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GENERAL STUDIES (TEST CODE 1986

Name of Candidate	Charu	Registration Number	26298
Medium Eng./Hindi	English	Date	
Center			

INDEX TABLE

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

Total Marks Obtained:

Remarks:

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 **ENGLISH & HINDI**
इसमें बीस प्रश्न हैं अंग्रेजी और हिन्दी 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.

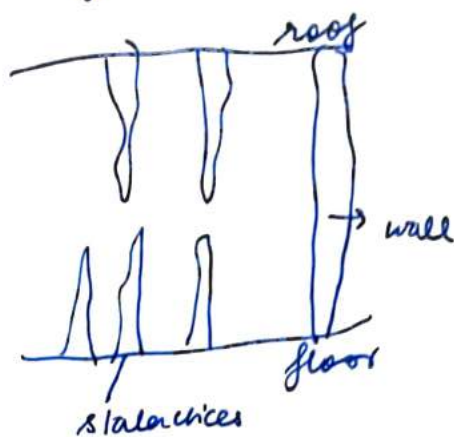
6.

All the Best

- Q1. Karst topography is one which is formed by limestone. (Erosional landforms)
It includes features like stalagmites, stalactites, limestone caves etc.

Conditions conducive

1. Presence of limestone, dolomite in huge quantity.
2. Conditions for erosion eg. presence of water (underground or overground stream)
3. Humidity
4. High temperature
5. Good quantity of Rainfall.



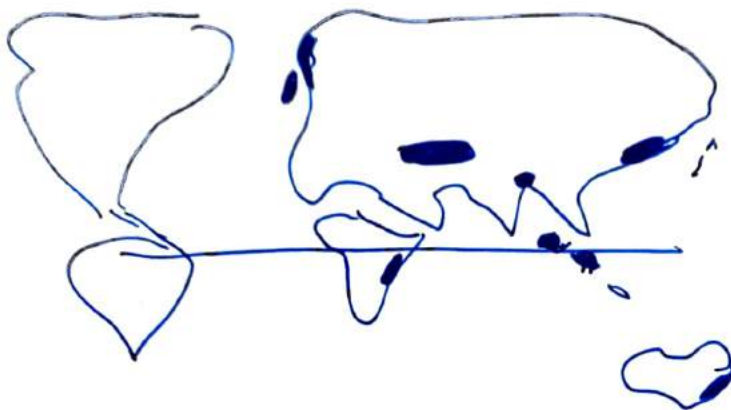
Distribution

1. Generally found in areas of good rainfall
eg. Tropics (Andaman & Nicobar Islands),
Malay Peninsula
wet temperate regions (eg. British Isles,
Scotland)
North East China, East Africa

2. monsoonal areas (receiving rainfall $> 250\text{cm}$)

eg cherrapunji (meghalaya)

3. limestone rich areas - karst areas
(Yugoslavia, Serbia etc.)

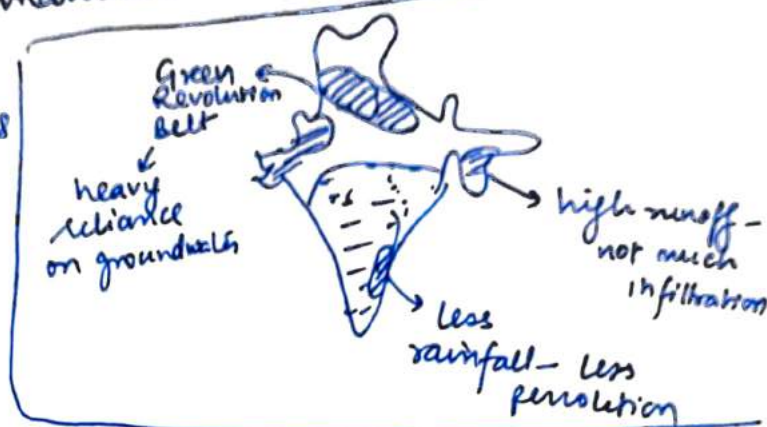


■ - Areas of Karst Topography

Q2. India is a water-stressed country (~ 1500 m³/capita) with heavy dependence on groundwater for its uses.

