts a message to Selvi, akin to sending a secret message via a messenger pigeon.

Cryptography: The art of creating secret codes for secure communication.

How Quantum Physics Secures Messages



Quantum Cryptography: Uses quantum principles for message security.

Technique: Quantum Key Distribution (QKD) alerts recipients of eavesdropping attempts.

Quantum Key Distribution (QKD) Explained

Concept: Shares a secret key between two parties, detecting any interception.

Mechanism: Changes in key state alert users to potential breaches.

Real-World Implementations of QKD

Global Progress: China operates the largest QKD network.

India's Efforts: Research in optimal conditions for QKD, especially in Ladakh.

Challenges and Limitations of QKD



Technical Issues: Concerns from the U.S. National Security Agency about authentication and infrastructure costs.

The Future of Quantum Cryptography

Outlook: Despite challenges, advancements in technology may overcome current limitations, enhancing digital security.

Conclusion

Significance: India's National Quantum Mission and quantum satellite mark a major advancement in communication technology.

Future: Quantum physics promises a more secure communication landscape.

Journal retracts the discredited hydroxychloroquine paper

The Hindu Bureau

More than four-and-a-half

years after the highly ques-

tionable "study" by a

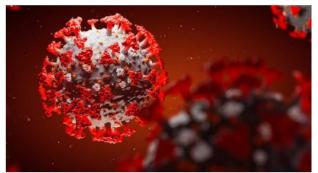
French researcher Didier Raoult and others claiming that hydroxychloroguine monotherapy and hydroxychloroguine in combination with azithromycin was "significantly associated with viral load reduction/ disappearance in COVID-19 patients" was published on March 20, 2020, the paper was finally retracted on December 17 this year. The paper published in the International Journal of Antimicrobial Agents was withdrawn because of concerns about the ethical approval for the research. The paper that was submitted to the journal on March 16, 2020 was accepted for publication the very next

day.

Three days after the paper was published, ICMR approved the use of

hydroxychloroquine as a prophylaxis by healthcare workers and those caring for COVID-19 patients. The drug was also granted an emergency use authorisation by the U.S. FDA on March 28, 2020, which was revoked about once-a-half months later. The publication of the paper and the FDA approval raised a lot of attention globally and contributed to a demand for the drug despite appropriate evidence of its benefit. The drug was also strongly backed by the then U.S. President Donald Trump.

On April 3, a fortnight after the paper was published, the journal publisher – the International Society of Antimicrobial Chemotherapy (ISAC) – which co-owns the journal with Elsevier, expressed concerns saying that the "article does not meet the Society's expected standard". An independent re-



Tall claim: The authors claimed that hydroxychloroquine significantly reduced the SARS-CoV-2 viral load. GETTY IMAGES

view commissioned by the journal also concluded that the trial had "several major methodological issues, including the design, outcome measure and the statistical analyses". Yet, the journal did not retract the paper until a few days ago.

Addressing the concerns about the peer-reviewing process, the ISAC statement said that despite being the Editor-in-Chief of the journal and an author of the paper, "Jean-Marc Rolain had no involvement

in the peer review of the manuscript and has no access to information regarding its peer review".

The paper came under investigation again a few months ago when three authors of the paper contacted the journal saying that they had "concerns regarding the presentation and interpretation of results" and no longer wanted to be associated with the article, as per documents seen by *Retraction Watch*. Responding to *Re-*

traction Watch, a spokesperson for the journal said that the "journal was reopening the previously closed investigation after receiving the authors' requests".

Ethical approval for the study was granted on March 6 and as per the paper, the follow-up of the participants was supposed to last for 14 days. But with a "submission date of March 16, the timeline becomes seemingly impossible", Elisabeth M Bik, an independent research integrity researcher wrote on PubPeer in March 2020. In the retracted notice, the journal addresses this concern saying: "The journal has not been able to establish whether all patients could have entered into the study in time for the data to have been analysed and included in the manuscript prior to its submission on the 20th March 2020, nor whether all patients were enrolled in the study upon admission as opposed to having been hospitalised for some time before starting the treatment described in the article."

