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GENERAL STUDIES (TEST CODE : 2715)

Name of Candidate	AKSHIT BHARDWAJ	Registration Number	45866015
Medium Hindi/Eng.	ENGLISH	Date	
Center			

INDEX TABLE

Q. No.	Maximum Marks	Marks Obtained
1	10	
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9	10	
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11	15	
12	15	
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14	15	
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16	15	
17	15	
18	15	
19	15	
20	15	

Total Marks Obtained:

Remarks:

Signature of Examiner

INSTRUCTIONS

- Do furnish the appropriate details in the answer sheet (viz. Name, Registration Number and Test Code).
उत्तर पुस्तिका में सूचनाएं भरना आवश्यक है (नाम, प्रश्न-पत्र कोड, विद्यार्थी क्रमांक आदि)।
- There are **TWENTY** questions printed in **HINDI & ENGLISH** इसमें बीस प्रश्न हैं हिन्दी और अंग्रेजी में छपे हैं।
- All questions are compulsory.** सभी प्रश्न अनिवार्य हैं।
- The number of marks carried by a question/part is indicated against it.
प्रत्येक प्रश्न/भाग के अंक उसके सामने दिए गए हैं।
- Answers must be written in the medium authorized in the Admission Certificate, which must be stated clearly on the cover of this Question-Cum-Answer (QCA) Booklet in the space provided. No marks will be given for answers written in medium other than the authorized one.
प्रश्नों के उत्तर उसी माध्यम में लिखे जाने चाहिए जिसका उल्लेख आपके प्रवेश पत्र में किया गया है और उस माध्यम का स्पष्ट उल्लेख प्रश्न-सह-उत्तर (क्यूसीए) पुस्तिका के मुख्य पृष्ठ पर अंकित निर्दिष्ट स्थान पर किया जाना चाहिए। उल्लिखित माध्यम के अतिरिक्त अन्य किसी माध्यम में लिए गए उत्तर पर कोई अंक नहीं मिलेंगे।
- Word limit in questions, if specified, should be adhered to.
प्रश्नों में शब्द सीमा, जहाँ विनिर्दिष्ट है, का अनुसरण किया जाना चाहिए।
- Any page or portion of the page left blank in the Question-Cum-Answer Booklet must be clearly struck off.
उत्तर पुस्तिका में खाली छोड़ा हुआ पृष्ठ या उसके अंश को स्पष्ट रूप से काटा जाना चाहिए।

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EVALUATION INDICATORS

1. Contextual Competence
2. Content Competence
3. Language Competence
4. Introduction Competence
5. Structure - Presentation Competence
6. Conclusion Competence

Overall Macro Comments / feedback / suggestions on Answer Booklet:

1.

2.

3.

4.

5.

6.

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क्षेत्रीय कृषि विशेषज्ञताओं पर आधारित खाद्य प्रसंस्करण इकाइयां जमीनी स्तर पर परिवर्तन को किस प्रकार सुगम बना सकती हैं? भारत के विभिन्न क्षेत्रों में उपयुक्त उदाहरणों के साथ चर्चा कीजिए।

How can food processing units based on regional agricultural specializations facilitate grassroots-level transformation? Discuss with suitable examples from different regions of India. (Answer in 150 words) 10

The food processing industry employs 12.41% of formal workforce & provides 23% of agri exports - highlighting its potential for grassroots transformation.

Regional Agricultural Specialisation leading to grass-roots level transformation

1. Increasing farmer incomes by transition to high value chain.
2. Introducing local snacks in market, increasing demand eg Banana Chips in Tamil Nadu
3. Addressing the issue of storage & reducing wastage
eg Using surplus sugarcane in North India

4. Promotion of GI Tag snacks

eg Makhana in Bihar

5. Reduces Monoculture practices

eg Promoting Millet products in Rajasthan

6. Increased formalisation of the agriculture sector → income security

7. Linkages with SHGs can lead to women empowerment

eg Lijjat Papad success story

Way Forward → Promoting localisation of food processing

Way Forward → Plug & Play Food Parks

Way Forward → Expanding PM Kisan SAMPADA

Scheme

A bottom-up approach can increase the impact of food processing Industry

बर्चा कीजिए कि डिजिटलीकरण भारत में समावेशी विकास के प्राथमिक चालक के रूप में किम प्रकार उभरा है।

Discuss how digitization has emerged as the primary driver of inclusive growth in India. (Answer in 150 words)

10

India has one of the largest digitised economies with over 1.14 Billion cellular connections.