90% of the groundwater is used in irrigation while it ranks highest in the world in terms of groundwater extraction.

usage patterns



In this regard, Central Ground water Authority (CGWA) has formulated guidelines to check use & misuse of groundwater -

- 1) No objection certificate (NOC) for industrial units before extracting groundwater
- 2) Water conservation fee on industries
- 3) Recycling & reusing the waste water generated
- 4) Emphasis on treating the water before discharging
- 5) water quota & tariff to be levied for

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extraction.

The steps are progressive as they regulate the drawls of groundwater by industrial & residential units.

However, it overlooks aspects like:

1. Regulation & wastage of water in MSME sectors
2. Most of the usage of Groundwater is in agriculture wherein excessive power subsidies remain cause of concern
3. Inadequate technology to reuse grey water

Therefore, India needs to strengthen its water recycling capabilities. For eg. Israel recycles 90% of its waste water.

Q3 North East India has huge potential for hydro-electricity because of its fast-flowing rivers, over the year abundant water availability, sudden change in gradient of water etc.

However, we do not see many hydroelectric power projects in the area.

Challenges :

1) Geographical -

- i) High sediment load in the rivers
- ii) shifting courses of the rivers
eg. Brahmaputra in Assam
- iii) seismically risk area - whole NE India lies in zone V
- iv) Building of reservoirs leading to submergence of forested land

2) Non-geographical

- i) International dimension - may lead to friction with neighbouring lower-riparian countries
eg. Bangladesh - over Barak River (Tipaimukh Dam)

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ii) Affect on fragile flora & fauna of region

iii) lead to displacement & rehabilitation issues which is already politically sensitive

iv) Affect the natural flow of rivers where main economy of region is dependent on these rivers.

Therefore, the best solution will be building small run-off the river projects which can generate electricity as well as are environmentally more sustainable.

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Q4. Various studies eg. IPCC's 5th Assessment Report has highlighted impact of climate change on nature & pattern of Jet streams.

Jet streams are narrow band of wind current flowing in ab upper troposphere.

These are formed at the margin of different frontal air masses.

eg. Polar jet stream between Arctic & Temperate air mass.

Climate change has altered the temperature patterns changing the intensity & frequency of heating which has impacted formation of Jet streams.

1) Late onset of Tropical Easterly Jet stream due to differential heating of Tibetan Air Plateau - leading to effect on Indian monsoon

2) Late/early withdrawal of Tropical westerly Jet stream because of erratic movements of pressure cells of tropical regions (ITCZ)

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3. Affect on Polar Front Jet Stream as polar regions are recording higher temperatures. leading to weak formation of the jet streams.

The changes in the jet stream has further impacted other related phenomenon like monsoons, temperate cyclones, rainfall etc.

Q5. Coal in India is divided in two types based on the age of formation.



India : Coal Distribution

Issues associated with coal mining :

- 1) Inefficiency in extraction - leading to coal wastage
eg. Rat hole mining done in North East India
- 2) Incidents of coal fires because of improper safety procedures
eg. Jharia coal mines occasionally catches fire
- 3) Lack of good quality Anthracite coal

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eg- High ash content in Indian coal

4) Inefficient & lack of economies as the collieries are small in size

5) Coal mafia presence eg. in North East India

6) Involvement of children in coal mining

Not only the mining is highly inefficient & wasteful but is associated with social & safety hazards -

Way Forward

- Upgrading mining technology eg. Roof & Pillar approach
- Ensuring proper safety equipments to workers
- Ensuring compliance of existing protocols by random inspections
- Integrating multiple collieries to ensure economies of scale

Q6. India's strategic plan for Biodiversity (2011-20) has been framed in line with the Aichi Targets under Nagoya protocol for conservation of Biodiversity.

1) Prevent threat to Biodiversity

India's plan for species conservation e.g. Project Tiger, Project Elephant - has been successful in increasing the population

2) Use of traditional knowledge

India's approach is more bureaucratic — exercise powers with forest department.

Recently, importance of cultural model of development has been highlighted.

e.g. Under forest rights Act; Muthnis tribe in Annamalai was awarded

3) Use of genetic resources & prevent Bio-piracy

Biodiversity Act of India provides for safeguards for prevention of bio-piracy.

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4) Preservation of ecosystems
Ecosystems based approach has been adopted
of SECURE - Himalayas

Limitations -

1. Increasing pressure of urbanisation
on forests
2. Subversion in EIA process in many cases
3. Reducing cover under Protected Areas

Therefore, India has been successful on many fronts. Although, continuous efforts are required to overcome challenges.