As per the details available in the EU clinical trials register, the secondary obiective of the trial was to evaluate the "clinical effectiveness of treatment on time to apyrexia, normalisation of respiratory rate, and average length of hospital stay and mortality". The results of the secondary objective are not available in the paper. While the primary objective of the study was to shorten the period of virus carrying and thus contagion, the secondary endpoint is "very important for determining whether patients may have clinical benefit and not only a reduced risk of infecting others", a researcher wrote on PubPeer.

Topic → **Hydroxychloroquine** as a **Prophylactic Treatment**



Overview

- Hydroxychloroquine is being explored for use as a prophylactic treatment.
- Prophylactic treatment refers to medical interventions aimed at preventing disease or health issues before they occur.
- It can include vaccinations, medications, or lifestyle changes to reduce the risk of illness
- The primary focus is on healthcare workers who are at a higher risk of exposure.
- Known primarily as an antimalarial drug, hydroxychloroquine is under scrutiny for new applications.
- Ongoing research aims to determine its effectiveness in preventing infections.



- The use of hydroxychloroquine for prophylaxis has sparked debate within the medical community.
- Studies are being conducted to assess its safety and efficacy in this context.
- The topic has gained significant attention, especially during health crises like pandemics.

Summary: Hydroxychloroquine is under investigation as a preventive treatment for healthcare workers at risk of exposure.



Question Corner

Squirrels and voles

Are ground squirrels strictly granivorous?

A new study provides the first evidence that California ground squirrels also hunt, kill and eat voles. Researchers have for the first time chronicled widespread carnivorous behaviour among squirrels. The study changes our understanding of ground squirrels. It suggests that what was considered a granivorous species is an opportunistic omnivore and more flexible in its diet. Through videos, photos and direct observations at the regional park, the researchers documented California ground squirrels

of all ages and genders hunting, eating and competing over vole prey between June 10 and July 30 this year. The squirrels' carnivorous summer behaviour peaked during the first two weeks of July. coinciding with an explosion of vole numbers at the park reported by citizen scientists on iNaturalist. This suggests the squirrels' hunting behaviour emerged alongside a temporary increase in the availability of prey, the study said. The scientists did not observe the squirrels hunting other mammals.

Readers may send their questions / answers to questioncorner@thehindu.co.in

Topic → **California Ground Squirrels: New Behavioral Insights**



Mew Findings

Study Revelation: California ground squirrels have been observed hunting, killing, and consuming voles, marking a significant behavioral discovery.

H Behavioral Shift

Dietary Perception: This research shifts the understanding of ground squirrels from being primarily granivorous to opportunistic omnivores with a flexible diet.

Research Methodology

Documentation: The study employed videos, photos, and direct observations to capture the squirrels' behavior in a regional park setting



Observation Period



Timeline: Observations were conducted from June 10 to July 30, with a notable peak in carnivorous activity during the first two weeks of July.



Prey Availability

Vole Population Surge: The increase in hunting behavior was linked to a rise in vole populations, as reported by citizen scientists on iNaturalist.

🐾 Age and Gender

Diverse Participation: Squirrels of all ages and genders were seen engaging in hunting and competing for vole prey.





Focused Hunting: The study noted that the squirrels exclusively targeted voles, with no evidence of hunting other mammals.

Summary: The study highlights a previously unrecognized carnivorous behavior in California ground squirrels, indicating a broader dietary adaptability



Denali Fault tore apart ancient joining of landmasses

A study shows that three sites spread along the Denali Fault located in the southern half of Alaska were once a smaller united geologic feature indicative of the final joining of two land masses. That feature was then torn apart by millions of years of tectonic activity. Historical reconstruction of 483 km of horizontal movement on the Denali Fault found that the three locations at one time formed a terminal suture zone, which represents the final integration of tectonic plates into a larger mass.



Topic → **Geological Insights on the Denali Fault**



Geological Feature and Tectonic Activity

Geological Feature: Three sites along the Denali Fault in southern Alaska were once part of a united geologic feature.

Tectonic Activity: The feature was separated due to millions of years of tectonic activity

Horizontal Movement and Terminal Suture Zone

Norizontal Movement: A historical reconstruction revealed 483 km of horizontal movement on the Denali Fault.

Framinal Suture Zone: The three locations once formed a terminal suture zone, indicating the final integration of tectonic plates.