Digitisation as Primary driver of Inclusive growth

1. Increased financial inclusion
 eg JAM Trinity, over 54cr Jan Dhan Accounts
2. Improvements in debt market and credit access eg United Lending Interface
3. Overdraft facilities for urgent loans to vulnerable sections
4. Expansion of Direct Benefit Transfers has improved subsidy outcomes
5. Increased access to Insurance
 eg 4cr new registrations in PM Fasa Bina

6. Digitisation of land records has consolidated land reforms & credit access

eg DILRMP, SWAMITVA SCHEME

7. Agricultural overhaul via digitisation of production process

eg FARMS App, AgriStack

However some challenges persist

1. Digital Divide - unequal access to digital infrastructure & devices

2. Lack of digital literacy eg NASSCOM says only 2% farmers use Apps on field

Way Forward

→ BharatNet rollout should be expedited

→ Focus on PM Digital Saksharta Abhiyan

Digitisation can lead to inclusive growth when coupled with SABKA SAATH SABKA VIKAS

डिजिटल कृषि मिशन भारत में किसानों के जीवन को रूपांतरित करने के लिए किस प्रकार प्रौद्योगिकी का लाभ उठाता है? प्रामाणिक उदाहरणों के साथ अपने उत्तर की पुष्टि कीजिए।

How does the Digital Agriculture Mission leverage technology to transform the lives of farmers in India? Substantiate your answer with relevant examples.
(Answer in 150 words) 10

The Digital Agriculture Mission launched (DAM) in 2015 aims to overhaul the use of ICT Technology in agriculture

DAM - leveraging technology to transform the lives of farmers

1. Use of Big Data technologies to make data-driven policies
eg Use of Agri-stack in policy making
2. Maintaining farmers registry and crop sown registry for tracking progress
3. Use of sensors & Internet of Things for Precision Agriculture
eg sensor based micro-irrigation

4. Use of Satellite technology for crop & yield estimation
eg CROPIC, YES-TECH
5. Use of Blockchain for storage of data eg Vishwanya
6. Cadastral Mapping for geo-referenced village maps eg ANRMP
7. Use of e-Tech solutions to boost productivity eg Krishi Decision support system

Way Forward

- Reducing Digital divide
- Using digital solutions for credit access eg ULI
- Digitisation of more schemes eg Soil Health Card

A digitally empowered agriculture sector can boost its current CAGR of 5%/annum.

भारत में नवीकरणीय ऊर्जा के लिए नई औद्योगिक अवसंरचना स्थापित करना एक कठिन कार्य है। सरकार इस उभरते क्षेत्रक में निजी क्षेत्रक की भागीदारी को प्रोत्साहित करने की क्या योजना बना रही है?

Setting up new industrial infrastructure for renewable energy in India is a daunting task. How does the government plan to encourage private sector participation in this emerging sector? (Answer in 150 words) 10

Industrial infrastructure for renewable energy is a key target for India to achieve its Panchamrit goals.

However, setting up new infra is a daunting task:

1. Large land requirements of the renewable energy production units
2. Need for front-loaded investment with delayed returns
3. Difficulty in ensuring grid connectivity of renewable supply.
4. Convergence of industries with existing DISCOM networks
5. Import dependence on China for capital machines

Government planning to encourage private sector participation

1. Crowding in via Capex - capex has increased to ~12% of GDP
2. Design linked incentives to create infra - projects in India
3. Production linked incentives to encourage expansion
4. Exploration missions & KABIL to provide stable supply-chain.
5. Diplomatic engagements to boost investment \Rightarrow International solar alliance

With COP28 of UNFCCC declaring the goal of just transition away from fossil fuels, India needs to lead the way as a VISHWAGURU

वैश्विक स्तर पर कच्चे तेल की बढ़ती कीमतों के भारत के लिए प्रमुख मकमल अर्थिक (Macroeconomic) परिणाम क्या हैं?

What are the key macroeconomic consequences of rising global crude oil prices for India? (Answer in 150 words) 10

The ongoing global polycrisis has led to rising global crude oil prices which has macro-economic spillover effects on the Indian economy

Macro-economic consequences of rising crude oil prices for India

1. Increased headline inflation due to higher prices.
2. Higher costs for industries dependent on fossil fuels.
3. Reduced exports of sectors like petroleum refinery
4. Reduction in Purchasing power of the population

5. Depreciation of the Rupee, making imports more expensive
6. Increased supply chain sector vulnerabilities for economy

Way Forward / Solutions

1. Monetary Policy - proactive decisions to keep inflation between 4±2%.
2. Supply chain resilience - through diversification & coordination
 (eg) SCRI initiative
3. Shift towards clean energy
 (eg) National Green Hydrogen Mission
4. Focusing on robust trade ties to ensure consistent supply

In the environment of Geo-Economic Fragmentation, Atma Nirbharta is a must

ई-अपशिष्ट प्रबंधन केवल कॉर्पोरेट उत्तरदायित्व नहीं है, बल्कि इसकी शुरुआत घर से होती है। इस संबंध में विभिन्न हितधारकों के उत्तरदायित्वों का वर्णन कीजिए।

E-waste management is not just a corporate responsibility, but it starts at home. Delineate the responsibilities of different stakeholders in this regard. (Answer in 150 words) 10

The concept of circular economy attributes e-Waste Management as a responsibility of consumers at home as well as corporates.

Responsibility of Consumers

1. Segregation of Waste - separating e-Waste from other waste
2. Disposal at e-Waste collection centres only.
3. Nudging Peer Behaviour by spreading awareness
4. Reducing waste generation by mindful consumption

Responsibility of Producers

1. Extended producer responsibility over entire life cycle of products
2. Recycling centres to promote circular economy.
3. Collection drives to collect e-waste from consumers

Role of Government

1. To act as a facilitator for circular economy
2. To issue periodic rules and guidelines for e-waste disposal

Only a holistic combined effort can bring desired results

भारत में सूखा शमन के प्रयासों को सुदृढ़ करने के लिए उभरती प्रौद्योगिकियों का लाभ किम प्रकार उठाया जा सकता है?