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Q7. Ecosystem Restoration aims to bringing the ecosystem back to its original state after harnessing its benefits.
eg. Restoring wetland ecosystem to prior state after use.

Challenges:

1. Allows for unbridled use of resources
2. Difficulty in bringing back to original state
3. Reactive approach to deal with degradation rather than preventive
4. Adverse impact on other ecosystems due to positive feedback cycle
eg. Deforestation lead to surface runoff
↓
lead to flood in low-lying regions
5. Technology & cost intensive

Opportunities:

1. Reverse the damage

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2. Allow use & preservation at the same time
3. Allows for deriving benefits from ecosystem eg. wood, food & regulating services
4. Development of local communities dependent on ecosystem.

Ecosystem restoration can help in reducing the negative impacts of climate change, global warming. It has to be carefully planned to overcome the challenges.

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Question No.

प्रश्न संख्या

- Q8. With COVID-19 pandemic, India has seen huge increase in the quantity of Biomedical waste being generated.

Challenges:

- 1) Lack of segregation - leading to mixing of this waste with other recyclable materials
- 2) Health risks - for sanitation workers, people because of unsafe disposal
- 3) Chemicals leaching into soil & water bodies
- 4) Giving rise to superbugs & other deadly microorganisms
- 5) Vector-borne diseases

To ensure safe disposal & handling of Bio-medical waste, 2018 Rules were framed -

- 1) Colour-coding of the Bio-medical waste
- 2) Expansion in coverage eg. health camps
- 3) Responsibility of the incinerators with regard to handling & disposal of waste
- 4) Segregation at source & different handling

Question No.
प्रश्न संख्या

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of different category of wastes

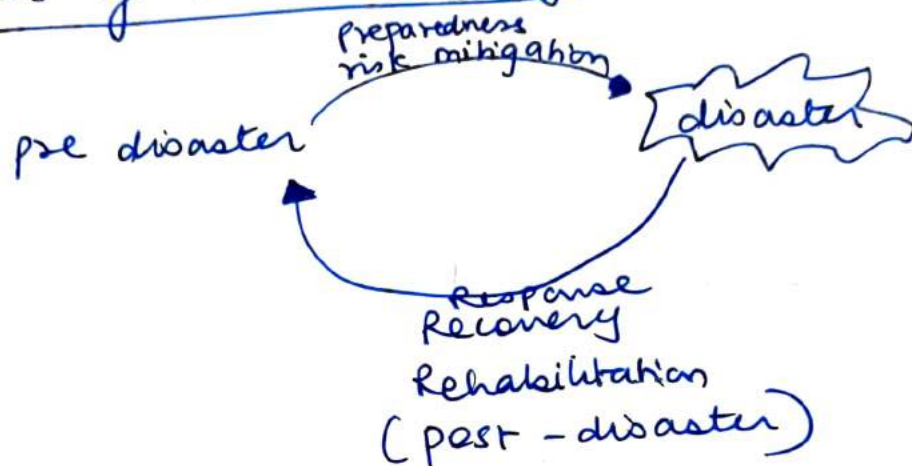
5) Bar-coding facility at units

6) Focus on recycling & sense of possible equipments

Therefore, these rules are positive step forward. However, as the biomedical waste continues to grow we need to ramp up our disposal facilities in relation to the amount of waste being generated.

Q9. The vulnerability & the impact of the disaster gets drastically reduced if the local bodies are well prepared to handle the disasters.
eg. as seen ^{during} sludhud cyclone

Phases of disaster management



1) Pre disaster :

i) Preparedness - preparing disaster management plans at local level
eg. NDMA guidelines provide for flood management plans at city level

ii) Increasing resilience
eg. ensuring critical infrastructure is disaster resilient

iii) Reducing risk

eg. forming local monitoring cells as in case of Drought monitoring cells to give early

warnings

2) Post disaster

i) Response - it is the first responder to the disaster.

eg. local bodies like PRIs & municipal bodies can provide for buffer supplies of food items to affected people ; help in search & rescue

ii) Rehabilitation - helping people to shift to other places & provide for necessary services

iii) Recovery - to 'Build Back Better' & learn from the disaster.

Therefore, in all the recent frameworks related to DM (Sendai, 10 Point Agenda by PM), role of local communities has been highlighted

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Q10. Forecasting is an important tool to inform people the timing, duration & extent of weather phenomena in a place.

eg. forecasting monsoon rainfall, cyclone activity.

