



# VISION IAS

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## GENERAL STUDIES (TEST CODE : 2076)

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Medium Eng./Hindi	English	Registration Number	1017909
Center	Online	Date	30.12.22

### INDEX TABLE

Q. No.	Maximum Marks	Marks Obtained
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
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11	15	
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16	15	
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18	15	
19	15	
20	15	

Total Marks Obtained:

Remarks:

### INSTRUCTIONS

1. 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)।
2. There are TWENTY questions printed in HINDI & ENGLISH  
इसमें बीस प्रश्न हैं हिन्दी और अंग्रेजी में छपे हैं।
3. All questions are compulsory.  
सभी प्रश्न अनिवार्य हैं।
4. The number of marks carried by a question/part is indicated against it.  
प्रत्येक प्रश्न/भाग के अंक उसके सामने दिए गए हैं।
5. 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।
6. Word limit in questions, if specified, should be adhered to.  
प्रश्नों में शब्द सीमा, जहाँ विनिर्दिष्ट है, का अनुसरण किया जाना चाहिए।
7. 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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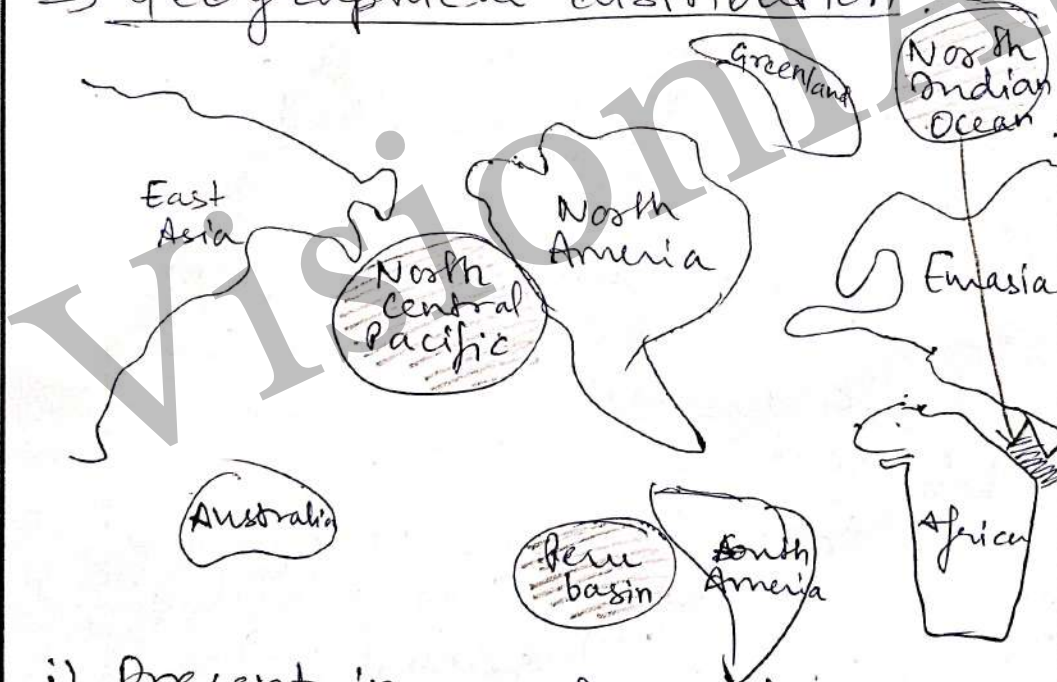
All the Best

1. बहुधात्विक ग्रंथिकाओं (पॉलिमेटेलिक नोड्यूलस) के भौगोलिक वितरण का उदाहरण प्रस्तुत करने हुए, उनके महत्व पर चर्चा कीजिए। (उत्तर 150 शब्दों में दें) 10

Illustrate the geographical distribution of polymetallic nodules and discuss their significance. (Answer in 150 words) 10

Polymetallic nodules are largely porous, potato-shaped accretions of manganese nodules found on the sea floor of world oceans. They also contain other metals like iron, copper, cobalt, nickel, lead etc.

⇒ Geographical distribution:



- i). Present in most world oceans
- ii). Economically significant nodules found in -
  - north-central Pacific ocean
  - Peru basin (south-east Pacific)

- north Indian ocean
- Highest concentration of polymetallic nodules found between 4000 - 6000 m

⇒ Significance :-

- i). Serve as reservoirs of Rare Earth elements and metals important to tech industries.
- ii). Source of valuable minerals such as gold, silver, zinc.
- iii). Copper in these nodules can be important to supplement land copper reserves.
- iv). Recovery of minerals from polymetallic nodules provides an importance reserve for energy requirement of India.
- v). Provide an avenue in empowerment of coastal communities and also bilateral relationship strengthening.

However, the extraction of these nodules ~~is~~ has technological and economic constraints. Thus, India's Deep Ocean Mission and draft Blue Economy Policy provide a way ahead to tackle the challenges and harness potential.

2. अत्यधिक और अविवेकपूर्ण रेत खनन की पारिस्थितिक लागत इसके आर्थिक लाभों से कहीं अधिक है। संघारणीय रेत खनन के महत्व के संदर्भ में चर्चा कीजिए। (उत्तर 150 शब्दों में दें)

The ecological cost of excessive and indiscriminate sand mining far outweighs its economic benefits. Discuss in context of the importance of sustainable sand mining. (Answer in 150 words) 10

Sand mining is the extraction sand, through an open pit or even from beaches, inland dunes, ocean and river beds. Sand is classified as a minor mineral.

⇒ Economic benefits of sand :-

- i). used for construction purposes
- ii). used for ~~cem~~ mixing with cement for industrial purposes
- iii). used as abrasive. Mixed with salt and applied on snow-blocked roads

⇒ Ecological cost of sand mining:-

- i). Deterioration of river banks, coastal erosion
- ii). Threat to aquatic ecosystems.
- iii). Makes river banks prone to flooding
- iv). Negatively affects soil formation  
eg. seen in case of Yamuna riverbed in U.P.

v). leads to contaminated water and crop damage

⇒ The immense risk of ecological damage due to sand mining has shifted focus on sustainable Sand mining:-

i). MoEFCC guidelines - to monitor and check illegal sand mining

ii). Use of technology - eg. satellite imagery for monitoring, as used in Gujarat.

iii). Focus on sustainability  
↓  
extracting only that volume of sand that is deposited each year

iv). District survey reports - focusing on where and how much sand to be mined

v). Grassroots participation with river audits.