How can emerging technologies be leveraged to strengthen drought mitigation efforts in India? (Answer in 150 words) 10

India is expected to become a water scarce country by 2050 - highlighting the importance of leveraging technology in drought mitigation

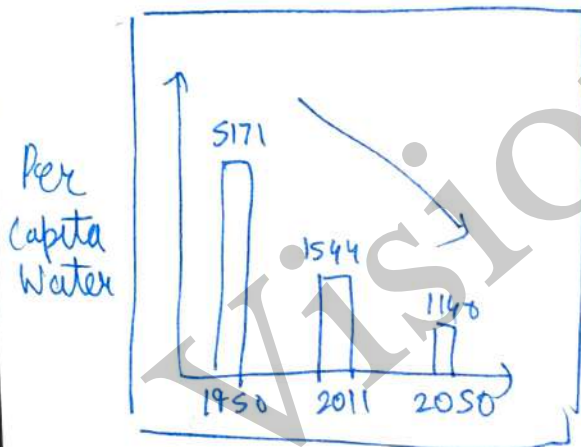


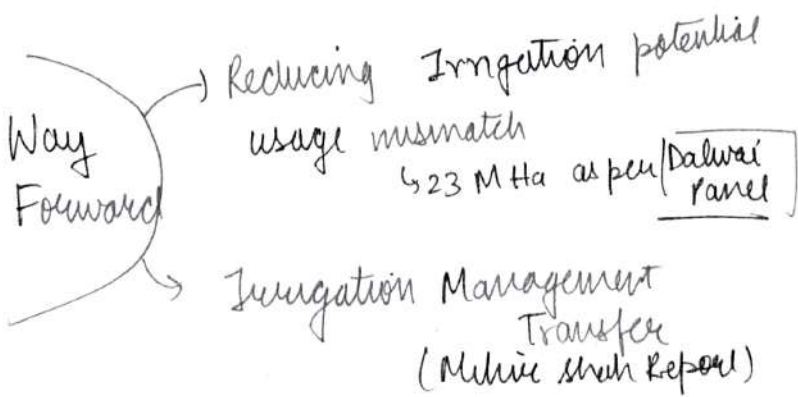
Fig : Water Scarcity

Role of Emerging Technology

1. In Precision Agriculture

eg) Micro irrigation, root zone watering

2. Using Internet of Things & sensors to reduce wastage of irrigation water
3. AI/ML & supercomputers to predict monsoon levels
 eg AIRAWAT supercomputer
4. Genetically modified drought resilient seeds.
5. Direct seeding of Rice and system of Rice Intensification



Thus climate smart technologies are the need of the hour

प्रो. जयंत नारीकर और सर फ्रेड होयल द्वारा विकसित 'हॉयल-नारीकर गुरुत्वाकर्षण सिद्धांत' को संक्षेप में स्पष्ट कीजिए। इसने ब्रह्मांड की उत्पत्ति और नियति पर समकालीन चर्चा को किस प्रकार प्रभावित किया?

Briefly explain the 'Hoyle-Narlikar Theory of Gravity' developed by Prof. Jayant Narlikar and Sir Fred Hoyle. How did it impact the contemporary discourse on the origin and fate of the universe? (Answer in 150 words) 10

The Hoyle Narlikar Theory of gravity is based on a stationary model of the universe

Basis: It says that the size of universe is fixed which led to collisions and formations of stars and planets

Shaping contemporary discourse

1. shifted focus to size of the universe

eg Doppler's Red shift

2. led to Hubble proving expansion of universe
3. Ultimately led to the Big Bang Model
4. Now it has expanded to discussions on Dark Energy

Thus the Hoyle - Nucleon model sparked the research that has shaped the contours of space exploration.

झामक खबरों (फेक न्यूज़) का प्रसार राष्ट्रीय सुरक्षा के लिए किस प्रकार खतरा उत्पन्न करता है? इस चुनौती से निपटने के उपायों पर चर्चा कीजिए।

How does the spread of fake news pose a threat to national security? Discuss the measures to counter this challenge. (Answer in 150 words) 10

'In war truth is the first casualty'
~ Aeschylus

The rise of information warfare has led to the increasing problem of fake news as a tool of propaganda

Fake News → Threat to National security

1. Creates Panic in the population
2. Diverts the attention of security forces during crunch situations
3. Leads to radicalisation and propaganda

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4. Can impact international image and Soft Power

Measures to Tackle Fake News

1. MHA's Cyber Volunteers to tackle fake news
2. Chakshu Facility on Sanchar Sathi portal to report fake news
3. Employment of AI/ML techniques for deepfake detection
4. Cooperation with social media platforms to takedown fake news
5. Identifying fake news as a part of intelligence activities