Impact based forecasting goes a step further & tells the likelihood of impact of that particular event.

eg. chances that low monsoonal rainfall may result into drought in a particular area.

It delineates the vulnerable area & people, thereby gives more precision to forecasting & better handling of disasters.

merits of impact based forecasting:

- 1) Categorises impact into high, medium, low based on intensity → more focus on high impact areas
- 2) Prepares people to better equip themselves for higher impact
- 3) Gives time for authorities to coordinate &

do necessary planning

4) Identify vulnerable sections in area
& evacuate them at the earliest

5) Ensure critical infrastructure in that area
remains safe

Therefore, it will help in better planning,
more smarter response to the disaster.

However, such a system is based on
higher level technological precision & modelling.

Q11. Plate Tectonics divides the earth's crust into 7 ^{major} plates & minor plates whose movement results into formation of features on Earth's surface.

It unifies the earlier developments in the field -

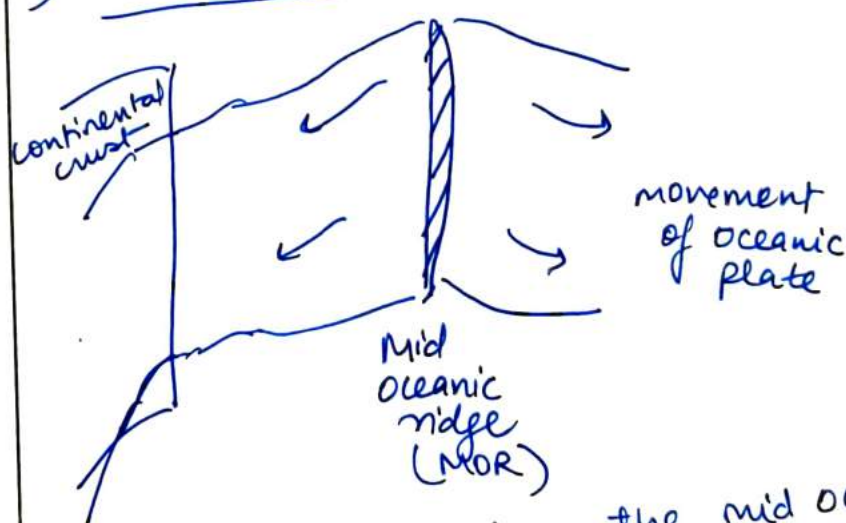
1) Continental drift theory of Alfred Wegener

Continental crust floating over lithosphere drifts because of tidal forces.

The drifting is westward & poleward.

Resulting into present formation of continents.

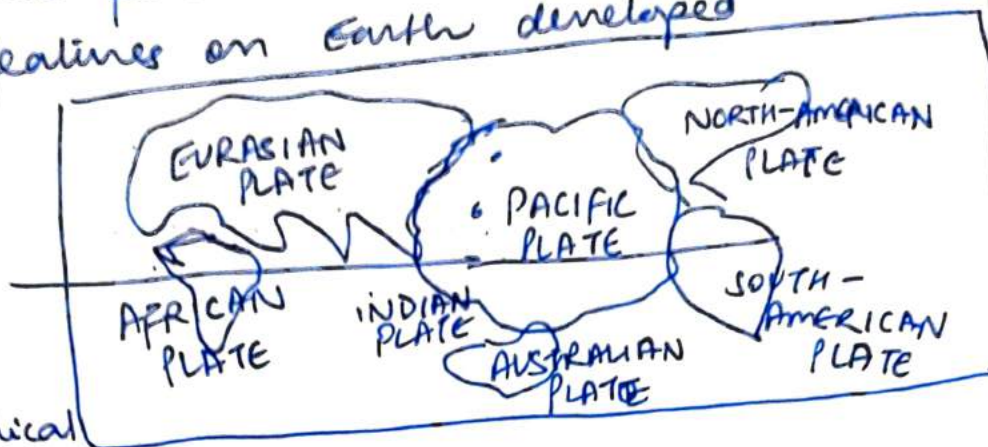
2) Sea floor spreading by Harry Hess



- Sea floor spreads along the mid oceanic ridge.
- New crust is generated along the MOR while old crust gets destroyed beneath the continental crust.

