GSSCORE

An Institute for Civil Services

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TEST COPY

RUPAL SRIVASTAVA

AIR - 113

(CSE 2022)

GEOGRAPHY OPTIONAL

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34377

Geography Test Series 2022

TEST - 02

129

GEOGRAPHY

Time Allowed: 3 Hrs. *Max. Marks: 250*

Instructions to Candidate

- Please read each of the following instructions carefully before attempting questions.
- There are EIGHT questions divided into TWO SECTIONS and printed in ENGLISH.
- The candidate has to attempt FIVE questions in all.
- Question Nos. 1 and 5 are compulsory and out of the remaining, THREE are to be attempted by choosing at least ONE question from each Section.
- The number of marks carried by a question/part is indicated against it.
- 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 a medium other than the authorized one.
- Word limit in questions, wherever specified, should be adhered to.
- Illustrate your answers with suitable sketches/maps and diagrams, wherever considered necessary. These shall be drawn in the space provided for answering the question itself.
- Attempts of questions shall be counted in sequential order. Unless struck off, the attempt of a question shall be counted even if attempted partly. Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

⇒ Avoid same pattern of presentation in your Answer
⇒ Content is fine in most of your Answer
⇒ Try to improve your introduction Part

Name RUPAL SRIVASTAVA

Mobile No. _____

1. *Invigilator's Signature* _____

Date _____

2. *Invigilator's Signature* _____

Signature Rupal

REMARKS

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Roll No. 34377

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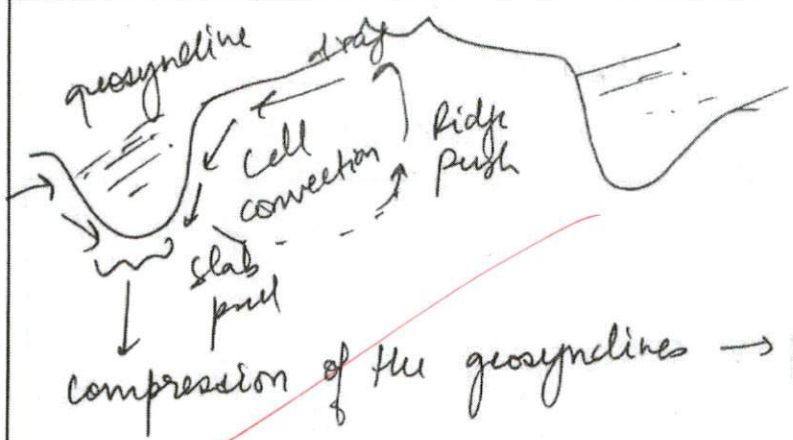
Section - A

1. (a) Write a short note on convectional current theory of Arthur holmes in context to geosynclinal formation. (150 Words) (10)

Convectional current theory by Arthur Holmes provides force the force responsible for geosyncline formations.



compression of the geosynclines → formation of fold mountains

Fig: Cell of Arthur Holmes and geosynclines.

key features

① the sinking limb of convectional cells creates geosyncline with mobile sinking floors

② the convergence of two convectional cells provides force for upliftment of geosyncline and hence forms fold mountains.

Remarks

Comparison wrt Thermal Contraction Theory

① According to Harold Jeffery and Kober, geosynclines were formed due to thermal contraction of the continents, thus forming long depressions.

② However, with the discovery of convectional cells and further supported by Plate tectonics, it was proved that thermal contraction is not the reason.

Read the Hint

• The convectional current hypothesis of Arthur Holms could explain both the north-south and east-west geosyncline formation unlike other theories which fail to explain North-South geosynclines.

3

Remarks

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1. (b) Ocean bottom relief of Atlantic Ocean (150 Words) (10)

The Atlantic Ocean is the 2nd largest ocean in the world. The OBR of Atlantic ocean is uniquely characterised by a central - MOR (mid Oceanic ridge). Along with this other features also

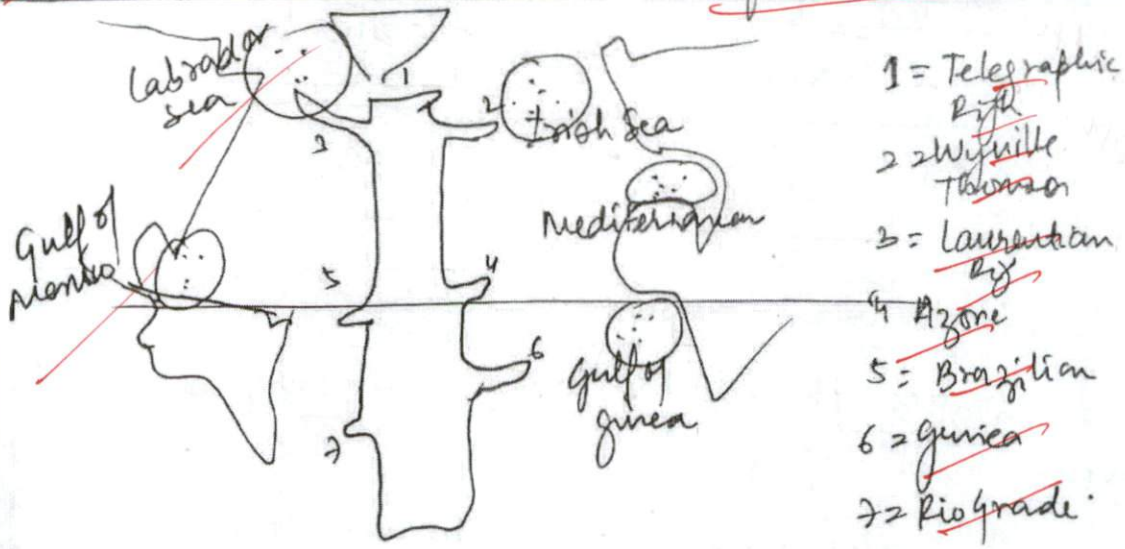

Fig: Ridges and basin of Atlantic

Along with this, other features of OBR of Atlantic are -

① Formation of fracture
- Vema (50-52°N)
- Atlantis (30-35°N)
- Romanche (0-5°)N

② Canyons - The Atlantic Ocean has huge submarine canyons like the Hudson canyon Canyon and Mississippi canyon

Remarks

(3) The Marginal Seas - Vast number of marginal seas like gulf of Mexico, Mediterranean sea as compared to Pacific

(4) Continental shelf - Wider shelf than Pacific and Indian Ocean as it is passive boundary

Shelf size: Atlantic > Indian > Pacific

(5) Abyssal plains and deposits

→ the abyssal plains of Atlantic are narrower than that of Pacific

however large amount of terrigenous mud deposits are found.

→ Also Biogenous deposits of corals in areas of Mediterranean Sea.

Atlantic bottom relief study has provided extensive detail about the sea floor spreading and is the largest MOR of the world

Remarks

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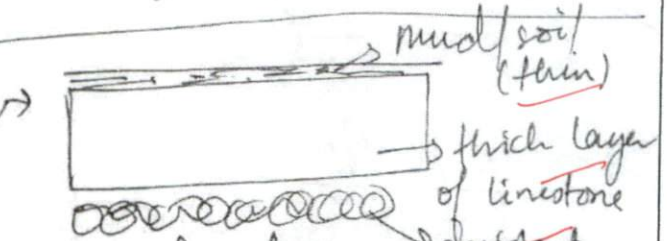
1. (c) Write a Short note on Karst landforms. (150 Words) (10)

Karst land forms are those formed in areas of limestone deposits primarily due to water action

Good Intro



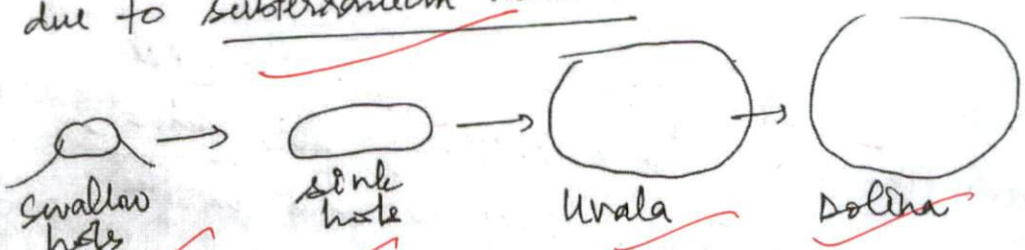
Condition for formation

- Absence of surface drainage
- Presence of subterranean drainage + low groundwater table
- Tectonic stability