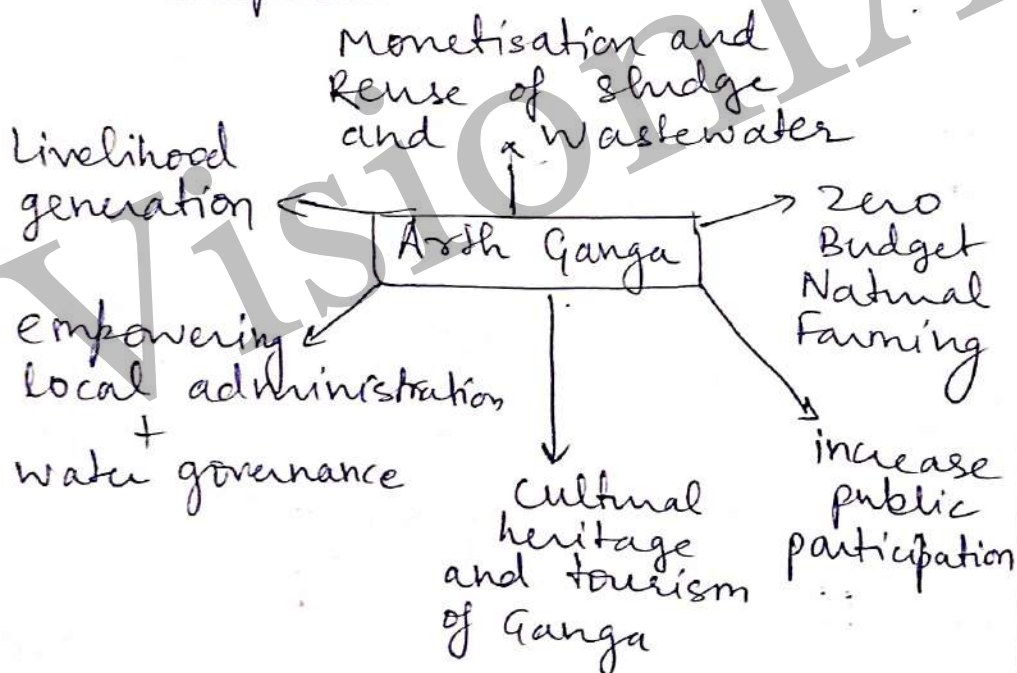
Sand is a valuable economic, geological and climatic resource. The Sustainable Sand Management Guidelines provide the way ahead to perceive it holistically as a part of wider ecosystem

3. अर्थ गंगा परियोजना के विभिन्न घटकों पर प्रकाश डालते हुए, इसके महत्व पर चर्चा कीजिए। साथ ही, इसके क्रियान्वयन में आने वाली चुनौतियों का भी उल्लेख कीजिए। (उत्तर 150 शब्दों में दें)

Highlighting the various components of Project Arth Ganga, discuss its significance. Also, state the challenges in its implementation. (Answer in 150 words) 10

Project Arth Ganga focuses on sustainable development model with a push towards economic activities related to Ganga. It also marks a shift from Namami Gange to Arth Ganga.

⇒ Components :-



⇒ Significance

- i). Brings concept of economics to forge connection between river

and people

- ii). Generate 3% of GDP from Ganga basin
- iii). Reinforces India's commitment to SDGs
- iv). Focus on water governance with sewage treatment, river surface cleansing, industrial effluent monitoring
- v). Ensure grassroots participation in executing Arth Ganga.

⇒ Challenges: —

- i). Lack of public awareness
- ii). Continued existence of polluting industries in vicinity of rivers.  
eg. Ganga in Kanpur reported to carry harmful levels of industrial pollutants
- iii). Resistance to switch to new modes of agriculture such as ZBNF
- iv). Over-reliance on chemical fertilisers and pesticides in agriculture.

While the challenges loom, Arth Ganga through its public participation and treating river as a holistic ecosystem offers a novel vision ahead.

4. भारत विभिन्न कारणों से अपनी पवन ऊर्जा की उच्च क्षमता का दोहन नहीं कर पाया है। चर्चा कीजिए और आगे की राह सुझाइए। (उत्तर 150 शब्दों में दें)

The high wind energy potential in India remains untapped due to various reasons. Discuss and suggest a way forward. (Answer in 150 words) 10

The kinetic energy of the rotating blades is transformed into electrical energy using wind turbines. This harnessing is wind energy.

⇒ Wind energy in India :-

- i). Currently, 13.4 GW of prospective wind energy projects.
- ii). COVID-19 delayed and disrupted installation of several wind energy projects.
- iii). Reports indicate that wind industry installations have been slowing down since 2017.

⇒ Reasons for untapped wind energy potential :-

- i). Concentrated projects - in Gujarat and Tamil Nadu. Other options not adequately explored
- ii). Lumpy market - results in delays in project execution

iii). COVID-19 pandemic - created supply bottlenecks. DISCOM dues have increased.

iv). Over-emphasis on onshore projects:-  
Offshore potential not adequately explored

v). Lack of technical and research exploration in arena of wind energy

vi). High capital cost in installation of wind energy project.

⇒ Way forward :-

i). Streamlining the procedures to grant permits

ii). Explore greater public-private cooperation

iii). National Offshore Wind Energy Policy Framework - to develop and explore offshore wind energy

iv). Solar-Wind Hybrid Policy - better grid stability.

India's policy initiatives in renewable energy sector and the avenue for their exploration are the opportunities for India to become a global trendsetter in promoting clean energy.

5. भारत में चीतों को पुनः बसाने के लिए संभावित स्थलों की पहचान करते हुए, इनके महत्व की विवेचना कीजिए और इस प्रयास से जुड़ी चुनौतियों का उल्लेख कीजिए। (उत्तर 150 शब्दों में दें)

Identifying the potential sites for the re-introduction of cheetahs in India, discuss its significance and mention the challenges associated with the exercise. (Answer in 150 words) 10

8 Namibian wild cheetahs were recently introduced in the Kuno National Park in Madhya Pradesh after around seven decades of extinction.

⇒ Potential sites for re-introduction

- i). Madhya Pradesh :-

Nauradehi Wildlife Sanctuary

- ii). Rajasthan -

Shahgarh Landscape, Desert National Park

- iii). Gujarat - Banni grasslands

⇒ Significance of the re-introduction

- i). Biological objective - establish functional role of cheetah in the wider ecosystem

- ii). Enhance livelihood opportunities through ecotourism and other activities
- iii). Uphold the vibrancy of food chain - and balance food webs
- iv). Aim for global climate change mitigation goals - through ecosystem restoration in cheetah conservation areas

⇒ Challenges :-

- i). Increased vulnerability of reintroduced species ~~in~~ a new habitat
- ii). Reintroduction - can lead to dis-  
turbance among locals and migration
- iii). Inter-specie competition between tiger, leopards and cheetahs in Kuno
- iv). Threat of livestock losses

Post-release monitoring, proper rehabilitation and awareness programs can provide a way ahead to bolster the project's aim of ecosystem conservation.

6. भारत दुनिया का दूसरा सबसे बड़ा मनोरंजन बाजार है। इस संदर्भ में, भारत में एनीमेशन और VFX उद्योग के विकास और उदय के लिए उत्तरदायी कारणों का विश्लेषण कीजिए। (उत्तर 150 शब्दों में दें)

India has the world's second-largest entertainment market. In this light, analyse the reasons responsible for the growth and emergence of animation and VFX industry in India. (Answer in 150 words) 10

Despite losses due to the pandemic, the animation and VFX industry in India moves from strength to strength, reaching around Rs. 24.5 billion market size in recent years.