Plate Tectonics, thus, unifies the 2 theories by dividing earth into 'plates' - continental & oceanic plates and advances further into how features on earth developed

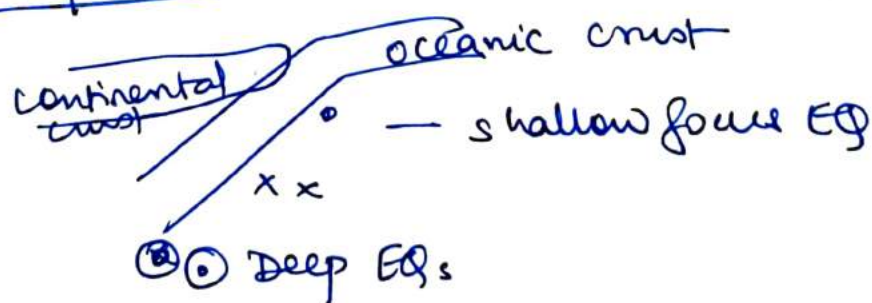
For Geographical Features:



- 1) Explanation for fold mountains - along boundary of plates
- 2) Trenches - along the back-arc zones
- 3) Oceanic^{volcanic} islands eg. Reunion, Diago Garcia, Hawaii - as plate moved northwards

Explanation for processes:

- 1) Earthquakes along the Benioff zones



- 2) Volcanoes along Oceanic - continental crust boundaries (submergent)

3) Tsunamis along plate boundaries - when there
sudden plate movement

Therefore, Plate Tectonics has clarified many
of the causes behind existence of certain features
& processes beyond the earlier Continental Drift
Theory & Sea floor spreading Theory.

Q12 Indian Monsoon has been heavily dependent on the vagaries of movement of temperature & pressure belts, jet stream movements, differential heating.

As the global temperatures increase & sea level rise, studies have indicated negative impact of it on the Monsoon.

This can be seen in increasing erraticity of rainfall (more shorter duration, high intensity spells) etc.

Indian monsoon & climate change

1) The impact on temperature belts has resulted into unequal warming of ITCZ which moves over Indian landmass & creates low pressure zone.

This has affected the movement of trade winds in region.

2) Late setting of low pressure trough & North Easterly Jet Stream because of climate change → lateness in arrival of monsoon

- 3) Late withdrawal of westerly Jet stream → adding to late onset
- 4) Intense heating of Tibetan landmass → extremely low pressure zone → adding to cyclonic activities
- 5) change in dates of monsoon as there is different movement of pressure cells
- 6) melting of Himalayan glaciers → ~~low~~ weak pressure zone

Consequences:

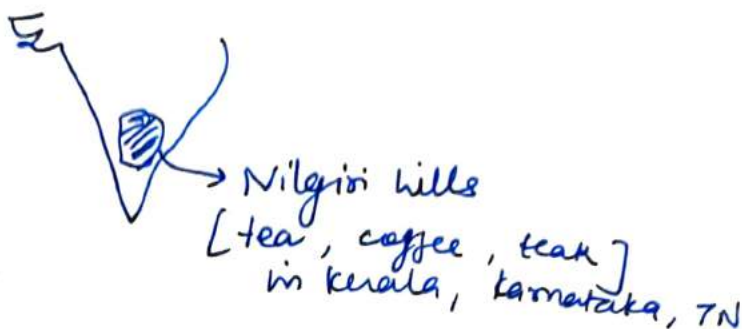
- 1) Pre-monsoon drought - due to late arrival.
~~low~~
- 2) High intensity showers leading to floods
eg. Mumbai, Kerala floods during monsoon
- 3) Early withdrawal - affecting crop patterns
(Kharif crops)
- 4) Reduction in amount of rainfall
- 5) Spatial variability increasing
eg. less than average rains in leeward regions of Western Ghats
- 6) Rainfall getting concentrated during particular duration eg. July-August-

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This has impacted the ecological, social & economic cycle of the country heavily dependent on monsoon rains.

Therefore, more advanced prediction systems & analysis is required to adapt & mitigate negative consequences.

Q13. Plantation in South India includes tea, coffee, ^{bamboo} teak, plantations.