Process - Chemical Weather (dissolution)

Erosional landforms

① Begins by formation of small swallow holes due to subterranean dissolution

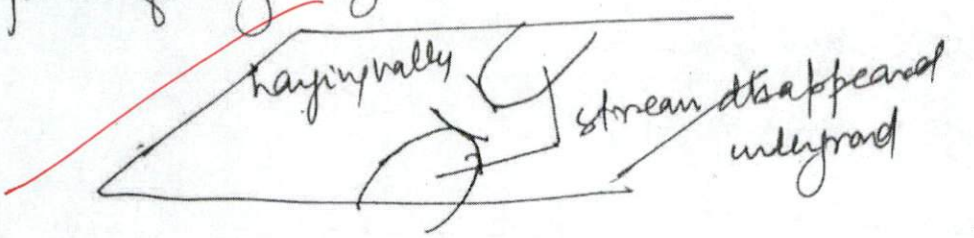


→ Many dolina's ultimately converge to form vaste Polje.

② formation of hanging valleys → as the stream erodes $CaCO_3$ rocks, it disappears under

Remarks

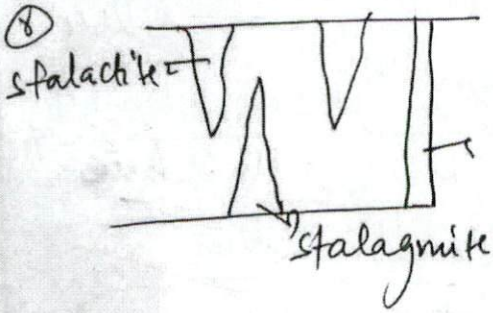
ground, forming hanging valley



Depositional landforms

① flow of $CaCO_3$ dissolved streams underground lead to depositional landforms

②



these are limestone deposits left after the evaporation of water.

(6) the karst landforms are widely distributed across the world - Mediterranean Sea, China, Australia. In India, they are found in the Vindhyan Rocks commonly

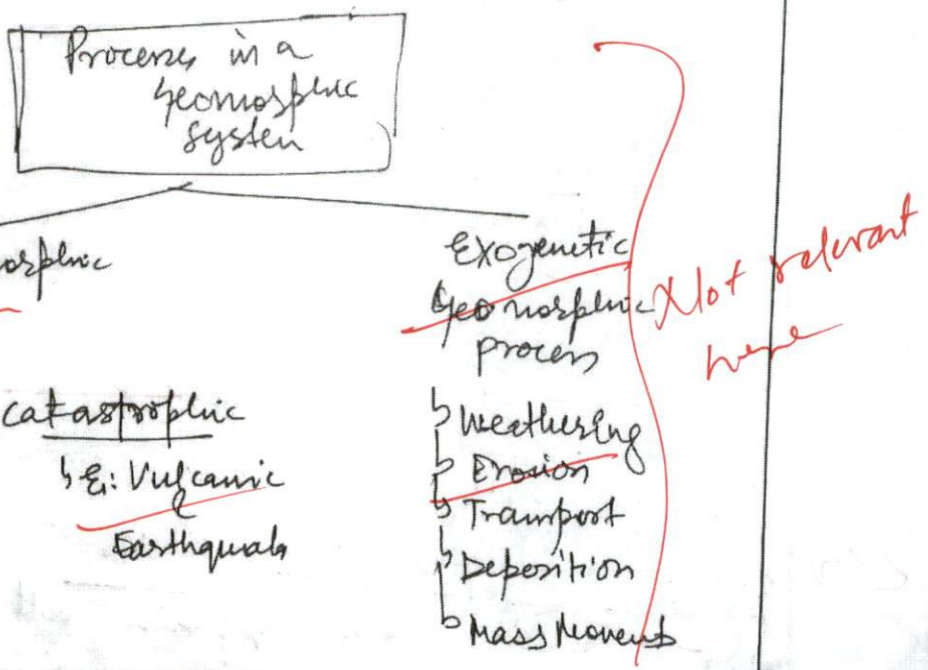
Remarks

1. (d) Geomorphic System

(150 Words) (10)

Geomorphic systems consists of components (landform) and the process operating on them.

The landform component → consists of the rock structure, arrangement and lithology.



Systems Approach in geomorphic Studies

- BJL Berry and RJ Chorley introduced the systems approach in geomorphic models. they applied it to Davis' and Penck's model of geomorphic landscape

Remarks

Types of geomorphic system

Closed system
- entropy maximization
- System attains equilibrium only when process stops.
Ex. Davisian geomorphic model

Open system
- equilibrium can be attained at any stage
→ Due to balance of exogenetic & endogentic forces
E: Penk's system

Geomorphic system describe landform development in the respect of structure, process, time, climate and vegetation. However, no one system model can explain all of these. Thus geomorphic system approach has generalisations of actual process.

5½

Remarks

1. (e) Write a short note on 'Peneplain' (150 Words) (10)

Peneplains refers to vast, extensive planar surfaces formed at the old/senile stage of Davisian cycle.

Can be written better

→ no valley cutting
– valley widening

convexo-concave profile

Fig: Structure of peneplains

avoid it

Process of formation

① According to Davis, peneplains are formed by the fluvial cycle of erosion in the warm temperate regions of North America.

Different from pedeplains and Structural plains

① Peneplains → erosional → Eg: Malnad (Karnataka)
② Pedeplains → depositional – Eg: Gangetic plain
③ Structural Plains → structural depressions → Eg: Great Plains of USA.

Remarks

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2. (a) 1

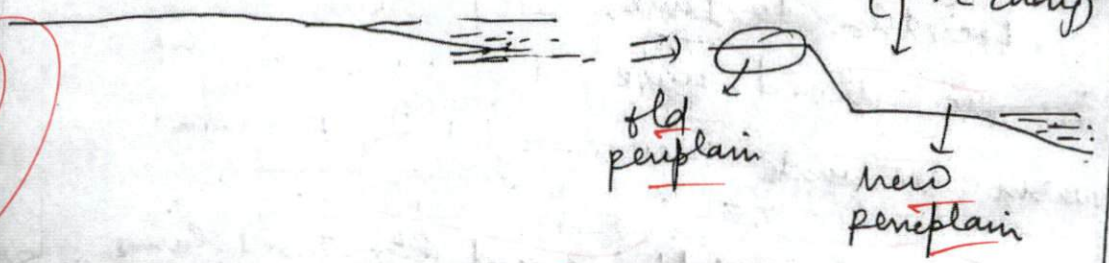
Significance of peneplain surface

① Peneplains are the erosional surfaces which have features of palimpsest topography

② They are used in denudational chronology to study the evolution of past landscapes.

Modification to peneplains

① According to Davis, peneplains can be modified by change in base level



Peneplains are a kind of diagnostic landform helping in identification of climatic landforms.

Remarks

2. (a) Discuss the various theories and models on evolution of continents and oceans. (250 Words) (20)

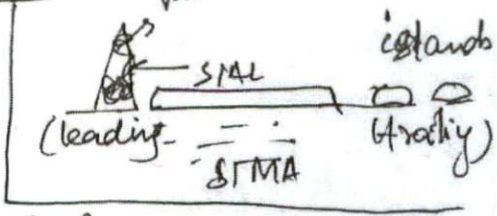
The earliest oceans formed can be dated back to 300-350 mya but the continents can be as old as 3500-3000 mya. their origin can be explained in various models and theories.

Continental Drift by Wegner → Convection current hypothesis → Sea floor spread → PT Theory → Wilson cycle

Fig: sequence of theories.