A whole of government approach is needed to tackle fake news

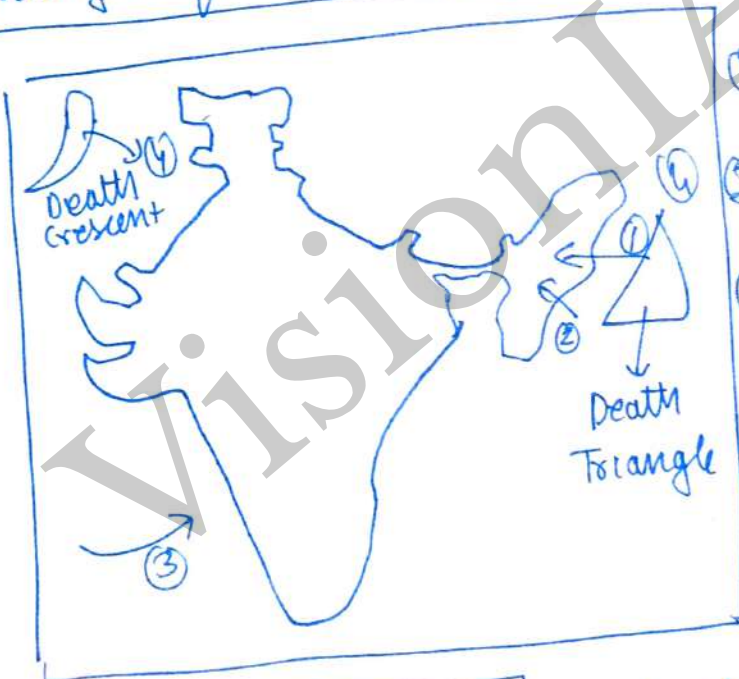
स्पष्ट कीजिए कि भारत को अंतर्राष्ट्रीय संगठित अपराधों (TOC) से निपटने में किस प्रकार विभिन्न चुनौतियों का सामना करना पड़ रहा है। इस खतरे से निपटने के लिए किए जा रहे उपायों पर टिप्पणी कीजिए।

Explain how India faces numerous challenges in combating Transnational Organized Crime (TOC). Comment on the measures being taken to counter this threat. (Answer in 150 words)

10

Transnational organised crime refers to crime networks extending beyond international borders

Challenges faced by India



- ① Drug Trafficking
- ② Gun Running
- ③ ~~Beet~~ Piracy
- ④ Digital Pirates

1. Porous Borders and long boundaries - lead to undetected crossings

2. Maritime / Maritime chokepoints -
facing ~~piracy~~ ^{piracy} # issues

eg → Bab-el Mandeb Strait

3. Gun Running in North-East
causing violence

Measures to Counter

1. Anti Cut Anti Climb fences
on borders

2. Naval Strength as a Blue Water
Navy to tackle Piracy

3. International cooperation with
FATF & UNODC

4. Improving Coordination
eg → Bharat Pol formation

A zero Tolerance policy is needed
to tackle organised crime

आहार विविधता, मृदा स्वास्थ्य और संधारणीय कृषि सुनिश्चित करने में दालों के महत्व का परीक्षण कीजिए। इन फसलों के उत्पादन और विपणन के संदर्भ में किसानों को किन चुनौतियों का सामना करना पड़ता है?

Examine the significance of pulses in ensuring dietary diversity, soil health, and sustainable agriculture. What challenges do farmers face in terms of production and marketing of these crops? (Answer in 250 words) 15

Recently the government has launched a 6-year Mission for Atmanirbharata in Pulses - highlighting their holistic qualities and importance

Significance in Dietary Diversity

1. Major source of protein in traditional Indian diet
2. Counters hidden hunger by being rich in nutrients & vitamins
3. Improves folic acid & iron acid levels in the body.

Significance in soil health

1. Increases Nitrogen concentration in soils.

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2. Leguminous plants develop symbiosis with Rhizobium & other Nitrifying Bacteria

Significance in Sustainable Agriculture

1. Reduces Rice/Wheat Monoculture
2. Improves long term soil health
3. Compatible with Organic farming & zero budget natural farming

Challenges faced by farmers

In Production

1. Lack of good quality seeds -
Seed Replacement Ratio < 20% (Dalwai Panel)
2. Limited knowledge on best-practices & optimal sowing season
3. Depleted soils & farm ecosystem

In Marketing

1. Absence of Price Discovery mechanisms

2. Low rate of procurement - as MSP is dominated by Rice & Wheat
3. limited demand as pulses are not part of PDS system

Way Forward

1. Improving procurement rates of pulses under NFSA
eg) PM AASHA scheme
2. Diversifying crops sown - expanding growth of Tur dal, Masur etc
3. Research into new seed varieties
eg) Increasing ICAR funds
4. Creation of unified national market
eg) Better eNAM onboarding

Pulses are a potential solution for both economic & nutritional lags in agriculture

12.

भारत में विमानन क्षेत्रक द्वारा सामना की जाने वाली सुरक्षा संबंधी चुनौतियां क्या हैं? इस संदर्भ में, भारतीय वायुयान अधिनियम, 2024 के प्रमुख प्रावधानों पर चर्चा कीजिए।

What are the safety challenges faced by the aviation sector in India? In this context, discuss the key provisions of The Bharatiya Vayuyan Adhiniyam, 2024. (Answer in 250 words)

15

The recent Air India crash in Ahmedabad exposed the safety challenges faced by the aviation sector in India.