Reasons

1) Geographical

- favourable conditions for tea plantation
- eg. slope — no retention of water
- ideal temperature
- adequate rainfall
- good quality soil

2) Social factors & Economic factors

- availability of labour
- eg. tea plantations
- capital availability
- export markets
- eg. Kerala, Karnataka exports tea, coffee

3) Political factors

- British policies for plantation
eg. Duty, Kummur, Coorg
- Incentives for planters

Significance

1. Source of income
eg. export income of coffee from Karnataka - different varieties
2. Source of employment
eg. women in tea plantations
3. Economies of scale - efficient use of resources
4. Forward & Backward linkages
eg. agro-processing industries in rural areas
5. Growing tourism around plantation economy
eg. Coorg - coffee estates

Challenges

1. monoculture → leading to ecological disbalance
eg. depletion of soil nutrients

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2. Reduction of forests due to commercial expansion
3. Increasing man-animal conflicts in Nilgiris
eg. elephants in tea plantations
4. Declining working population in South India —
pressure on labour needs

plantations offer an opportunity for commercial agriculture leading to more profit. However, it should be balanced with more sustainable approach balancing it with environment concerns

Q14. Industrial inertia is the reluctance of industries to come out of status-quo & innovate or move to newer, smarter approaches.

eg. Inertia of MSMEs to evolve into bigger companies to reach economies of scale.

Factors :

- 1) Legacy of the past - pre 1991 legacy of closed economy continues to make our industries non-competitive
- 2) Lack of push by Government to innovate (less than 1% spend on R&D)
- 3) Labour intensive Indian economy rather than trying to bring in advanced technology
- 4) Societal factors - resistance locally to bring in changes
eg. regressive labour laws, factory Act
- 5) Lack of integration with global economies focus only on Indian market.

6) Dynastic business houses - based on family relations & not on professional merit creates scope for innovation

Lack of adoption of new technology in MSME sector is an example of lack of inertia seen in India.

many industries like leather, sugar, paper based depend on archaic practices & thereby rely more on Government subsidies.

PSUs in India have also contributed to Industrial inertia because of security of support from the Government -

eg. Non-competitiveness of Air India, BSNL

The startups have led to a break in this inertia by focusing on innovation & creating new demand.

Growing interlinkages with Global supply chains will further push industries to adapt to changing times by reforming their practices.

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Q15. Rare earth elements which are low in quantity & used in precision industries (eg. Titanium, Cesium)

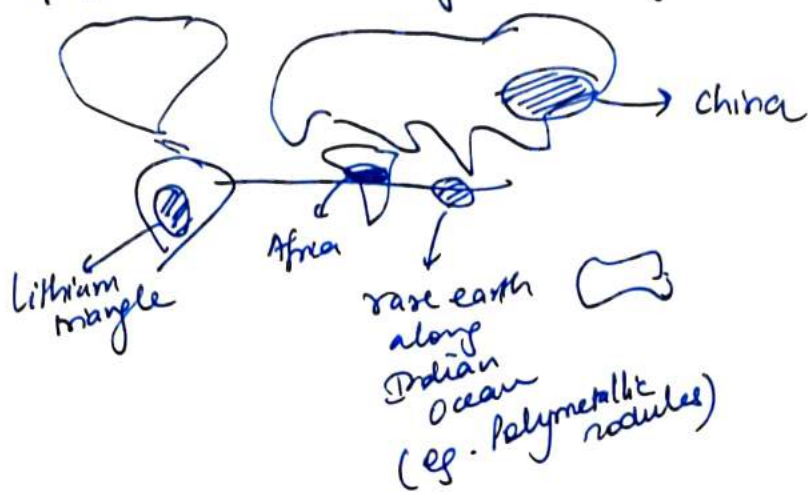
They come at the end of the Periodic Table & generally are difficult to isolate.

Industrial applications:

1. Semi-conductor industry
eg. used in diodes
2. Mobile phones, laptops & other electronic & electrical appliances
3. Renewable energy sector
eg. manufacturing of solar photo-voltaic diodes
4. Military applications
eg. precision equipments - sensors
5. Health sector
eg. Robotics, Laser surgeries

The use of rare earth is growing in various fields with advancements in Information Technology & robotics.

The distribution is highly concentrated with top producers having most of the resource reserves.



China has the highest concentration of Rare earth minerals [major importer of India]

South America - Lithium triangle (Bolivia, Peru, Argentina)

Along ocean floors eg. Polymetallic nodules along Indian ocean

India does not have any exploitable reserves of Rare earth. So imports 90% of its requirements from China.