Drift theory by Alfred Wegner

① continents float over the ocean due to tidal pull of moon (Right from poles)



② He explained the breakup of Pangea II around 300 mya which was surrounded by ocean Panthalassa

③ Evidences like → fossils, Jigsaw fit, Glacier Deposits could explain the breaking

Limitation

(i) could not explain the 1st crust = Pangea I and also the force behind breaking of Pangea II

Remarks

Microcontinent theory for earliest crust

① An improvement over the drift theory as it could explain the formation of 1st crust

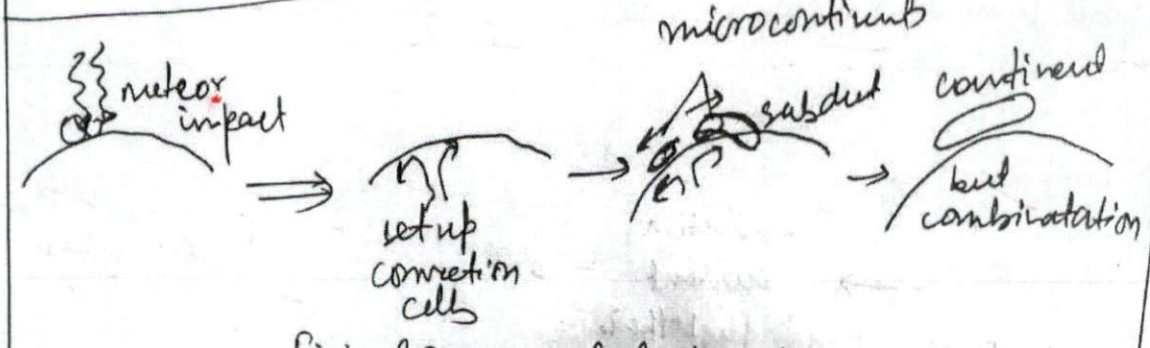
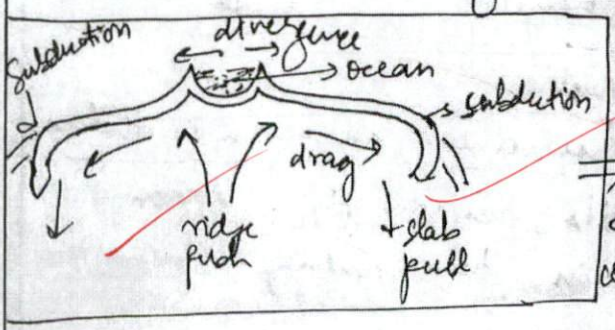
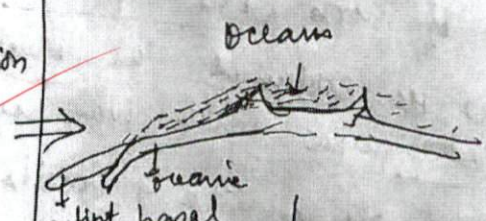


fig: Sequence of Continent

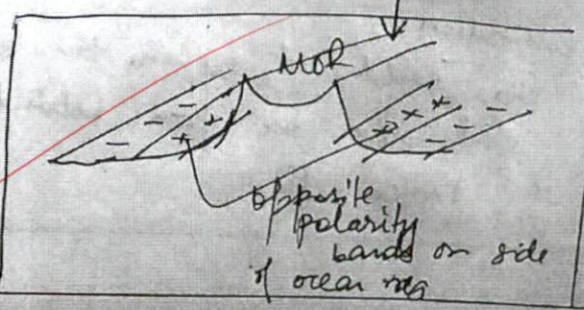
Convection current hypothesis and Sea floor Spreading

① Arthur Holmes convection current hypothesis explains the force behind the movement of continents, their breaking and formation of ocean





Sequence of ocean spreading



Remarks

Plate Tectonic theory

① PT theory by Mackenzie and Parker provided scientific evidences for evolution of continent and oceans

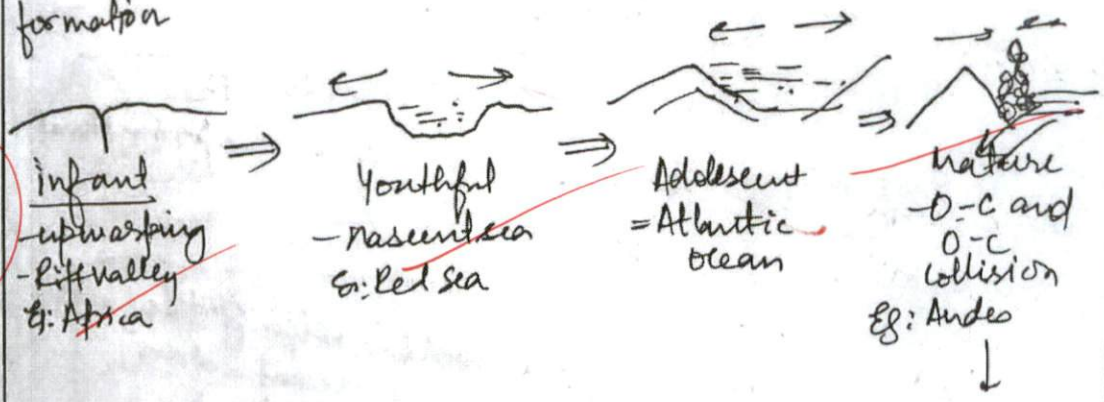
② Lithosphere = rigid, brittle plates which float on Asthenosphere

③ Boundary interactions form oceans and continents.

- Convergent → Subduction of ocean
- Divergent → creation of new ocean
- Transform ⇄

Wilson Cycle

Combining the ideas of PT, Tuzo Wilson gave his wilson cycle explaining continent and ocean formation



Thus the evolution of oceans and continents has formed the basis to understand the evolution of earth from Precambrian till anthropocene times.

Remarks

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2. (b) Geomorphological technologies have increasingly influenced economic aspirations of Nations. Elaborate with suitable examples. (200 Words) (15)

Geomorphological technologies like that related to study of coast, the rock structure, channel characteristics, mineral resources have increased the economic aspiration of nations.

key component of economic aspiration of nation
- → Agriculture Prosperity
- → Industrial Prosperity
- → Urbanisation
- → Geopolitical aspirations

Geomorphological technologies – Agriculture Planning

① Study of geohydrological basin characteristics along with soil structure has helped in agricultural regionalisation of crops.

Example
- Punjab: 'grainary' of the world → soil = fertile chestnut soil
  - → wheat basket
  - ← suitable texture
  - ← porosity & permeability

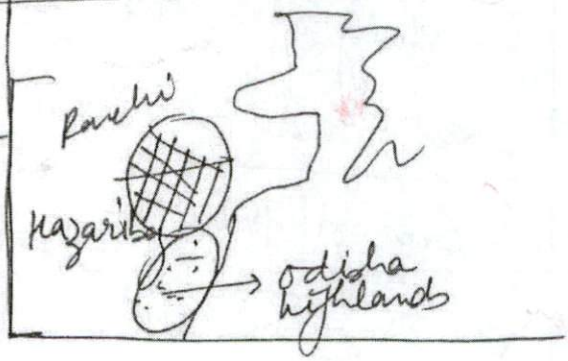
In India also, selection of Green Revolution belts in rich groundwater provinces was an outcome of geomorphological technologies.

Remarks

Geomorphological technologies – Industrial planning

① identification of key mineral zones based on Rock studies helped to plan the industrial locations

Core: Cratonic Rocks > laterite/granite/gneissic ← Rich deposits of Fe, Mn, Nickel → Chief industrial belt of India



Geomorphological technologies | Urbanisation

① Planning of urban centres done on the basis of geographical studies of the fault lines, the slope characteristics, the channel sinuosity index in flood plains has helped in urban settlement planning.