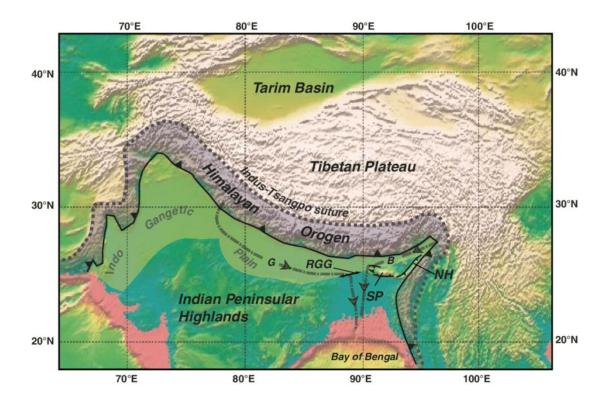
 A suture zone is a region where two tectonic plates collide and merge, or "suture" together.



Suture zones can form mountain ranges, volcanic activity, and seismic events.

They can also be marked by the presence of ophiolites, mélanges, and accretionary

complexes.



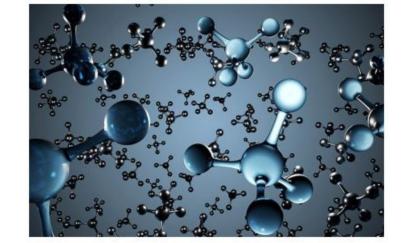
Land Masses and Research Significance



Land Masses: The study highlights the joining of two land masses in the region.

Research Significance: The findings contribute to understanding the geological history and tectonic processes in Alaska

Summary: A study reveals that three sites along the Denali Fault in Alaska were once part of a united geologic feature, later separated by tectonic activity, indicating significant horizontal movement and the final integration of tectonic plates



Eco-friendly reactor converts air and water into ammonia

Taking inspiration from how nature produces ammonia, researchers have developed a reactor that produces the chemical commodity from nitrogen in the air and water, without any carbon footprint. The plasma-electrochemical reactor can sustain a high ammonia production rate of approximately 1 gram per day for over 1,000 hours at room temperature, and does so directly from air, which is a significant advance toward green ammonia synthesis at an industrially competitive production rate.



Topic → **Nature-Inspired Ammonia Production**



Researchers have developed a reactor inspired by nature for ammonia production.

 The reactor produces ammonia from nitrogen in the air and water, with zero carbon footprint.

It utilizes a plasma-electrochemical process for ammonia synthesis.

• The reactor can sustain a production rate of about 1 gram of ammonia per day.

It operates effectively for over 1,000 hours at room temperature.



This technology represents a significant advancement toward green ammonia synthesis.

The production rate is competitive for industrial applications.

Summary: Researchers have created a carbon-free reactor that efficiently produces ammonia from air and water, marking a significant step towards sustainable industrial practices

Key Features of the Reactor



Nature-Inspired Design: The reactor mimics natural processes to produce ammonia.

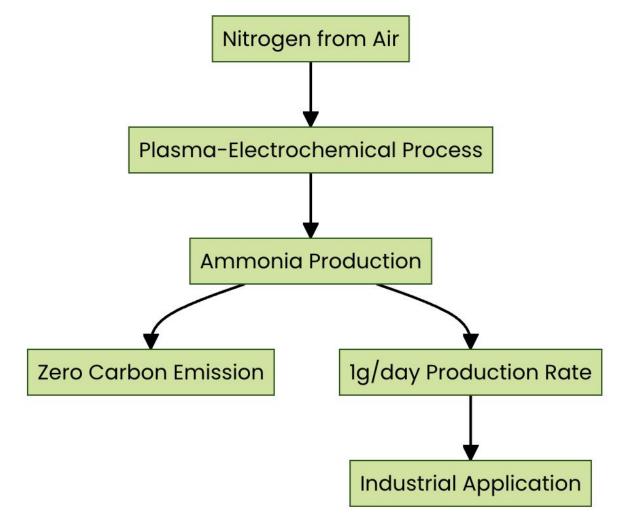
Zero Carbon Footprint: Utilizes air and water, ensuring an environmentally friendly process.

Plasma-Electrochemical Process: Innovative method for efficient ammonia synthesis.

Sustained Production: Capable of producing 1 gram of ammonia daily.

Long Operational Life: Functions effectively for over 1,000 hours at room temperature.