⇒ Reasons responsible for growth and emergence :-

- i). Booming market - with growth of 4G, 5G enabled gadgets and the youngsters' demand for improved visual experience
- ii). Relevant opportunities - with the expansion of OTT, television and the second largest entertainment market of India
- iii). Policy - FDI cap has been expanded to 100% in this sector. NDCP 2018 further encourages development of digital services.
- iv). Investments expansion in the sector
- v). Increased demand for localised

animation content

vi). Platforms such as Netflix and Amazon - looking to partner with animation studios

vii). Emphasis on post-production processes in filmmaking - have fostered growth of VFX

viii). Efforts of state governments:

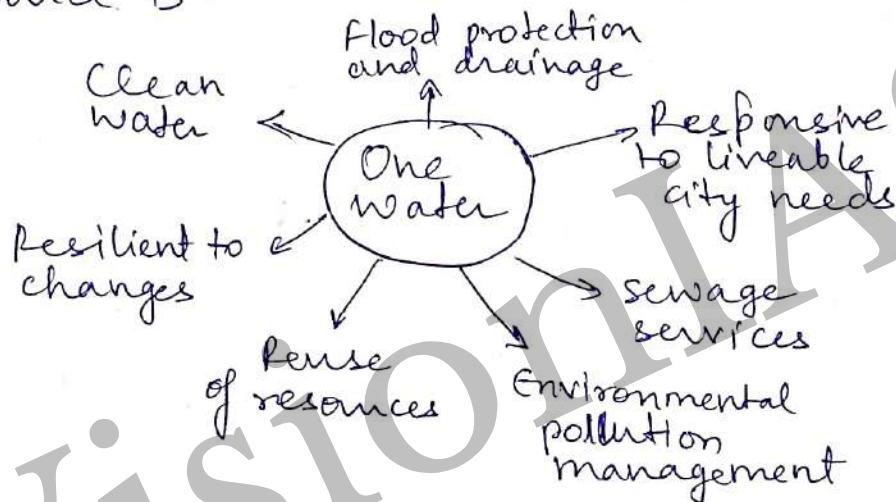
- Maharashtra - allocation of land for setting up National Centre of Excellence for Animation, VFX, Gaming and Comics
- Karnataka - policy to include digital art education in fine arts curriculum

As per Boston Consulting Group's study, India's animation industry has the potential to grab 20%-25% of global AVAC market with facilitative governmental policies and the sector's potential in employment generation, there is a hope for its bright future.

7. जल और शहरी-पारिस्थितिकी चुनौतियों से निपटने के लिए 'वन वाटर' दृष्टिकोण महत्वपूर्ण है। चर्चा कीजिए। (उत्तर 150 शब्दों में दें)

'One Water' approach is the key to combat water and urban-ecological challenges.  
Discuss. (Answer in 150 words) 10

One Water Approach is an integrated water resource management (IWRM) that recognises that all water is of value, no matter what its source is.

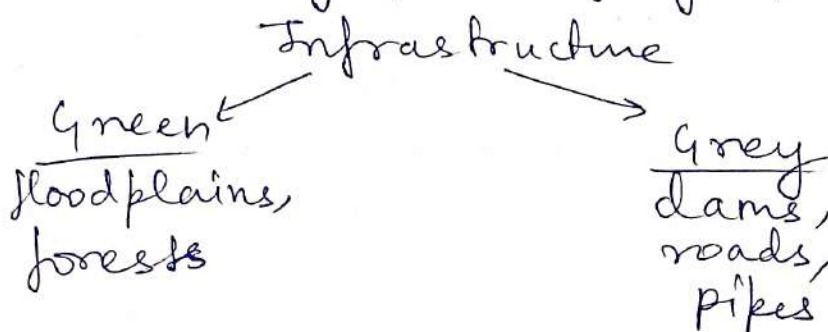


⇒ One water :- combat water and urban-ecological challenges :-

- i). Follows multi-faceted approach :-  
economic + environmental + societal returns
- ii). Watershed management - that is responsive to natural and local context
- iii). Inclusivity and multi-stakeholder Partnership :- eg. India's traditional water harvesting systems such

Zing in Ladakh, Baolis in Rajasthan

iv). Focus on sustainability with a mix of green + grey infrastructure



v). In IRWM, water is recycled and reused several times

vi). Utilises storm-water :- to recharge aquifers and support vegetation

vii). New water techniques - that combine traditional knowledge with breakthrough scientific research

viii). Focus on long term sustainability

As per UN, mismanagement of water resources is caused due to a failure to understand its value. One water then is a radical approach to focus on the value of water and take steps to safeguard it sustainably.

8. शोध बताते हैं कि ग्लोबल साउथ जलवायु परिवर्तन से सर्वाधिक प्रभावित होगा एवं दक्षिण एशिया गंभीर रूप से प्रभावित क्षेत्रों में से एक होगा। विश्लेषण कीजिए। (उत्तर 150 शब्दों में दें)

Research suggests that the Global South will suffer the most from climate change, and South Asia will be one of the hardest-hit regions. Analyse. (Answer in 150 words)

As per World Bank, more than half of South Asians were impacted by one or more climate-related disasters in the last 20 years. This highlights the extreme vulnerability of Global South to climate change.

⇒ Global South and climate change:

i). Climate, geography and demography render South Asia vulnerable  
eg. Bangladesh - 160 million people in less than 150,000 km<sup>2</sup>

India - deltas of Ganga and Brahmaputra have annual flooding

ii). Lack of appropriate infrastructure in South Asia :-

- no air conditioning during heat waves
- houses in coastal areas not designed to withstand cyclones

iii). Lack of information and know-how on specific local disasters and their management.

iv). Over-reliance on state and flouting of safety norms

v). Unprecedented construction in ecologically fragile zones eg. Himalayas, coastal areas  
↓  
leads to catastrophes such as cloudbursts in Uttarakhand

vi). Territorial issues in South Asia - neglect ecological boundaries. As politics reigns supreme, ecosystem becomes vulnerable.  
eg. China's construction in Himalayan region close to Indo-China borders

vii). The emissions of Global North further hinder Global South and South Asia. Despite survival emissions, they bear the brunt of West's unchecked GHG emissions.

Climate change as a reality needs to be addressed. Cooperation among South Asian nations and collective learning are the need of the hour. India's AMRUT, Bhutan's stringent tourism policy, Bangladesh's indigenous cyclone warning system are some praiseworthy steps to be emulated.

9. रेत एवं धूल भरी आंधियों के पर्यावरणीय और आर्थिक प्रभावों पर चर्चा कीजिए। (उत्तर 150 शब्दों में दें)

Discuss the environmental and economic impacts of sand and dust storms. (Answer in 150 words) 10

Sand and dust storms are meteorological hazards in arid and semi-arid regions. They are caused by thunderstorms that generate strong winds which lift sand from bare soils and transport it kilometres away.