Safety Challenges in Aviation sector

1. Regulatory Blind-spots - absence of regular safety checks
2. Pilot Fatigue due to increasing number of flight hours
3. Old Fleets and equipments leading to malfunctioning
4. Cost cutting by airlines to reduce ticket prices

5. Lack of uniform rules on purchase & sale of Aircraft
↳ Do not follow CAPE TOWN convention
6. Congested Airspace leading to scheduling challenges
7. Understaffed air traffic control - forcing ATC operators to multi-task
8. Lack of periodic upgrades of cockpit equipment.

Key Provisions of Bharatiya Vayunam Adhiniyam 2024

1. Introduces rules for acquisition & sale of airplanes

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2. Increased frequency of regulatory checks
3. Burden of safety & insurance increased for airlines
4. Aligns rules with international laws like Cape town convention
5. Introduces rules on Pilot's workload management
6. Instructions for periodic overhaul of fleet

The rules are an effort to minimise accidents in the future & airlines must follow them with due diligence

पिछले कुछ वर्षों में रुपये के मूल्य में होने वाली तीव्र गिरावट के लिए कौन-से कारण उत्तरदायी हैं? भारतीय अर्थव्यवस्था के संबंध में रुपये के अवमूल्यन के लाभ और हानियों पर चर्चा कीजिए। मुद्रा अस्थिरता को प्रबंधित करने के लिए RBI द्वारा उपयोग किए जाने वाले उपकरणों पर प्रकाश डालिए।

What are the causes for sharp depreciation in the value of rupee in the last few years? Discuss the merits and demerits of rupee depreciation on the Indian economy. Highlight the tools used by the RBI to manage currency volatility. (Answer in 250 words)

15

India follows a mixed-float system of exchange rate management - influenced by both external & internal factors

Causes for sharp depreciation of Rupee

1. Rapid increase in crude oil prices due to geo-economic fragmentation
2. Trade Weaponisation and Resource Nationalism have increased pressure on Rupee
3. Bullish rise of Dollar vis-a-vis most global currencies
4. Recent expansionary monetary policy has increased Rupee supply & influenced exchange rates

Merits of Rupee Depreciation

1. It makes Indian exports more competitive in global market
2. Makes imports expensive and thus increases domestic sales
3. Boosts Make in India initiative

De-merits of Rupee Depreciation

1. Creates inflationary pressure on the entire economy
2. Increases cost of Imports, especially Inelastic imports like crude oil
3. Increases overall Fiscal Deficit
4. Increases debt-burden since 53% of loans are Dollar denominated and the become costlier

5. Reduces purchasing power of the Indian Rupee

Tools used by RBI to manage currency volatility

1. Repo Rate - Increased if there is need for contraction & vice versa
2. Open Market Operations - to absorb or supply liquidity from/to market
3. Sterilisation bonds - to absorb or supply liquidity from market
4. Conveys Stance - Hawkish/Dovish or neutral to indicate strategy

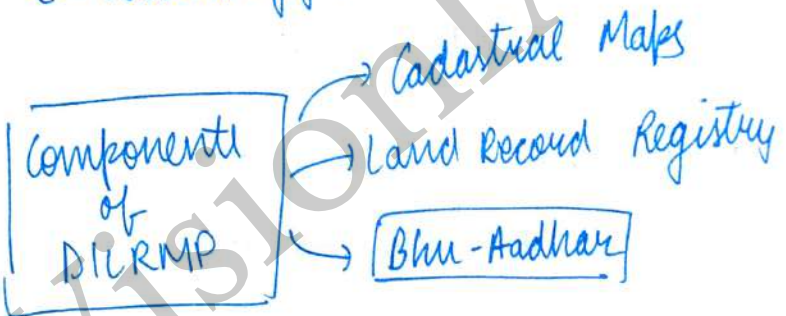
In the times of increasing economic volatility, there is a need to develop a robust mechanism to tackle exchange-rate fluctuations

14.

भारत में भूमि प्रशासन को बेहतर बनाने में डिजिटल इंडिया भूमि अभिलेख आधुनिकीकरण कार्यक्रम (DILRMP) के तहत भूमि अभिलेखों के डिजिटलीकरण की भूमिका का परीक्षण कीजिए। इसके कार्यान्वयन में आने वाली प्रमुख चुनौतियां क्या हैं?

Examine the role of digitization of land records under the Digital India Land Records Modernization Programme (DILRMP) in improving land governance in India. What are the key challenges in its implementation? (Answer in 250 words)

The Digital India Land Record Modernisation programme aims to improve land governance through e-technology.



Role of DILRMP in improving land governance in India

1. Ownership Rights are consolidated for farmers - land to the tiller
2. solves agricultural land disputes - boosting efficiency

3. Formal records enable the implementation of Data-Driven policies for farmers.
4. Digitised records improve the access to formal credit by improving collateral.
5. Convergence with existing subsidies and schemes like Soil Health Card streamline land governance.