Industrial Relevance: Production rate is suitable for industrial applications



Implications for Industry



Sustainable Practices: Supports the shift towards eco-friendly industrial processes.

Innovation in Technology: Represents a breakthrough in green technology for ammonia synthesis.

Competitive Edge: Offers a viable alternative to traditional ammonia production methods

Q. Chancay port has recently been in news on account of Chinese involvement in its development through Border and Road Initiative. In this context the given port is located in which among the following Country. (Tol)

- A) Ethiopia
- B) Argentina
- C) Venezuela
- D) Peru
- . Ans: D

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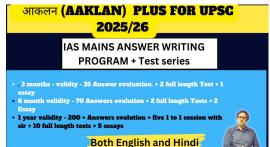
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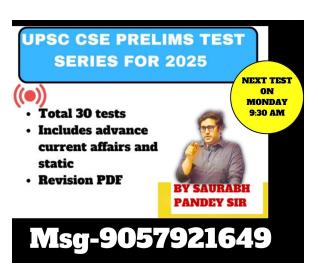


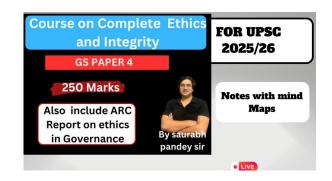
NEXT TEST scheduled on Monday - 9:30 am

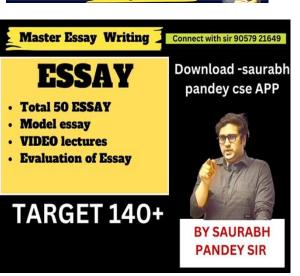












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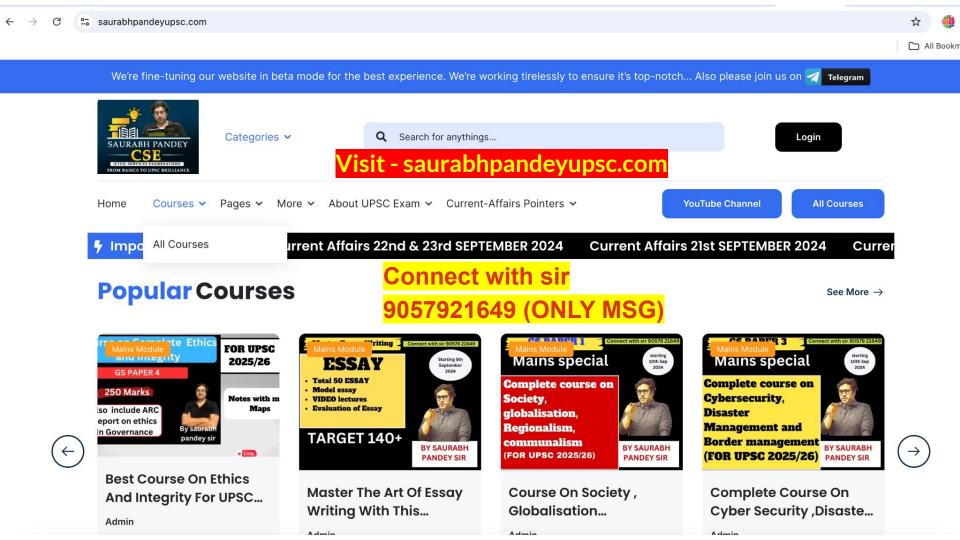
Border management and internal security

Week -2 - International relations

Week -3 -Ethics and integrity

Week -4 - Ethics and integrity

One short videos of sources will b uploaded + model answers



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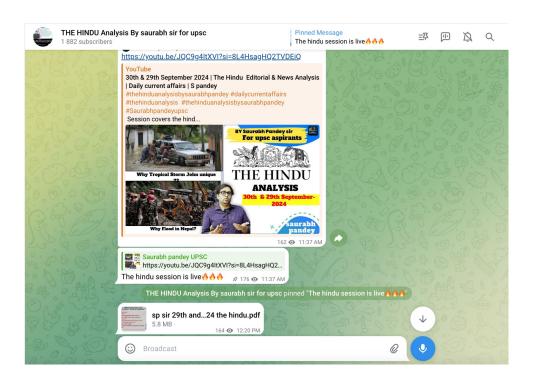
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Target Mains -2025/26 -

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