⇒ Environmental and economic impacts :-

- i). Deposition of dust on glaciers induces warming and increased melting
- ii). Dust when combined with high salt content affects crop growth. Harms agriculture
- iii). Reduces visibility - affects aviation sector
- iv). Triggers health issues in humans. Worsenes health of those who are asthmatic or allergic
- v). Poor air quality - aerosol accumulation
- vi). Affect energy infrastructure -

lead to power outage.

vii). Energy loss is a drain on exchequer.

eg. India's loss amounted to ₹ 782 crore/year

viii). Sand/dust storms deposit dust in Himalayan range and Tibetan plateau, negatively affecting the fresh water sources

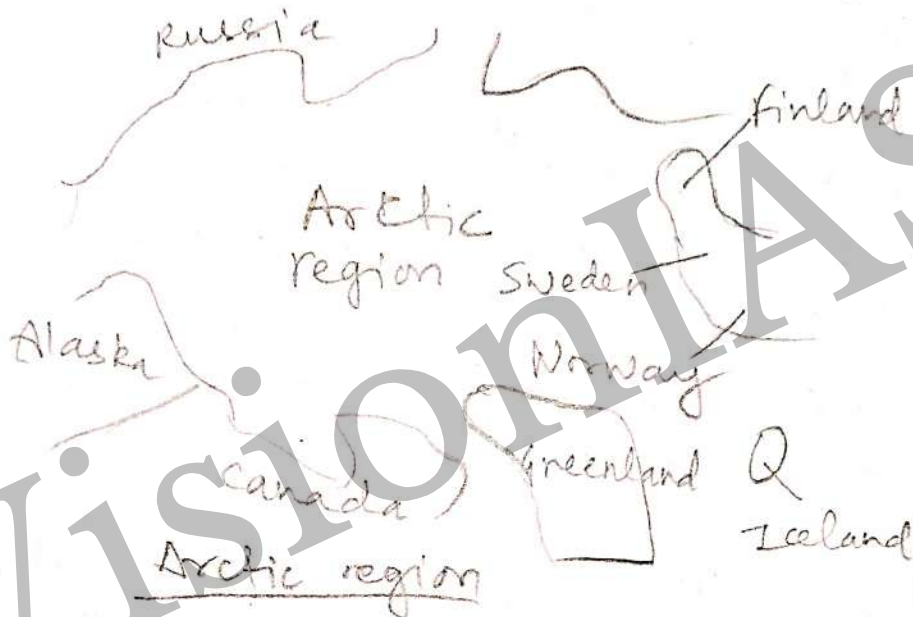
ix). Crop yield is reduced - can trigger food crisis

Considering the impact of sand storms on SDAs, policy makers, especially in Asia-Pacific need to devise a strategic, concerted action plan to mitigate social, economic and environmental risks.

10. यह पूर्वानुमान लगाया गया है कि 2040 की ग्रीष्म ऋतु तक आर्कटिक हिम-मुक्त हो सकता है। महासागरों पर इसके संभावित प्रभावों का उल्लेख कीजिए। साथ ही, चर्चा कीजिए कि भारत इस स्थिति में किस प्रकार प्रभावित होगा। (उत्तर 150 शब्दों में दें)

It is predicted that the Arctic could be ice-free in summer by 2040. State its possible impact on oceans. Also, discuss how India will be affected in this scenario. (Answer in 150 words) 10

Global warming caused by greenhouse gases has been identified to be the prime reason for the melting of Arctic ice in the northern polar region



⇒ Impact on oceans :-

- i). Will make the Arctic ocean stormier and unpredictable
- ii). slowing of ocean currents :- domino effect on Indian monsoon, El Nino and global circulation of ocean currents
- iii). increased ocean acidification :-

due to carbon di oxide uptake

iv). Disruption of oceanic ecosystem - as marine plant and animal life will be affected

⇒ Impact on India :-

- i). Rise in sea level - as per World Meteorological Organisation
- ii). Monsoons affected - extreme weather events
- iii). Food security affected - due to monsoonal disturbance
- iv). Danger to coastal communities and to their livelihood

In the face of unprecedented risks posed by Arctic ice melting, India's Arctic Policy provides the framework for sustainable development. International collaboration for securing lives, livelihoods and environment is the need of the hour.

11. भारत के पास 1,80,000 मेगावाट महासागरीय तापीय ऊर्जा उत्पादित करने की क्षमता है, हालांकि, इस दिशा में प्रगति धीमी रही है। इस संदर्भ में, संबंधित चुनौतियों को रेखांकित कीजिए और सुधारात्मक उपायों का सुझाव दीजिए। (उत्तर 250 शब्दों में दें)

India has the potential to generate 180,000 MW of ocean thermal energy, however, progress in this regard has been slow. In this context, highlight the associated challenges and suggest remedial measures. (Answer in 250 words) 15

The National Institute of Ocean Technology under MoES is establishing an Ocean Thermal Energy Conversion plant in Kavaratti Lakshadweep.

⇒ Ocean Thermal Energy :-

is generated by harnessing the temperature differences (thermal gradient) between surface and deep ocean waters.

⇒ Despite OTEC's potential, the progress has been slow for various reasons :-

i). High capital investments and comparatively low cost-benefit ratio.

ii). In 1980s, the closing down of operations of the foreign

Vendor affected OTEC development.

- iii). The technology for OTEC development is still in initial stages. Lack of suitable R & D is a challenge for envisioning projects
- iv). Concerns regarding negative impact on the marine ecosystem and commercial risks
- v). Limited deployment and under-utilisation of deployed technologies
- vi). Conversion efficiency of OTEC plants is low, as compared to other sources of energy generation
- vii). Uneconomical - low efficiency and high capital and maintenance costs

⇒ Remedial measures :-

- i). Ensure environmental and biological monitoring - to mitigate negative impact on marine life and ecosystem
- ii). Public-Private Partnership:-

to raise funds and also bring research expertise

iii). Foster innovation and create jobs by developing and promoting indigenous models of knowledge

iv). Better linkage between associated initiatives such as Deep Sea Mining, Deep Ocean Mission and DNA Bank.

v). Begin with cost-efficient models in potential locations and then expand the coverage of OTEC

vi). Institutes such as National Institute of Ocean Technology should undertake holistic economic, scientific, oceanographic assessment for better implementation of OTEC projects.

OTEC offers immense energy generation potential to India. It also provides the avenue to create jobs, foster economic development while also balancing it with sustainability and reduced carbon footprint.