Challenges in implementation

1. Coverage issues - Not all districts have benefitted from DLRMP
2. Digital divide - Large portions of the population do not have access to digital records

3. limited Digital Literacy - even after accessing records, very few farmers able to use them
4. slow pace of project completion - due to multiple land disputes
5. Cost overruns with the project overshooting initial estimates

Solutions / Possible Improvements

1. Creating a lender interface where creditors can access DLRMP records
2. Increasing digital literacy through PM Gramin Digital Saksharta Abhiyan

The DLRMP mission sets out on a mission to make growth data driven.

जैव विविधता पर कन्वेंशन के नागोया प्रोटोकॉल के तहत पहुंच और लाभ साझाकरण (ABS) समझौते के संदर्भ में, डिजिटल अनुक्रम सूचना (DSI) क्या है? डिजिटल अनुक्रम सूचना, ABS के प्रबंधन की पारंपरिक पद्धति को किस प्रकार जटिल बनाती है? इस आलोक में, नए जैव विविधता (पहुंच और लाभ साझाकरण) विनियमन 2025 के प्रावधानों को रेखांकित कीजिए।

In the context of Access and Benefit Sharing (ABS) agreement under the Nagoya Protocol to the Convention on Biological Diversity, what is Digital Sequence Information (DSI)? How does DSI complicate the traditional method of managing ABS? In this light, delineate the provisions of the new Biological Diversity (Access and Benefit Sharing) Regulation 2025. (Answer in 250 words) 15

The recent COP to the UN convention on Biological Diversity in Cali revolved on the issue of Digital Sequence Information

Digital Sequence Information is the digital information obtained from the genetic sequencing of components of bio-diversity.

DSI Complicating the traditional method of benefit sharing

1. Adding multiple steps in usage of traditional knowledge
2. One time sequencing can be

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used for multiple products,
bypassing benefit sharing norms

3. Commodification of genetic information can lead to trading of traditional knowledge without consent of local communities
4. Indirect nature of use & cascaded transactions may not reveal the benefits gained.

New Bio-diversity (Access & Benefit sharing) Regulation 2025

1. Operationalises the Calic Fund for use of digital sequencing information

2. Corporations using DSI for business have to deposit 1% profits in the Califund
3. The funds shall be used for benefit sharing among local bodies
4. Remaining amounts shall be used for biodiversity conservation & 30x30 targets under the Kunming Montreal Framework

Thus the new regulations aim at ensuring Developmental Justice & uphold the rights of local communities over their traditional knowledge

16.

बढ़ते तापमान, कमजोर अवसंरचना और खराब नियोजन के कारण शहरी आग को नियंत्रित करना कठिन होता जा रहा है। इस आपदा के कारणों पर चर्चा कीजिए। भारत में पिछले दो दशकों में घटित हुई इस तरह की आग की दो बड़ी घटनाओं की विशेषताओं का उल्लेख कीजिए। साथ ही, भारत में ऐसी नीतियों और तंत्रों का वर्णन कीजिए जिनका उद्देश्य ऐसी आग से निपटना है।

Urban fires are becoming difficult to control due to growing temperatures, failing infrastructure, and poor planning. Discuss the causes of this disaster. Mention the features of two such major fires in the last two decades in India. Describe the policies and frameworks in India that aim at tackling such fires. (Answer in 250 words)

15

India witnessed more than 20 incidents of major urban fires in 2024.

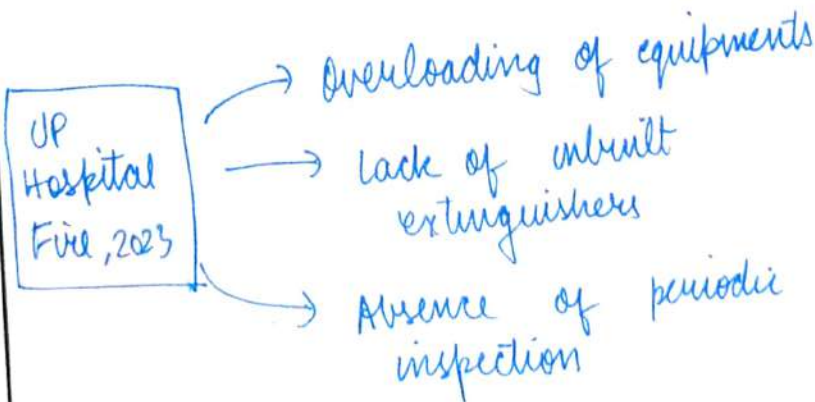
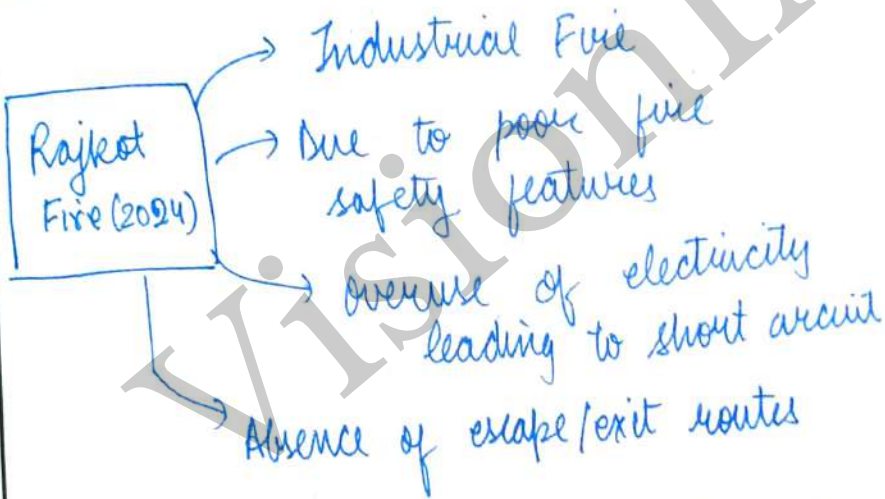
Causes of Urban Fires