Case: Japan – highly effective earthquake EWS and fault line mapping. Despite lying in zone II one of the most urbanised

Remarks

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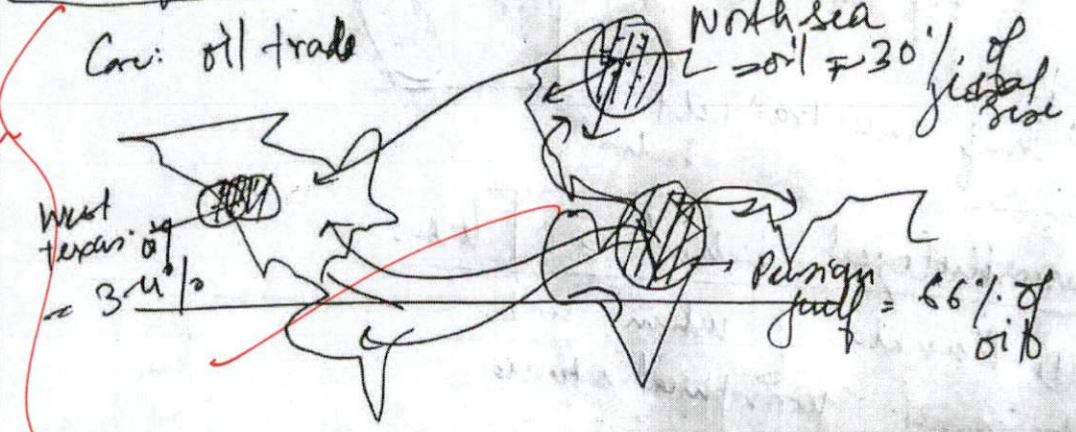
(c) Cri

Geomorphological studies and Geopolitical planning

① Geomorphological studies have helped in identification of HOCs in international transport

② study of native resources by mapping has formed the basis of trade.

Core: oil trade



⇒ diagrams can be drawn refined

(A) = suppli

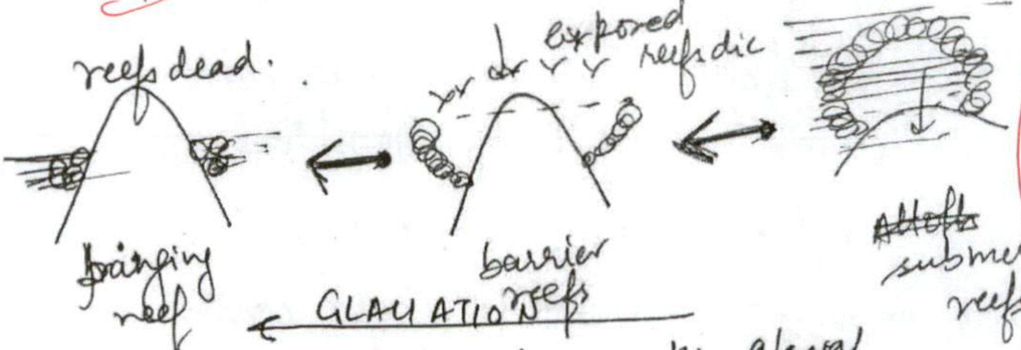
thus with the advancement of geomorphological studies, economic aspirations have increased. Yet there is a need to balance this with the environmental sustainibility - because according to Jean Brunhes → 'man can modify nature but not suppress it'

8

Remarks

2. (c) Critically examine the coral reef formation theory as proposed by Darwin.
(200 Words) (15)

Coral reefs are the most productive and diverse zones of ocean ecosystem. They are found in various forms like fringing reefs, barrier reefs and atolls and their formation is of high curiosity to geographers.



Reef formation as per glacial ~~based~~ ~~subsidence~~ in Darwin theory

first write the theory properly ⇓ Don't try to replace content with diagram

Critical examination of theory

Pros-

① Explains the formation of reefs submerged in water and how decrease in sea level during glaciation leads to death of corals.

② can explain the formation of barrier reefs, and fringing reefs also like that of Dar[w]in's.

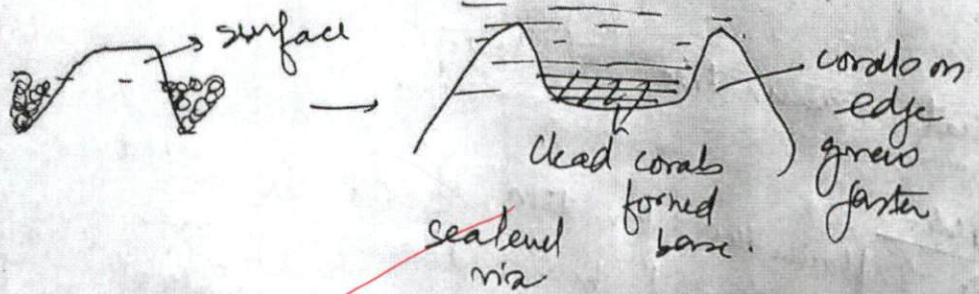
Remarks

Cons:

① Could not explain the circular shape of atolls as that explained by Davis Subsidence theory.

② Also no insights on the deep water corals below the depth of 400-1000 m. During any glacial cycle, sea level did not decline more than 1000 m. yet corals are found in deepwaters also.

③ Faulty explanation of lagoons.



Darwin's glacial control theory shows that corals are formed in tectonically stable regions However, many contra agreement can be

Remarks

land.

The existence of corals in Timor which is tectonically active and many other examples cannot fully justify the theory.

9

Remarks

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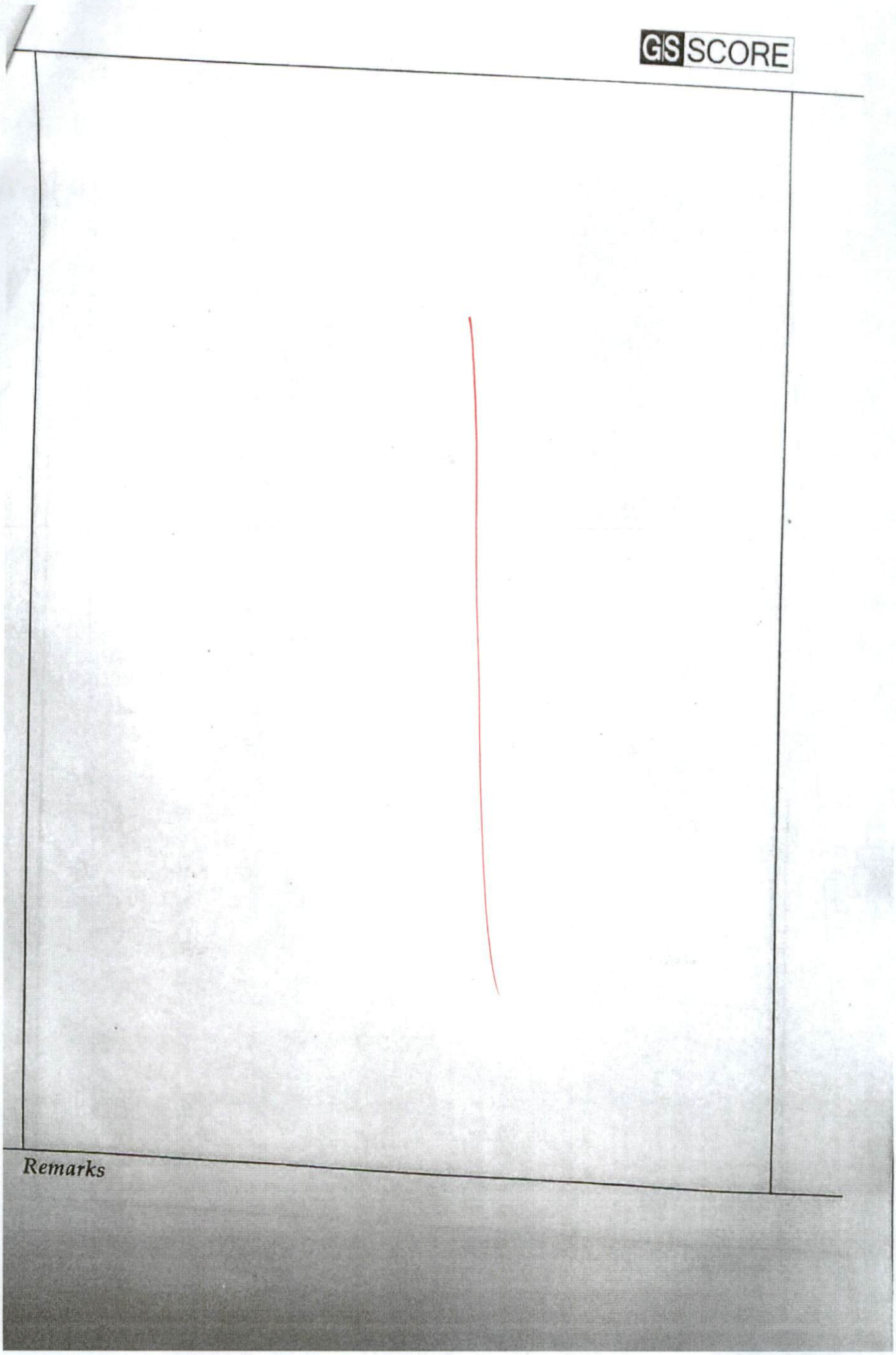
3. (a) How does the Greater Maldive Ridge (GMR) provide the evidence for understanding the evolution of the Indian Ocean basin? Give suitable examples. (250 Words) (20)

Remarks



Remarks

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(b) 'Structure is a di... with suitable exam...