12. भारत में आई.टी. & बी.पी.एम. (बिजनेस प्रॉसेस मैनेजमेंट) उद्योग की स्थिति का संक्षिप्त विवरण दीजिए। साथ ही, विभिन्न भारतीय शहरों में आई.टी. हब की अवस्थिति का निर्धारण करने में महत्वपूर्ण भूमिका निभाने वाले कारकों पर चर्चा कीजिए। (उत्तर 250 शब्दों में दें)

Give a brief account of the state of IT & BPM (Business Process Management) industry in India. Also, discuss the factors that are at play in determining the location of IT hubs in different Indian cities. (Answer in 250 words) 15

Under IT and BPM, MNCs, startups and brands engage the services of a third party to create value and decrease costs in their business. Their methodology focuses on continuous process improvement and maximise the investment

⇒ State of IT and BPM in India

- i). Constitutes around 8% of India's GDP
- ii). Forms the largest employer within the private sector, employing 3.9 million people
- iii). IT revolution ushered in post 1991 LPA reforms as:—
  - FDI inflow grew
  - relaxation of licensing norms
- iv). IT-BPM sector is integral to India's goal of being a \$5 trillion economy

v). Within BPS domain, there is growth of sectors like :-

- Knowledge service
- data analytics
- legal services

vi). IT-BPS plays a key role in India's fulfilling of SDG by ramping up the infrastructure needed to achieve SDGs

vii). IT-BPS - have been crucial to rural development in India and also increase women's labour force participation

⇒ Factors determining location of IT hubs :-

Tier II and III cities are gaining traction among IT companies for various reasons :-

- i). Cheap and skilled labour availability
- ii). affordable real estate
- iii). Government policies - such as
  - PLI scheme for IT Hardware

- Creation of Software Development Fund- financial support
  - Revamping of UPI
- iv). Tax rebates in software Technology park Scheme
- v). The flourishing start up scenario in Tier-II and III cities- India has around 84 unicorns
- vi). Traditional hubs of Bengaluru and Delhi-Gurgaon as they:-
- have the infrastructural ecosystem
  - ready supply of skilled labour: graduates from nearby colleges
  - have operational PPP projects in the region - eg. Gurgaon metro

With the fast-emerging business potential in cloud, AI, IoT and metaverse, IT-BPO continues to stay relevant in the Indian context. They may further be expanded into areas such as the North-east to leverage their potential.

13. हाल ही में सरकार द्वारा अधिसूचित बैटरी अपशिष्ट प्रबंधन नियम, 2022 में एक चक्रीय अर्थव्यवस्था को बढ़ावा देने की प्रचुर संभावनाएं हैं लेकिन इन नियमों को इस तरह से बनाने की आवश्यकता है जिससे कुशल और प्रभावी पुनर्चक्रण सुनिश्चित किया जा सके। चर्चा कीजिए। (उत्तर 250 शब्दों में दें)

The recent Battery Waste Management Rules, 2022 notified by the government promise to trigger circular economy, but they need to be designed to enable efficient and effective recycling. Discuss. (Answer in 250 words) 15

The MoEFCC has notified the Battery Waste Management Rules to ensure an environmentally sound management of waste batteries invoking principles of reuse and recycling.

⇒ Key provisions :-

- i). Extended Producer Responsibility - Producers responsible for collection and recycling of batteries
- ii). Polluter pays principle - Imposition of environmental compensation on non-fulfilment of EPR targets
- iii). New industries - for collection and recycling of waste batteries
- iv). Norms for certain amount of recycled material to be used in new batteries

v) Monitoring rule implementation through online registration, auditing

⇒ Importance of battery designing to facilitate recycling :-

i). This is done through labelling  
labelling indicates -

- limits on use of heavy metals eg cadmium, mercury, lead
- picture of crossed out bin - to indicate that batteries have to be recycled

ii). However, different kinds of batteries have different recycling requirements of labelling and eg. lithium-ion battery

This needs to be properly addressed

iii). There is lack of research regarding suitable chemical compositions to ensure battery recyclability.

This needs to be focussed upon when designing batteries

iv). Carbon footprint as a parameter can further enhance the scope of battery recyclability

v). Good battery = Sustainable design + standards + battery waste management

⇒ Significance :-

- i). Reduce over dependence on new raw materials
- ii). Introduce new technologies crucial to battery sustainability and environment.

The dual focus on efficient battery design along with waste management Rules offers a platform to bolster battery manufacturing in the country while subscribing to India's climate mitigation targets.

14. तेल और गैस पाइपलाइन को अर्थव्यवस्था की धमनी माना जाता है। इस संदर्भ में, भारत में तेल और गैस पाइपलाइन की स्थिति पर प्रकाश डालिए। साथ ही, पाइपलाइन परिवहन के लाभ और हानियों को भी सूचीबद्ध कीजिए। (उत्तर 250 शब्दों में दें)

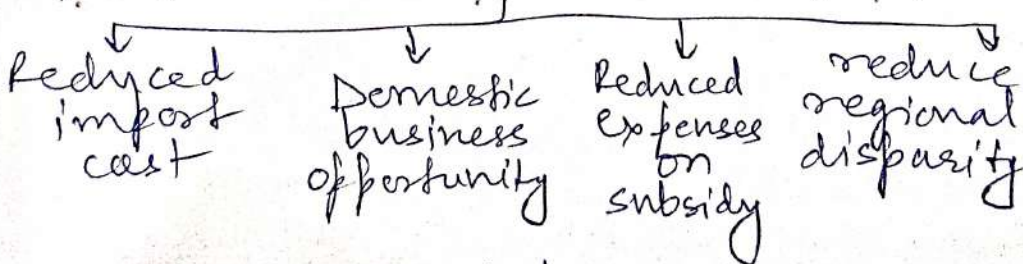
Oil and gas pipelines are considered as the veins of the economy. In this context, throw some light on the status of oil and gas pipelines in India. Also, enlist the advantages and disadvantages of pipeline transportation. (Answer in 250 words) 15

Recently, a gas pipeline was inaugurated between Kochi (Kerala) and Mangalore (Karnataka). This has been done under the broader One Nation, One Gas Grid scheme that aims to improve clean energy access along with regional development.

⇒ Status of oil and gas pipelines in India :-

i). India's aim - One Nation, One Gas Grid to meet target of 15% natural gas in its energy basket mix by 2030