1. Unplanned urban sprawl leading to congested buildings & wiring
2. Cost-cutting in safety protocols
 ⇒ low quality insulation in wires
3. Regulatory ~~Blind~~ Blind spots - ignore violation of safety measures
4. Rising urban temperatures due to global warming

5. Urban Heat Islands & Urban Canyons
increase temperatures & reduce ventilation

6. Absence of fire safety protocols
in buildings

Two Major fires in last two decades



Policies & Frameworks to manage Urban Fires

1. NDMA's guidelines to tackle Urban Fires
2. PM's 10-point Agenda for tackling disasters
3. NDRF & SDRF modernisation
4. Investing in technical textiles to improve fire-fighter safety
5. Increasing regulatory guidelines for regular inspection
6. Aligned with international protocols like Sendai Framework

Urban fires are avoidable disasters that can be mitigated via resilient infrastructure

वर्तमान में बिना चालक दल वाले मिशन बहुत कम लागत और जोखिम पर अधिकांश उद्देश्यों को पूरा कर लेते हैं। इस पृष्ठभूमि में, चालक दल वाली अंतरिक्ष उड़ान जारी रखने के औचित्य का परीक्षण कीजिए। यह भी आकलन कीजिए कि एक्सिओम-4 (Axiom-4) मिशन में भारत की भागीदारी प्रस्तावित भारतीय अंतरिक्ष स्टेशन (BAS) के विकास को किस प्रकार प्रभावित कर सकती है।

Uncrewed missions now accomplish most objectives at far lower cost and risk. In this backdrop, examine the rationale for continuing crewed spaceflight. Also assess how India's participation in the Axiom-4 mission could influence the development of the proposed Bharatiya Antariksh Station (BAS). (Answer in 250 words)

15

Crewed missions are at the centre of space discussions with the upcoming Gaganyaan & BAS missions

Rationale for crewed spaceflight

1. Essential functions like satellite repair \rightarrow NASA astronauts repaired hubble telescope
2. To understand impact of cosmic events on human body.
 \rightarrow Polaris Dawn studied impact of radiation in Van Allen Belt
3. Maintenance of the International Space Station (ISS)

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4. Preparation for future missions like Mars Landing
5. To satisfy humanity's quest for exploration.

India's participation in Axiom-4 in influencing BAS

1. Spaceflight experience for Indian astronaut Captain Shukla
2. Microgravity experiment conducted by ISRO to aid planning for BAS
3. Training and Exposure at NASA & Yuri Gagarin Space Centre to aid in ISRO's spaceflight mission

4. Command - level coordination -
ISRO has gained experience in
ground station monitoring
5. knowledge regarding astronaut
diets in space.
6. Preparing for post-return
requirements of astronauts

Thus the Axiom-4 mission
can be considered as a
Base Camp for future of
India's human spaceflight and
the Bharatij Antarikhs Station

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18.

अगली पीढ़ी की सैटेलाइट इंटरनेट सेवाओं के लिए उपयोग की जा रही लो अर्थ ऑर्बिट (LEO) कॉन्स्टेलेशन प्रौद्योगिकी क्या है? इसके कार्य सिद्धांत की व्याख्या कीजिए, भूमिस्थ प्रणालियों पर इसके लाभों को सूचीबद्ध कीजिए और इसके समक्ष आने वाली प्रमुख सीमाओं का उल्लेख कीजिए।

What is the low-Earth-orbit (LEO) constellation technology being employed for next-generation satellite internet services? Explain its working principle, enumerate its advantages over geostationary systems, and mention the major limitations it still faces. (Answer in 250 words)

15

Low - Earth - Orbit constellation technology like Starlink employs multiple satellites to provide internet connectivity

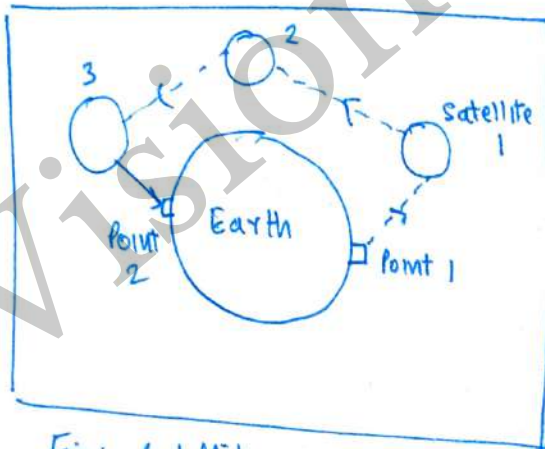


Fig: Satellite Internet services

Working Principle of Low-Earth Orbit constellation technology

1. Geometric arrangement for maximum coverage.

2. Ground based connector device sends signal to satellite
3. The Constellation relay transfers the signal to the satellite closest to destination
4. The last satellite transfers the signal to receiver's device or the nearest mobile tower

Advantages over Geostationary systems

1. Higher coverage - can reach remote areas where towers cannot
2. Flexibility - satellite positioning can be changed as per user load
3. Back-up - Geometry can be changed even if some satellites fail to work.