Q16. With growing human footprints & declining natural habitats for animals, the human-wildlife conflicts have become a regular occurrence.

eg. death of elephants, leopards & tigers coming in human settlements

Causes:

- 1) Expansion of ^{human} ~~urban~~ settlements along the peripheries of Protected Areas
- 2) Increasing agriculture
 - reducing forest cover for animals
 - encroaching into reserve forests
- 3) Infrastructure passing through forests
 - eg. National highway through Kaziranga, train through elephant corridors
- 4) movement of animals to human enclaves
 - in search of water (declining water in forests)
 - in search of food (eg. elephants)
 - in search of prey (eg. leopards attacking dogs in human villages)

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- 5) Changing adaptation mechanism of animals — more used to interaction with humans
- 6) Reducing buffer zone along the forests
- 7) many animals outside protected areas
- 8) Decrease in population of vernomine
eg. monkey menace in cities

Government approach :

- 1) Protection of animals under wildlife (Protection) Act — classifies animals according to in different schedules

ex. schedule IV as vernomine

- 2) migratory corridors for animals
eg. elephant corridors in Nilgiris

- 3) Preventive mechanism like warning system, fencing along villages

- 4) Availability of water & fodder within the forests for animals

- 5) Proactive approach of forest department tracking the movement of animals

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One of the approach regarding human & elephant conflict has been landscape Approach where not just an area but whole region is ~~pt~~ taken into account.

migratory pathways are planned across the whole region to ensure no interference in movement.

further, planning of region is done so that region where concentration of elephants is higher is more strictly regulated.

Thus, it allows for better adapting to human & elephant presence in the region.

Q17. Around 12% of Indian landmass is vulnerable to floods. wth changes in climate, the incidents of flash floods are increasing.
eg- Uttarakhand 2013, Mumbai, Kerala, Chennai

India's vulnerability

1. 80% of India's precipitation in 3-4 months with heavy rainfall in western coasts, NE India leading to more chances of flash flood.

2. Increasing urban heat island effect → leading to higher temperatures of cities → more vulnerable to flash floods

3. melting of glaciers & glacier lake outburst floods leading to floods in downstream regions as well

4. Due to cyclones along the Indian coast



☐ → flash flood during monsoon

☒ → due to cloudburst or glacier lake burst

☐ → due to NE monsoon

☐ → due to cyclone

Vulnerability map.

measures :

- 1) Better prediction mechanism -
eg. intensity of precipitation
- 2) Structural measures
eg. embankments along river banks,
levees
- 3) Non-structural measures
eg. flood plain zoning along rivers,
series of water bodies to contain water
- 4) Afforestation along high hill slopes to
contain the runoff
- 5) Urban drainage improvement to ensure
there is no collection of water
- 6) Flood mapping at local levels & identifying
the most vulnerable population
- 7) Safeguarding the critical infrastructure
ensuring proper protection in case of floods

Flash flood Guidance system would help
in:

- Better preparedness in case of alarm

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- Inform the local authorities of imminent precipitation & chances of flood
- Vulnerable sections could be evacuated, emptying the low-lying areas
- Safeguarding critical infrastructure eg. telecommunications
- Better resource mobilisation eg. food packets

Therefore, it will reduce the impact of flash-floods on the people.

Q18 Almost 80% of the plastic find its way to the oceans. It is predicted that soon there will be more plastics in ocean than the fish.

marine litter is growing at face pace due to urbanisation & industrialisation affecting not just marine ecology but also other aspects.