Remarks

3. (b) **'Structure is a dominant control factor in the evolution of the landforms'. Elaborate with suitable examples.** (200 Words) (15)

Remarks

3. (c) How geomorphology is useful in hazard management and in the urbanization. Discuss in the backdrop of some recent hazards. (200 Words) (15)

Remarks

4. (a) What is Isostasy? Discuss the views of Airy and Pratt on Isostasy.

(250 Words) (20)

Isostasy refers to the mechanical stability between the upright features and lowlying features on a rotating earth. idea Law been propogated by James Hutton

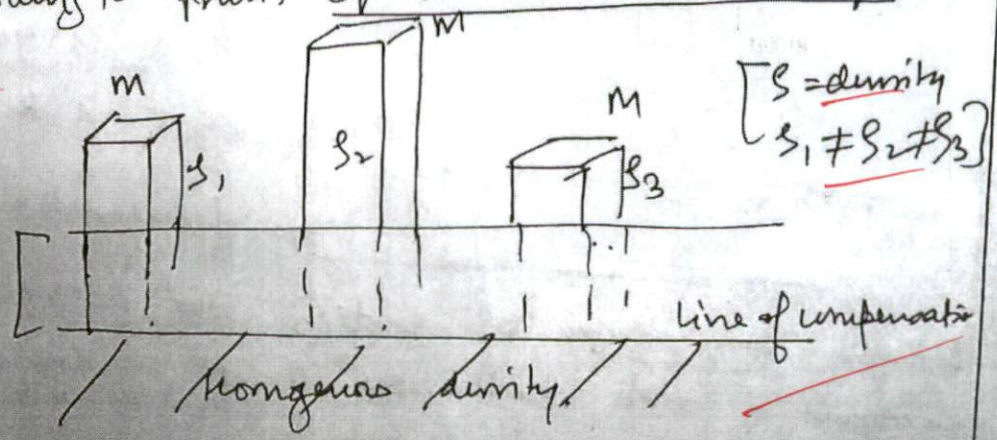
Avoid this

Isostasy answers queries?
- What keeps the Himalayas aloft?
- Why is the Icelandic continental plate rising?
- Why have the Aravallis not denuded?

the concept of isostasy has been 1st explained by Pratt which was further improved by Airy and subsequently validated by Plate Tectonics

Pratt's View on Isostasy - Theory of no Roots'

- According to Pratt, equal masses underlie equal area



Remarks

the difference in the height of feature is due to differences in densities

Hence: Mountains > Plateaus > Plains

$\rho_{mountain} < \rho_{plateau} < \rho_{plain}$

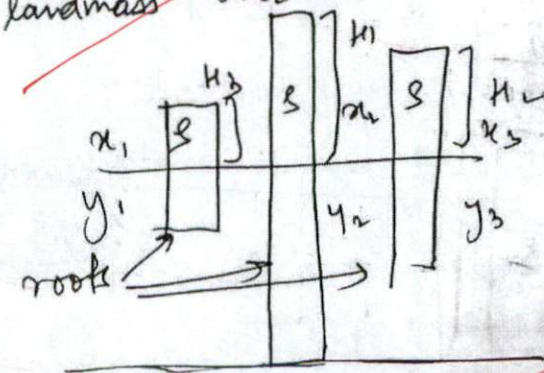
Eg: $\rho_{Himalayas} < \rho_{Deccan} < \rho_{Gangetic\ plain}$

Pratt's view was modified by Dana who said instead of plane of compensation there is a zone of compensation.

Airy's View on Isostasy — Theory of roots

(i) According to Airy, the relief feature have uniform density

(ii) Variation in height is due variation in proportion of landmass over and above the asthenosphere



$H_1 \propto x_1 : y_1$

$H_2 \propto x_2 : y_2$

$H_3 \propto x_3 : y_3$

Although Airy theory of floation was accurate in terms of roots but the concept of density was flawed.

Remarks

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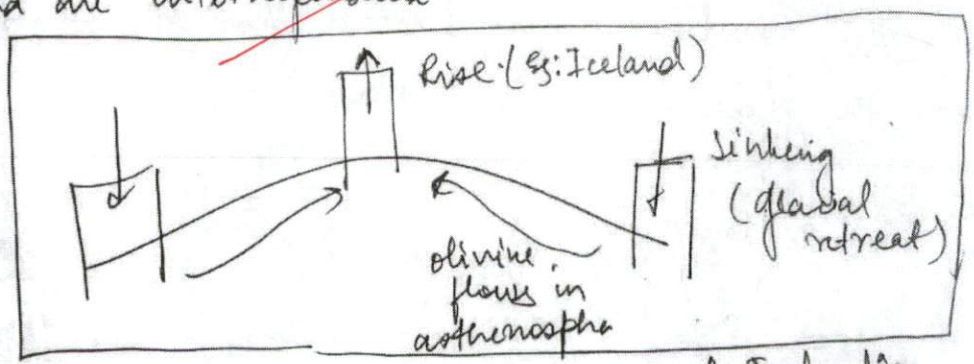
Plate tectonics improvement over Airy's view

(i) Unlike Airy's view where blocks of features float independently, Plate tectonics presented a relation between blocks.

(ii) According to Plate Tectonics, the blocks of wood float on a 'stretched membrane' = Asthenosphere and are inter dependent.



This could accurately explain: Rise of Icelandic ridge post glacial retreat from the continents.

Isostasy thus can help us understand the Himalayas are balanced by equally deep root within, the Aravallis are balanced by isostatic rebound and hence all features have stability.

Remarks

GS SCC

4. (b) The decline of the Atlantic Meridional Overturning Circulation (AMOC) might cause global existential threats to humanity in myriad ways. Analyze. (200 Words) (15)

first write what is AMOC?

According to IPCC 6th AR., the ~~AMOC intensity~~ has been declining in the recent years and its speed is slowing down from 15-20 km/year to 12-13 km/year.

This decline can have effect on humanity across the globe in myriad ways.

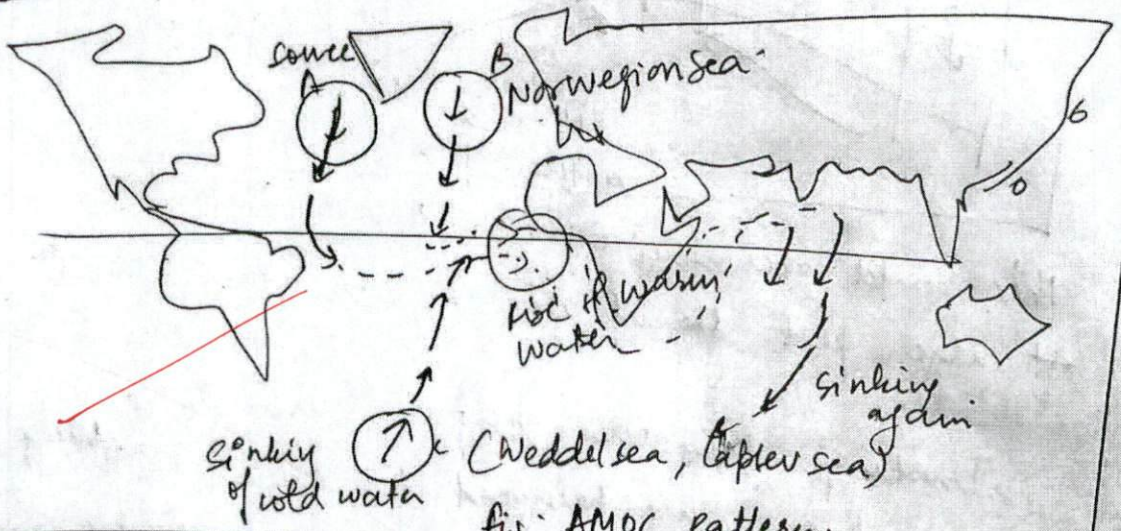


fig: AMOC pattern

Possible causes for decline

① Increase in ocean temperatures - creating a stronger thermocline which will prevent the process of downwelling at poles and upwelling at equator.