ii). Pipeline - economic prospects

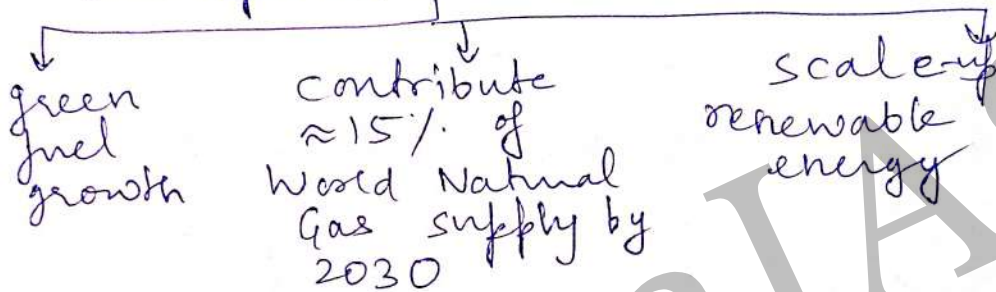


iii). Measures taken :-

◦ Pradhan Mantri Vajra Ganga project :- piped cooking gas to 20 lakh households

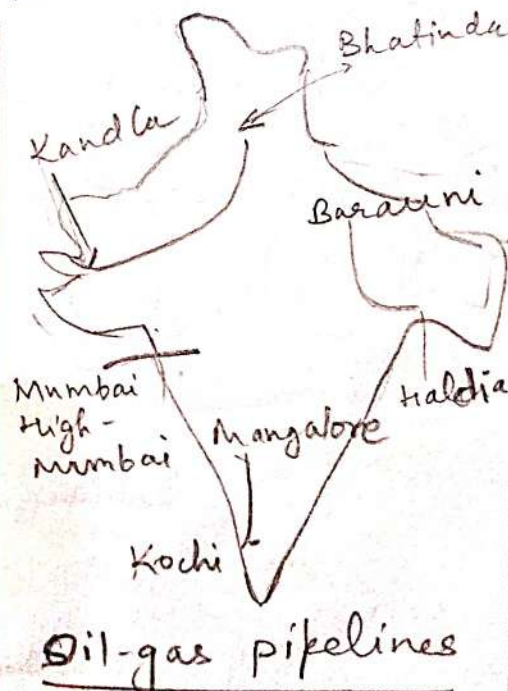
◦ Barauni to Guwahati Pipeline

iv). Futuristic approach :- Pipeline transportation to ensure :-



⇒ Advantages of Pipeline transportation :-

- i). Minimal transit losses
- ii). Running cost of materials through pipelines is low
- iii). Can be laid in difficult and varied terrains
- iv). Facilitates industrial



development in adjoining areas  
eg. fertiliser industries around  
gas pipelines - Jamnagar -  
Madhura

- v). Examples :- Mumbai High -  
Mumbai pipeline,  
Hazira - Bijaipur - Jagdishpur pipeline

⇒ Disadvantages :-

- i). Difficult to find leakages and cracks
- ii). Initial cost of laying pipelines is very high.
- iii). Repair is difficult
- iv). Susceptible to security threats especially in case of transboundary pipelines  
eg. TAPI pipeline and terrorist threats
- v). Once laid, the capacity of pipelines can't be increased or adjusted.

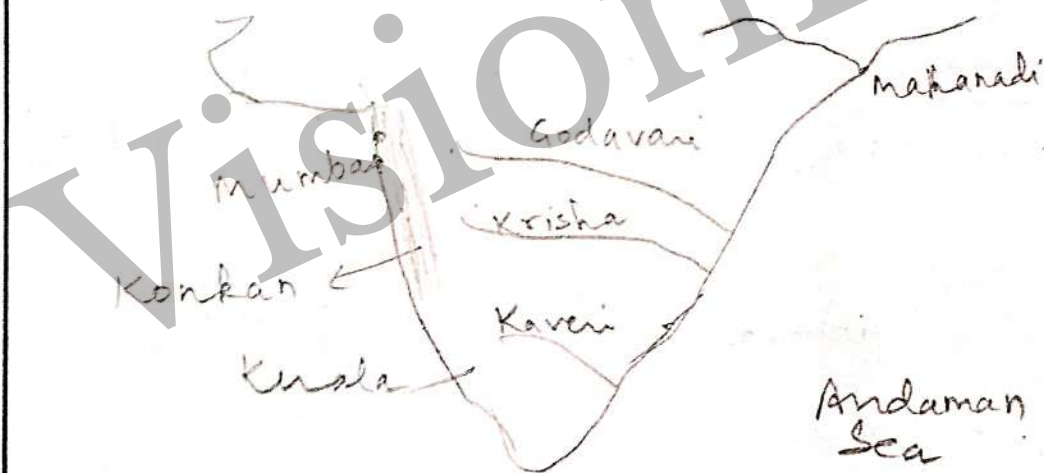
The pipelines are economic veins. They link geography of production with consumption fostering balanced regional development. Gas infrastructure thus is the need of the hour.

15. भारत में प्राकृतिक गैस हाइड्रेट्स की उपलब्धता का वर्णन करते हुए, उनके महत्व के साथ-साथ उनके अन्वेषण में जुड़ी चुनौतियों पर चर्चा कीजिए। (उत्तर 250 शब्दों में दें)

Bringing out the availability of natural gas hydrates in India, discuss the promise as well as the challenges associated with their exploration. (Answer in 250 words) 15

Natural gas hydrates are naturally occurring ice-like combination of natural gas and water. They are crystalline forms of methane (CH<sub>4</sub>) and water, existing in shallow sediments of outer continental margins.

⇒ Availability in India:



→ The regions with gas-hydrate availability are:-

- i). Krishna-Godavari
- ii). Kaveri
- iii). Kerala basin

iv). Andaman Sea

v). Konkan basin

→ India has 2nd largest gas hydrate reserves after America

→ Krishna-Godavari, Kaveri and Kaveri basins have around 100-130 billion cubic feet of reserves

⇒ Promise and Significance of gas hydrates: -

i). Aid in marine carbon dioxide sequestration: - as gas hydrates form complexes with  $\text{CO}_2$ .

ii). Offer a sustainable energy resource - that is less polluting

iii). Hydrates can be a fresh water source

iv). Potential use in cold storage and air conditioning

v). Can be used in desalination of seawater

⇒ Challenges with exploration: -

i). Geophysical challenge - hydrate extraction can lead to :-

- strength loss of seabed
- sand migration

ii). Environmental challenge -

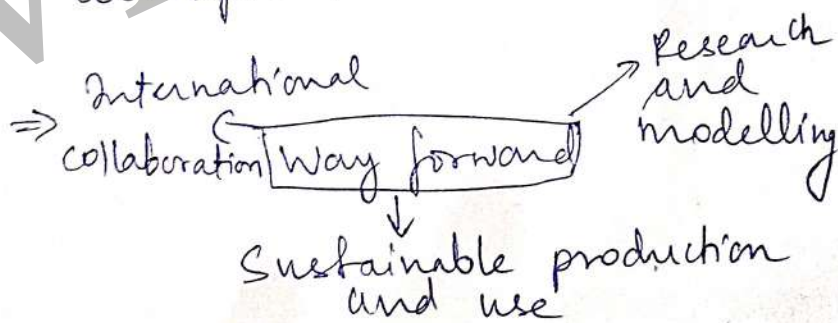
- affect marine ecosystem
- cause climate change and accelerate global warming

iii). Economical challenge :-

- needs huge capital investment
- high shipping cost

iv). Technological challenge :-

- lack of required technological development



As gas hydrates provide a novel energy source, government initiatives such as National Gas Hydrate Programme and collaboration with Japan, Canada provide a way ahead.

16. जैसा कि विश्व अर्धचालक की तीव्र कमी से जूझ रहा है, ऐसे में भारत के लिए इस क्षेत्रक में आगे बढ़ने का अवसर उपलब्ध है। इस संदर्भ में, भारत में चिप डिजाइन उद्योग के समक्ष विद्यमान चुनौतियों पर चर्चा कीजिए तथा इस संबंध में उठाए जा सकने वाले कदमों का उल्लेख कीजिए। (उत्तर 250 शब्दों में दें)

As the world grapples with an acute semiconductor shortage, there is an opportunity for India to tap into this sector. In this context, discuss the challenges that confront the chip design industry in India and mention the steps that can be taken in this regard. (Answer in 250 words) 15

Semiconductors are materials that have a conductivity between conductors and insulators. Made of silicon, germanium, pure elements or compounds, they are building blocks of modern electronics, information and communication.