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However, it still faces some major limitations

1. High latency - due to larger distances it needs to cover
2. Connectivity issues due to signal interference
3. Costlier than on-ground cellular services
4. Prone to interception and spoofing of data
5. Limited load capacity → Starlink has said it can only give 20 lakh connections in India

Thus the technology is still in its nascent stage and needs time to evolve.

बुद्धिया जानकारी साझा करने में मल्टी-एजेंसी सेंटर (MAC) और नेटग्रिड (NATGRID) की क्या भूमिका है? वास्तविक समय के खतरों से निपटने में इनकी प्रभावशीलता का आकलन कीजिए तथा डेटा सुरक्षा और अंतर-एजेंसी अनुक्रियाशीलता, दोनों को बेहतर बनाने के उपायों को प्रस्तावित कीजिए।

What is the role of the Multi-Agency Centre (MAC) and NATGRID in intelligence sharing? Assess their effectiveness in tackling real-time threats and propose measures to enhance both data security and inter-agency responsiveness. (Answer in 250 words)

15

Multi-Agency Centre & NATGRID aim to improve inter-agency intelligence coordination

Role of Multi-Agency Centre

1. Common centre for decision making
2. Interagency information sharing
3. Preparation for combined operations

Role of NATGRID

1. One stop Platform for intelligence sharing & coordination
2. Reduces lag in information transfer among agencies

3. Critical role in fighting against
information warfare

Effectiveness in tackling real time threats

1. Strict Monitoring of security concerns & sensitive areas
2. Real time updates on NATGRID aid in rapid response
3. Better interagency cooperation to tackle real time threats
4. Enables use of AI/ML technology to process intelligence data
5. Common centre for taking decisions on joint operations

Measures to Improve Data Security

1. Leveraging Blockchain technology for securing data
2. Localisation of Data servers - 1
3. Imposing a No-Fly List on sensitive data

Measures to improve inter-agency responsiveness

1. Creation of a National security doctrine
↳ containing coordination pathways
2. Pilot tests of Integrated theatre commands to boost responsiveness
3. Upgrading digital infrastructure

Information security is crucial
for building a SURAKSHIT, SASHAKT, SAMRIDH
BHARAT.

20.

पारंपरिक हवाला के साथ पीयर-टू-पीयर क्रिप्टोक्युरेसी के अभिसरण ने एक अपारदर्शी अंतरराष्ट्रीय मूल्य-हस्तांतरण नेटवर्क का निर्माण किया है। परीक्षण कीजिए कि यह क्रिप्टो-हवाला गठजोड़ किस प्रकार कार्य करता है और यह भारत की धन-शोधन रोधी और आतंकवाद-वित्तपोषण रोधी व्यवस्था के लिए चुनौतियां क्यों उत्पन्न करता है। साथ ही, इस संदर्भ में अब तक उठाए गए कदमों पर चर्चा कीजिए।

The convergence of peer-to-peer cryptocurrencies with traditional hawala has created an opaque transnational value-transfer network. Examine how this crypto-hawala nexus operates and why it poses challenges for India's anti-money-laundering and counter-terrorist-financing regime. Also, discuss the steps taken so far. (Answer in 250 words)

15

As per UNODC, Money Laundering impacts 3-4% of the global GDP with cryptocurrency playing an increasing role.

Crypto - Hawala Nexus

- Hawala networks operate without ~~an~~ actual cash flow - making detection difficult.

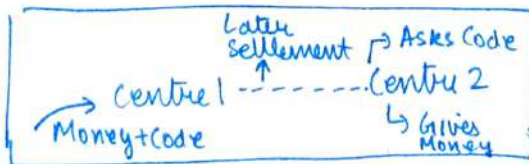


Fig: Hawala System

- Crypto-currency networks are used as connecting points between centres.

3. Earlier Hawala networks could be traced during settlement between centres
4. Now Crypto-currency is used for these settlements

Challenges for India's Anti-Money Laundering & Counter-Terror Finance Regime

1. No mention of Crypto or Virtual Assets in PMLA act.
2. Less traceability of money at placement stage due to crypto
3. Use of ring signatures and ZK-snarks further increases opacity of transactions
4. Anonymity of crypto-networks prevents identification

Steps taken to counter the use of Crypto-Hawala method

1. De-anonymisation of transactions by following money trail
2. Denial of spending attacks on terror financing nets
3. Trace, Target & Terminate framework for stopping finance
4. ~~For~~ Identification of Mule accounts
 Eg) RBI's Mule Hunter

India's rapid achievements in countering money laundering has earned it the Regular Follow up tag from FATF