Remarks

Threats due to AMOC decline

① Disruption to global heat balance ~~of~~ AMOC transfer the surplus heat from tropics of pole. weakening can lead to warmer tropics and colder polar seas.

Case: Recent 'Blue Blob' in Arctic : cool patch due to weaker AMOC

② Changes in ocean chemistry → changes in the temperature and salinity patterns affect the survival of fishes in the zones like Labrador's Grand Banks - world's largest fishing bank.

③ Affect the coral biodiversity
- Warmer SST at tropics can lead to dead corals by coral bleaching.
- this can affect the tourism industry of tropical centres like Maldives.

④ Impact on coastal communities
(i) cold wave conditions in the higher latitudes on coasts of Norway, Sweden etc.

Remarks

(ii) Increased risk of tropical cyclones due to warmer tropical seas in the SIDS and countries like Maldives, India etc

(iii) Affect the coastal community's settlement patterns and forcing them to migrate (as per Lee's push factor) thereby forming climate refugees.

Recent Initiatives by India like the IRIS - system at CDRI (Coalition for Disaster management) can help in mitigation and disaster proofing the coastal communities due to unexpected AMOC changes.

(5)

Remarks

4. (c) The successful implementation of the Sendai framework for disaster risk reduction for Urban areas lies on accurate collection of geomorphological information. Elucidate. (200 Words) (15)

The Sendai framework was adopted in 2015 as a 15 year plan for disaster management and risk reduction. When it was adopted for its succesful implementation, it is necessary that robust data collection be made a priority

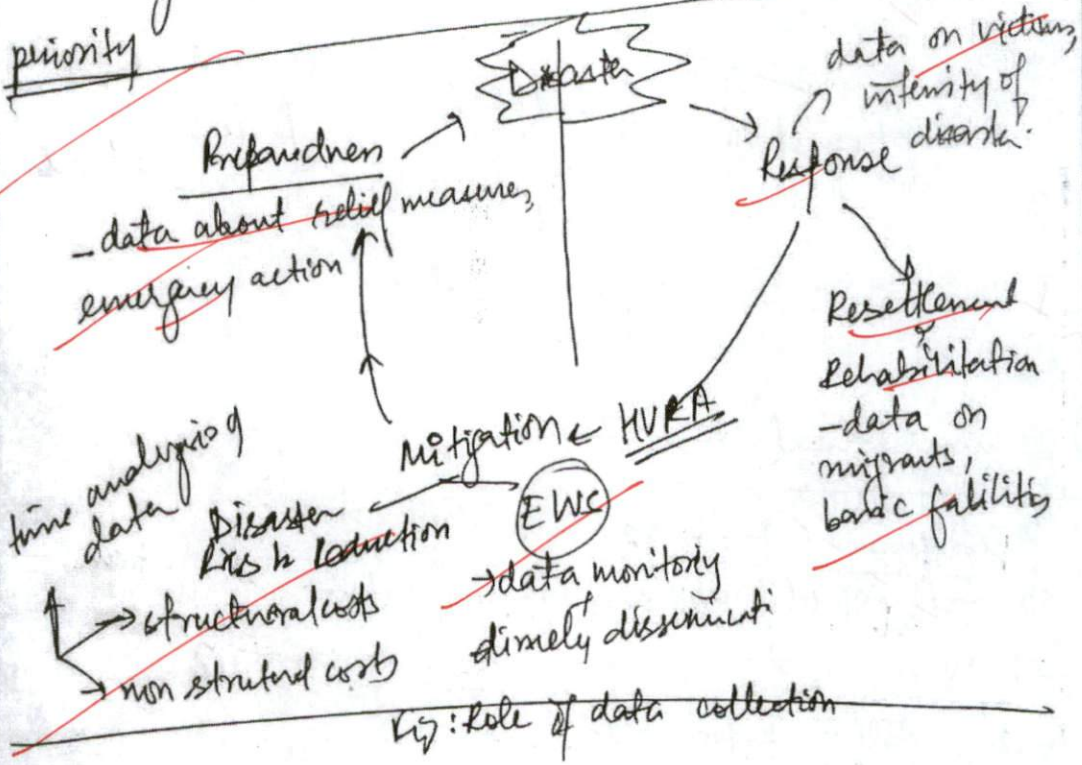


Fig: Role of data collection

For Urban Areas

① common disaster include - urban floods, urban heat waves, landslides in hilly areas, earthquakes etc.

Remarks

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Role of Data Collection in Urban Disaster Planning

According to R.C. Doornkamp, collection of geomorphological information of urban areas is a crucial aspect of urban geomorphology and disaster management

① Hazard Vulnerability Risk Assessment (HVRA) of urban areas

- seismic zone identification
- Floodplain Zonation – based on sinuosity index of meanders.
- Thermal maps of urban heat islands

Hint

refer also

② Demographical Data –

- Settlement patterns and their density
- location of urban slum, extent of urban sprawls and fringe areas to identify vulnerable population

③ Strengthening of Early Warning System (EWS)

→ A strong EWS can only work if there is real time data collection and upgradation.

→ Based on local topography and climate

Remarks

Ex: In India - the lead time between flood occurrence and EWS is about 48 hrs but in UK, the lead time = 5 to 6 days.

Planning of structural interventions, settlement complexes in urban areas also needs geomorphological data based on lithology of rocks, the building materials available and the channel characteristics of floodplain areas.

8

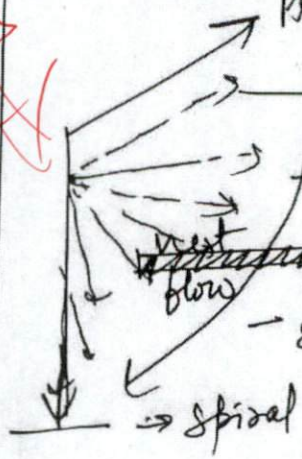
Remarks

Section - B

5. (a) Ekman Transport (150 Words) (10)

Ekman transport refers to net movement of ocean currents due to combined action of winds, friction and coriolis force.

Formation of Ekman transport



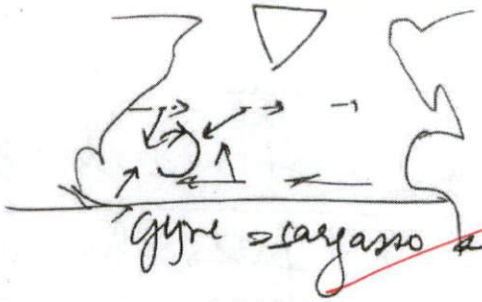
→ Spiral stops at a depth where
- either ocean floor meets
- where the direction becomes opposite

Ekman spiral and gyre formation

Ekman spiral leads to formation ocean gyres (circular motion) of currents.