⇒ Semiconductors :- opportunity for India :-

i). COVID-19 pandemic - disruptions in semiconductor supply chain

ii). India's initiatives such as Design Linked Incentive Scheme and Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors

↓  
can transform India from an importer to global exporter

⇒ Challenges ahead :-

- i). High investments required :-  
to keep up with long gestation period and rapid technological changes.
- ii). Lack of chip fab capacity :-  
ISRO and DRDO design basic chips for own requirement. However, sophisticated technology is absent.
- iii). Semiconductor Fabrication facility establishment is very expensive and government investment has not been adequate.
- iv). Chip industry gobbles resources such as clean water, power supply. It is very resource intensive. Can create crunch for other sectors.
- v). Diversion of resources such as clean water for semiconductor industry may lead to less availability of water for agriculture threatening livelihood of vulnerable sections.

⇒ Steps to be taken :-

- i). Introduce sufficient and sustainable fiscal system support for the

Chip industry,

- ii). Maximise self-reliance in all aspects from designing to fabrication to packing and testing.
- iii). Improve research and development - in collaboration with leading academic institutes such as IITs and IISc.
- iv). Undertake connectivity and capability measures - to enhance national ~~own~~ capability and interlink different industries
- v). Strengthen the ongoing PLI scheme and expedite implementation of India Semiconductor Mission

The global crunch in the semiconductor industry provides an avenue to India to build upon capability, set up robust policy and ecosystem to emerge as a major player in global semiconductor industry.

17. जलवायु शमन और अनुकूलन के साथ-साथ जैव विविधता को बनाए रखने और मानव स्वास्थ्य के लिए आर्द्रभूमियों को जीवंत बनाए रखना महत्वपूर्ण है। चर्चा कीजिए। इसे सुनिश्चित करने के लिए भारत में कौन-से साधन मौजूद हैं? (उत्तर 250 शब्दों में दें)

Ensuring healthy wetlands is critical for climate mitigation and adaptation as well as sustaining biodiversity and human health. Discuss. What are the mechanisms that exist in India to achieve this? (Answer in 250 words) 15

Wetlands are the lands transitional between ~~terrestrial~~ and aquatic ecosystems where the water table is usually at or near the surface or the land is covered by shallow water.

⇒ Significance of wetlands :-

i). Climate mitigation and adaptation

- regulate water quantity and groundwater recharge
- act as bulwarks against storms and regulate floods
- Help in erosion control and sediment transport
- Store carbon

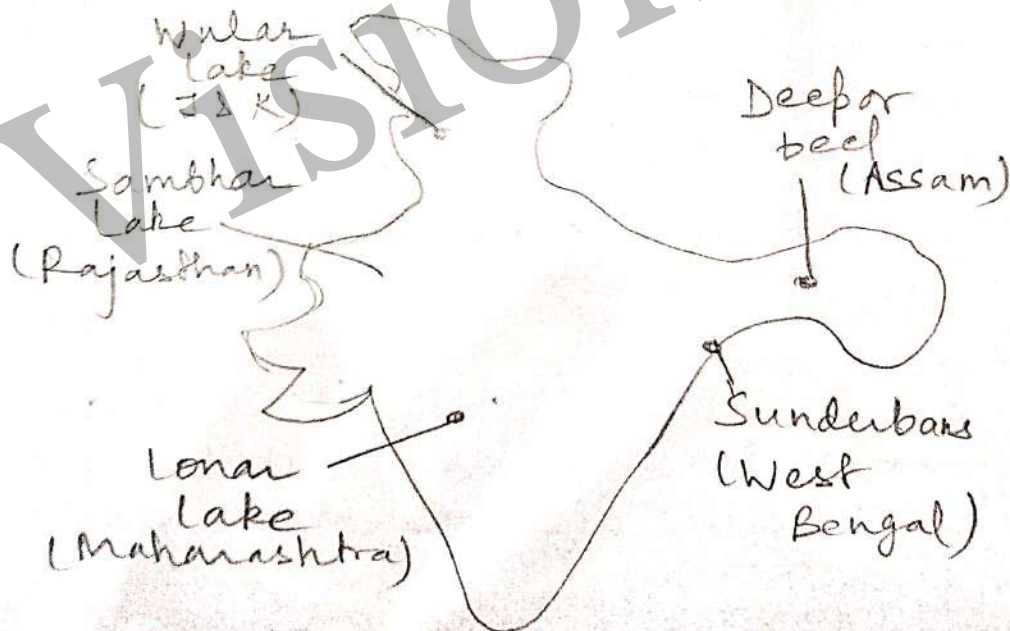
ii). Sustain biodiversity :-

- wetlands serve as habitat for marine life and migratory species  
eg. endangered dugongs in wetlands of Kutch, Andaman and Gulf of Mannar

- Around 40% of world's species live and breed in wetlands

### iii). Human health :-

- source of food - for eg. rice paddy systems
- form inland fisheries that support human nutrition as well as commerce
- wetlands are of significant importance to human cultural system
- source of raw material, food, water, genetic resource for medicines



### Some important wetlands

⇒ Mechanisms in India to ensure healthy wetlands :-

- i). National Wetland Conservation Program (NWCP) - 1985 - to prevent degradation of wetlands
- ii). <sup>2010</sup> Central Wetlands (Conservation and Management) Rules - for regulation of wetlands in India
- iii). National Environment Policy 2006 - aimed at wetland conservation through EIA
- iv). Wetlands (Conservation and Management) Rules 2017 - shifted responsibility from ~~State~~ to Centre to States.
- v). National Plan for Conservation of Aquatic Ecosystems (NPCA)
- vi). Effective management and capability building under Ramsar Convention and its Montreux list eg. Chilka Lake and Loktak Lake

Through these schemes, India streamlines environmental concerns with the SDG commitments. AMRUT and Smart Cities also incorporate wetland management

18. उत्तर भारत में फसल अवशेष और पराली दहन की प्रथा में उत्पन्न होने वाले वायु प्रदूषण की समस्या से निपटने हेतु समग्र समाधान विकसित करने की आवश्यकता है। चर्चा कीजिए। (उत्तर 250 शब्दों में दें)

Holistic solutions need to be devised to deal with the issue of air pollution arising from the practice of crop residue and stubble burning in North India. Discuss. (Answer in 250 words) 15

Stubble burning is the process of setting on fire the straw stubble left after harvesting of grains like paddy, wheat etc. As per CAQM, stubble burning leads to noxious air pollution in North India, especially Delhi.