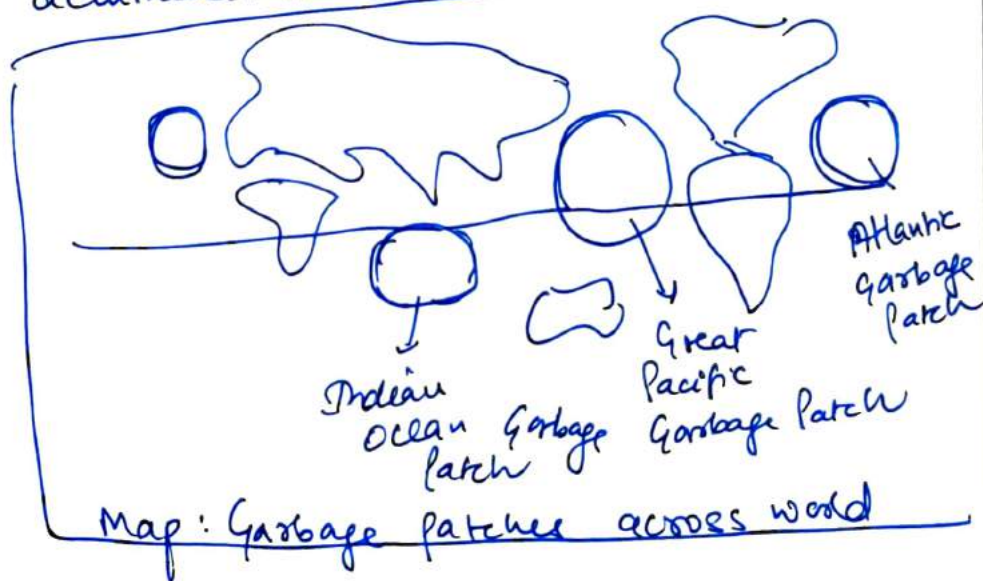
1) As an Environmental issue

- Affecting marine fauna
eg. death of sea turtles trapped in plastic bags
- Degradation of coral reef
- Affecting phytoplanktons in ocean
- Seeping of chemicals & hazardous wastes in water

2) Socio-economic challenge

- Affecting coastal communities
 - as a health hazard
 - piling up of waste on coast
 - Leaching of chemicals in water bodies

- Affect on fishing industry
 - Decline in fish population affecting economy of major regions
- marine tourism would decline
- people dependent on oceans — threat of livelihood
eg. small fisherman
- shipping & navigation industry — difficulty in movement in & out of ports due to waste accumulation



Initiatives taken:

- 1) London Convention → dealing with dumping of wastes in oceans
- 2) Marpol convention → related to marine pollution due to shipping

industry

- 3) Blue flag campaign →
on ensuring cleaning coasts & beaches
- 4) GloLitter campaign by IMO
- 5) Agreements related to -
Transboundary movement of Hazardous
wastes

However, as oceans have no boundaries,
it will only be a collaborative effort
that can result into more cleaner
Oceans in accordance with SDG (life in oceans).

Q19. COVID-19 pandemic has been a test to India's disaster management framework.

with NDMA, 2015 & National Disaster Management Rules 2016 calling for proactive approach, India still was not able to coherently deal with the crisis.

Inadequacies in framework

- 1) Lack of focus on epidemics — more on meteorological & geological hazards
- 2) ~~Low~~ Inadequate attention to robust health facilities — not able to deal with influx of patients
- 3) Poor disease surveillance mechanism — controlled by archaic Epidemics Act, 1897
- 4) Lack of focus on sanitation & hygiene
- 5) Community did not know how to respond to such an epidemic → knee-jerk reactions were seen
- 6) Governments had lack of knowledge on disease handling

Ambiguities :

1. Responsibility in epidemic handling not fixed
eg. Centre announcing lockdown for states
2. How to respond to longer duration disaster & respond simultaneously
3. Roles & responsibilities of NDRF with respect to epidemic control (National Disaster Response Force)
4. Usage of funds out of NDRF & SDRF.
eg. separate PM-Caree fund was created.

Therefore, in light of lessons learnt during the pandemic, we need to revamp our existing mechanisms.

Need to ensure that epidemics control, prevention & response framework is included with proper demarcation of responsibilities with Disaster Management Act.

Q20. Industrial disasters in chemical industries, power plants etc. have been increasing as the number of industries in the sectors increase. (recently ^{incident} at an NTPC plant)

Reasons

1. Poor compliance of regulations
eg. Safety standards, proper maintenance of hazardous materials
2. Infrequent inspections done by the regulatory bodies
3. Poor storage of hazardous material
eg. hydrogen
4. Safety mechanisms not in place
eg. Automatic cutoff in case of leakages
5. Poor handling as in MSME sector
6. Not adequate tools to prevent spread
eg. for water sprinklers, cordoning off

Post the Bhopal Gas tragedy, Government had taken steps :

- 1) Personal Liability Act - Liability of company if they fail to control the incident
- 2) Factories Act - responsibility of the industries with regard to accidents
- 3) Hazardous waste management Rules 2016 - on dealing with hazardous waste generated by industries
- 4) NGT directives on safety standards in industries

More proactive approach is required to limit the occurrence of such incidents. Use of better technology in handling of materials & following proper safety standards is the necessity.