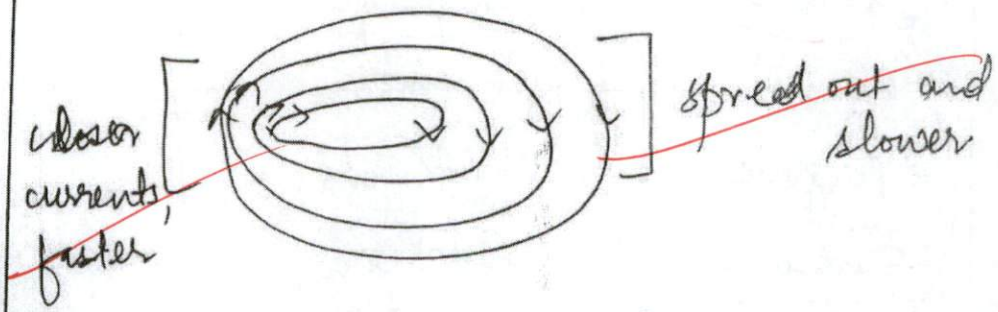
Eg: North Atlantic gyre due to Ekman

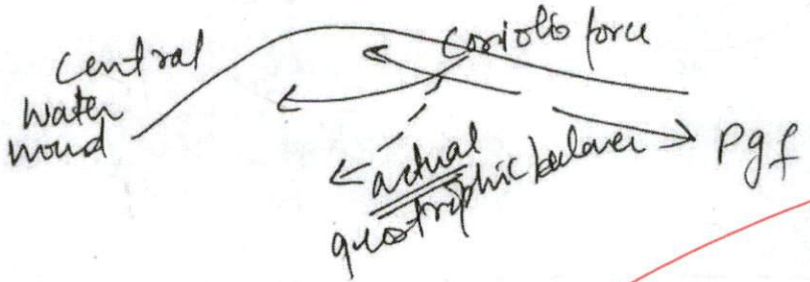
Remarks



Gyre = sargasso sea = due to special type of sargassam weed.

Ekman transport and Western intensification





Thus ekman transport helps in understanding the ocean currents and their movement patterns.

5. (b) Write a short note on 'Development of Palimpsest Landscapes'. (150 Words) (10)

Palimpsest landscapes are those which preserve the details of the past landscapes. They can be related to a particular climate or process.

Process	Palimpsest landscape
- Fluvial	→ Peneplain
- glacial	→ Moraine
- Periglacial	→ Cryoplains
- Semi-arid	→ Etchplains

Palimpsest landscapes are vast, planar surfaces without any significant relief features.

Development of Landscapes from Palimpsest

① According to Hutton, the present is the key to the past

② Hence, Davis utilisized this concept and devised a technique of denudational chronology

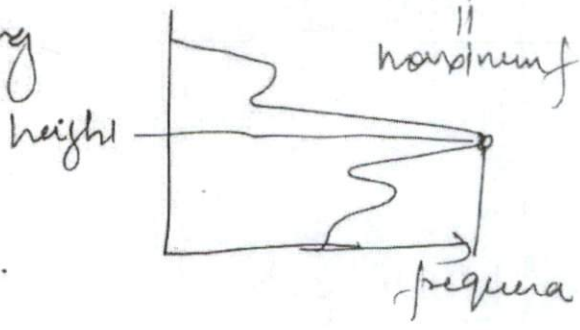
Remarks

Palimpsest landforms ⟹ studied: dated, analysed ⟹ Find out the original landscapes.

Methods used in the Study of Palimpsest Landscape

① Physical identification

② Altimetric Mapping



③ Cross sectional studies.

Palimpsest landscapes though help in reconstruction of past geographies (Historical Geography) yet are difficult to study due to tectonic or climatic modification

Remarks

5. (c) Write a short note on different relief features on the earth's surface with suitable examples. (150 Words) (10)

Relief features features to upstanding features of the earth's surface.

Orders of Relief

1st order	2nd order	3rd order
- continents	- mountains, Plateaus, Rifts, Ridges	→ Erosional features. like plains, gorges etc.

Deper

1st order features

① continents - formed around 3500 mya due to microcontinent evolution and subsequent evolution by Plate tectonics

Eg: formation of Gondwanaland → Drift of Indian subcontinent → Merge with Angaraland

Ocean

2nd order Reliefs

① Formed due to endogenetic forces of folding or faulting

Remarks

- generally formed on top of 1st order reliefs

Ex: Formation of Himalayas
- over the Indian Plate (1st order)
- Convergent boundary - C-C collision
- compressive forces.

3rd order
- Formed over the 2nd order reliefs.
- Due to isogenetic process

Ex: Formation of Valleys, gorges, mushroom rocks etc

Just like reliefs on continents, ocean bottom also has relief features like the mid ocean ridge, Abyssal Hills, sea mounts, guyots etc

Relief studies can help in settlement planning and disaster risk assessment.

Remarks

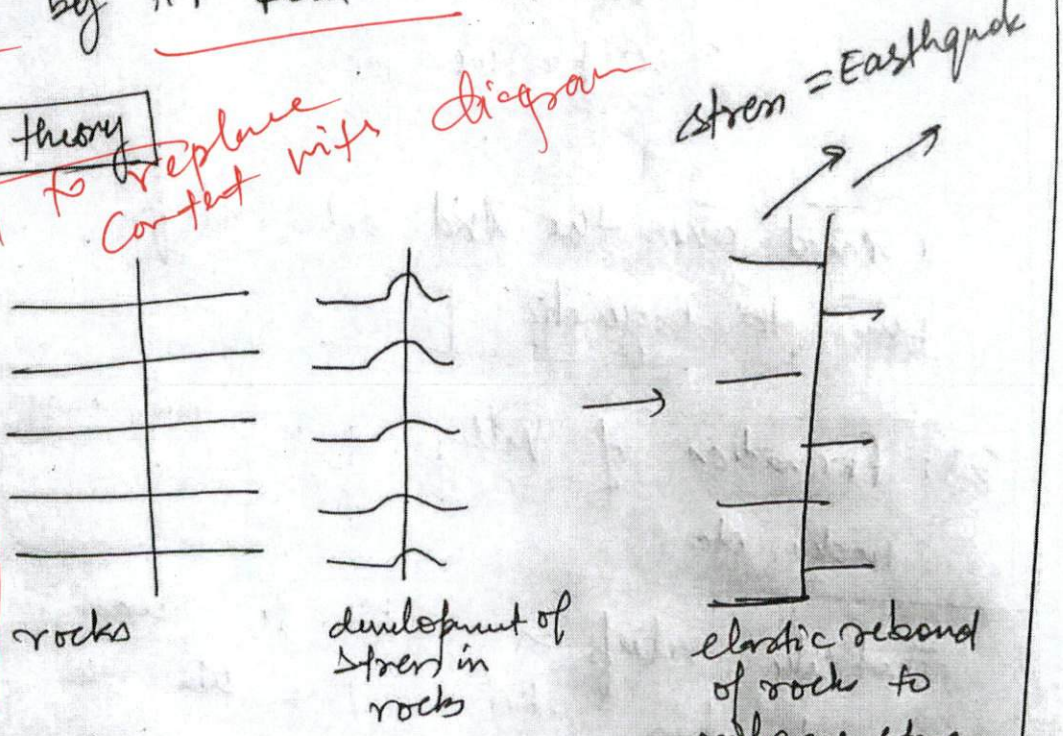
GS SCORE

5. (d) Elastic Rebound Theory of earthquake. (150 Words) (10)

Elastic Rebound theory of earthquake was given by H.F. Reid.

The theory

Don't try to replace Content with diagram



Analysis :-

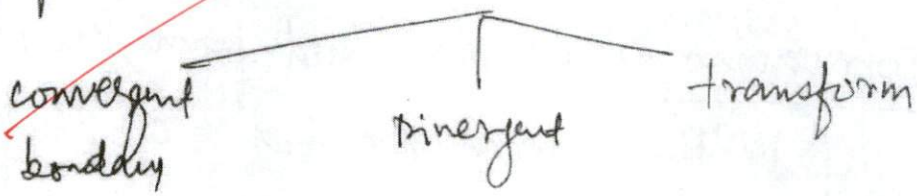
① The basic premise about development of stress in rocks holds true till date.

② However, release of energy by elastic rebound has been a faulty description of earthquake

Remarks

Modification to Rebound theory

① The Plate tectonic theory by Mackenzie and Parker explained earthquake as a result of plate interaction



② the intensity of earthquake is related to the depth of the focus / origin

- shallow – 70 km → strongest
- Mid – 70 – 300 km
- Deep → > 300 km → weakest.