⇒ Impact of stubble burning :-

- i). Air pollution - due to emission of toxic pollutants containing  $CH_4$ , CO, VOCs and carcinogenic hydrocarbons
- ii). Reduced soil fertility
- iii). Heat penetration

⇒ Impact of air pollution arising from stubble burning :-

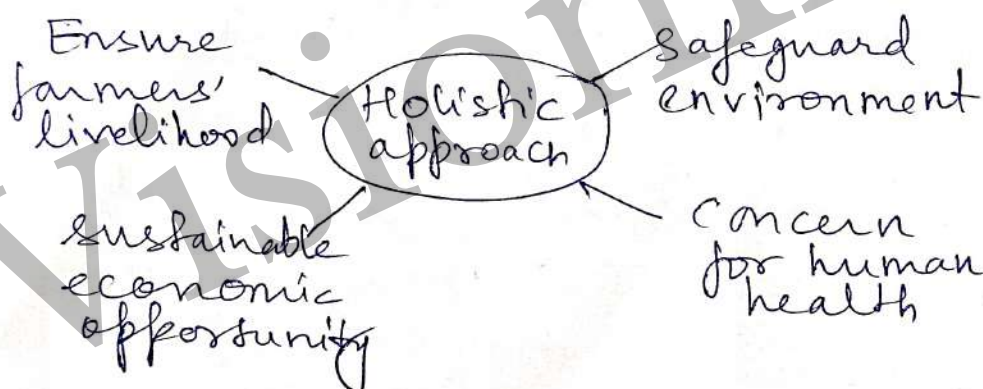
- i). Reduced visibility
- ii). Negative effect on human health - on respiratory, circulatory and neural systems

- iii). Various studies have posited how air pollution due to stubble burning makes it more noxious than cigarette smoke.
- iv). Affects growth of plants

⇒ Relishic solutions to address the issue :-

- i). Adoption of Chhabisgarh model
- setting up of common plots called gauthan
  - The stubble and crop residue is collected at gauthan and converted into organic fertiliser
- ii). Post-harvest regulation and incentivisation - Incentives to farmers to reuse and recycle stubble
- iii). Use stubble as fodder - eg. wheat stubble can be used for fattle fodder. Rice stubble because of silica content should not be used as fodder.
- iv). Microbe fusa - developed by IARI to decompose stubble

- v). Happy Seeder - rice stubble deposited as mulch
- vi). Recycle and Reuse stubble - to make paper, cardboard and use as manure  
eg. Nandi foundation turns paddy residue from farmers into manure
- vii). Power generation: - Crop residue may be used for charcoal gasification and for bio-ethanol production.



Innovative nexus thinking that integrates sectors such as energy, environment, economy and society is the basis for holistic way ahead. It is the need of the hour to bolster India's sustainable development agenda.

19. भारत में पारिस्थितिकी संवेदनशील क्षेत्रों (ESZs) के निर्माण की आवश्यकता पर प्रकाश डालते हुए, इससे संबंधित मुद्दों पर चर्चा कीजिए। साथ ही, इस संबंध में हाल में किए गए प्रयागों का भी उल्लेख कीजिए। (उत्तर 250 शब्दों में दें)

Highlighting the need to create Eco-Sensitive Zones (ESZs) in India, discuss the associated issues. Also, mention the recent developments in this regard. (Answer in 250 words) 15

ESZs are ecologically fragile areas notified by the MoEFCC around National Parks, Protected Areas and Wildlife Sanctuaries. An ESZ can go up to 10 kms. around a protected area.

⇒ Need for ESZs :-

- i). To create a "shock absorber" around protected areas by regulating and managing activities
- ii). To act as a buffer for protected areas and reduce the impact of developmental pressure
- iii). Provide for a transition zone from high protection to less protection areas
- iv). In-situ conservation - especially of endangered species in a shrinking habitat  
eg. One horned rhino at Kaziranga (Assam)
- v). Reduce man-animal conflict:-

that has been on a rise due to habitat exploitation of animals due to anthropogenic activities

⇒ Associated issues :-

i). Affects livelihood of people living close to protected areas.

The strict ESZ policies negatively affect villagers, tribals etc. who depend on forests for livelihood and live close to it

eg. recent protests in Kerala against an ESZ modification.

ii). Governance and new laws -

- often undermine traditional rights of forest communities
- They also undermine ESZs for economic pursuits
- eg. draft notice for reducing ESZ of Bannerghata National Park.

iii). Tourism related pollution -  
eg. as seen in western Ghats and Himalayas

iv). Outdated agriculture practices such as slash and burn - pose threat

v). Demand for firewood, fodder

and forest produce - exerts pressure on resources.

⇒ Recent developments :-

i). SC judgment 2022 - every protected area to have mandatory ESZ of minimum 1 km.

ii). SC directed that State has to act as a trustee for use of natural resources for the public and sustainable development.

iii). Around 600 ESZs notified by MoEFCC under EPA 1986.

iv). ESZ boundary to be based on region-specific requirements. Representatives from forest department, revenue department, Panchayat - to decide on the boundary.

Considering the significance of ESZs and the associated issues, the decision must involve major stakeholders so that environment and livelihood are duly balanced.

20. जलवायु क्षतिपूर्ति (क्लाइमेट रेपरेशन) के विचार से आप क्या समझते हैं? इस विचार को वर्तमान संदर्भ में लागू करने की आवश्यकता पर चर्चा कीजिए। साथ ही, इसके कार्यान्वयन के समक्ष विद्यमान चुनौतियों को रेखांकित कीजिए। (उत्तर 250 शब्दों में दें)

What do you understand by the idea of climate reparations? Discuss the need to implement this idea in the current context. Also, highlight the challenges you foresee in its implementation. (Answer in 250 words) 15

Climate reparation refers to the call for money to be paid by the developed countries to developing countries as a means of historical contribution that developed nations have made to climate change

⇒ Need to implement it :-

i). Pakistan's arguments :-

- rich countries responsible for climate change.
- Despite negligible contribution in global warming, developing countries like Pakistan bear the brunt of climate change related fatalities

ii). Historical responsibility of Developed nations - in contributing to GHG emissions

iii). Resource limitation of developing countries - as they are most vulnerable to climate change but cannot sacrifice development

iv). Economic losses -  
eg. cyclone Amphan led to \$15 billion losses in Bangladesh and India

If it's estimated that USA's emissions have caused more than \$1.9 trillion damage to other countries

v). Non-economic losses - of health, life, well-being, cultural heritage.

Third world countries eg. Maldives more susceptible to climate changes

vi). Rationale of Polluter-Pays principle :- Polluter pays for remedial action and also for compensating environmental victims

- US + UK - account for over 50% of global emissions

⇒ Challenges in implementation:-

i). Practical difficulties in assessment of environmental loss due to other countries

ii). No mechanism to quantify non-economic losses such as those of health, cultural heritage migration

- iii). Difficult to establish direct link between a disaster and an aspect of climate change
- iv). Problem in assessing how much of the loss is due to climate change and how much is a result of misgovernance
- v). Unwillingness of developed nations to assume responsibility :-  
eg. Mr. Donald Trump had withdrawn from the Paris Agreement.

While the 1994 UNFCCC agreement lays down principles of differentiated but collective responsibility, a more comprehensive involvement of developed and developing nations is required to enforce it. COP 27's loss and damage fund paves the way ahead