Elastic rebond theory provided beginning of earthquake theories. It eventually was improvised and now earthquake planning can be done based on study of rock structure and vulnerability.

Remarks

5. (e) Write a short note on 'Ocean deposits'. (150 Words) (10)

Ocean deposits are of various kinds - terrigenous, biogenous, hydrogenous, cosmogenous.

(A) Terrigenous deposits > sourced from land
- Neritic, coarse grained = on shelf
- Pelagic = fine grained = on abyssal plain

3 types

Red Mud	Green Mud	Blue Mud
Fe oxide, Al oxide	Potassium Glauconite	Fe sulphid
Eg: Yellow Sea	Eg: Persian gulf	Eg: Mediterranean

Also: Abyssal clay > 35% of terrigenous
- finely powdered
- Fe rich.

(B) Biogenous deposits - most abundant = 55% of all

Remarks

Siliceous	Calcareous
- Rich in SiO_2 - at all depths, even below calcium compensation Eg: Radiolarian, Diatom	- Rich in $CaCO_3$ - not below calcium compensation - Eg: Foraminifer.

Hydrogenous deposits

↳ Precipitates = Eg PMN - Mn Crystals

↳ Evaporites - Potash & Halite

Cosmogenous.

↳ Eg: Meteors, Asteroids.

Ocean Deposits offer insights as the **paleoclimate** evidence and distribution of lifeforms.

6. (a) Explain the concept of polycyclic landforms and present an analytical study of the polycyclic landforms of any selected region. (250 Words) (20)

Remarks

6. (b) Write the difference between tidal currents and tidal bores. Discuss the importance and utilization of tidal currents. (200 Words) (15)

Remarks

6. (c) Submarine volcanoes need to be monitored in a better manner as they might cause unusual tsunamis and other geo-phenomena, thus wreaking havoc to nearby coastal areas. Comment. (200 Words) (15)

Remarks

7 (a) Any disruption to the abyssal ecosystem of the ocean significantly impacts pelagic and mesopelagic ecosystems. Discuss with respect to deep sea mining.

(250 Words) (20)

Remarks

7. (b) **Compare the views of W.M. Davis and Penck on the cycle of erosion.**

(200 Words) (15)

Remarks

7. (c) 'Channel Types are mainly determined by lithological characteristics of region'. Comment. (200 Words) (15)

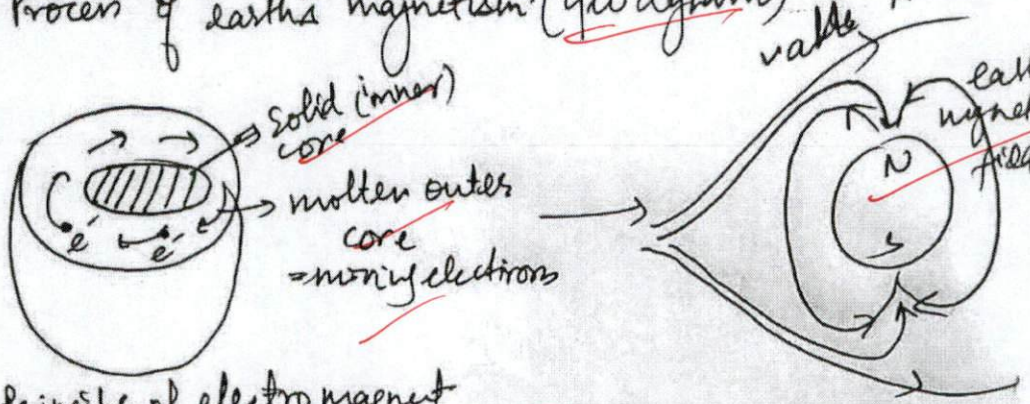
Remarks

GS SCORE

8. (a) What is geomagnetism? Explain and discuss the causes of geomagnetism and also explain how geomagnetism helps us to understand some aspects of the earth's crust? (250 Words) (20)

Geomagnetism refers to the magnetism generated with the earth ('geo'). This property of earth has helped in sustaining life on earth.

Fig1: Procss of earth's magnetism (Geodynamo)



* Principle of electromagnet
— conductor (core = Ni & Fe) placed in electric field (e^-) behave like magnet

(Hussler's Theory)

Causes of geomagnetism

(i) Initially, it was believed that earth's magnetism is due to a strong bar magnet inside it. However this was discarded because at such high temperature the magnet would not sustain

(ii) Eventually, Hussler's theory of GeoDynamo (as stated in fig 1) explained the real reason

Remarks

behind the geomagnetism

Geomagnetism | tool to understand earth's crust

the properties of a magnet – namely → dip; magnetic field strength and polarity have revealed secrets of the crust.

① Evidences of continental drift of the crust

(a) Rocks of an area (magnetic) have a magnetic dip different from that of earth's field in that area. (Paleomagnetic Evidences)

This shows that rocks have migrated over a period.

(b) North pole Wandering Curve

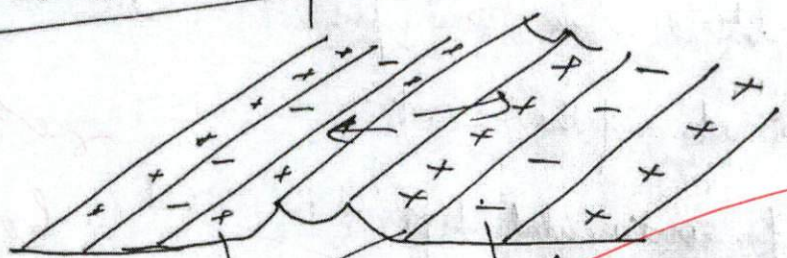
- Plotting of N pole of different continents shows that North pole has moved randomly; which cannot be true
- But when the continents are joined, the path forms a curved N pole trajectory.

② Evidences of sea floor spreading

- Study of the magnetic basaltic rock of ocean

Remarks

floor on either side of the mid-oceanic ridge has helped to understand the magnetic reversals and spread.



Cycle of Reversal

Gaussian
↓
Brunhes
↓
Matuyama.

bands of same polarity on either sid

polarity reversals

Fig: Ocean floor

this has also explained why oceans older than 200mya have not been ~~found~~ found as they have subducted due to continous sea floor spreading.

Geomagnetism is also crucial in protecting the earth from intense solar storm by directing the flares towards poles forming the famous 'Aurora Borealis' and 'Aurora Australis'

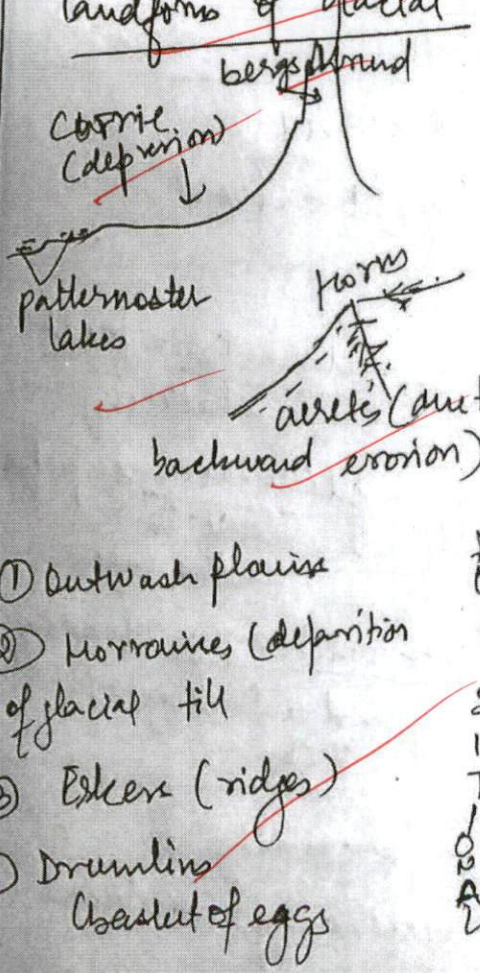
Remarks

8. (b) The landforms formed in glacial and peri-glacial areas vary across space and time despite being proximately located. Discuss. (200 Words) (15)

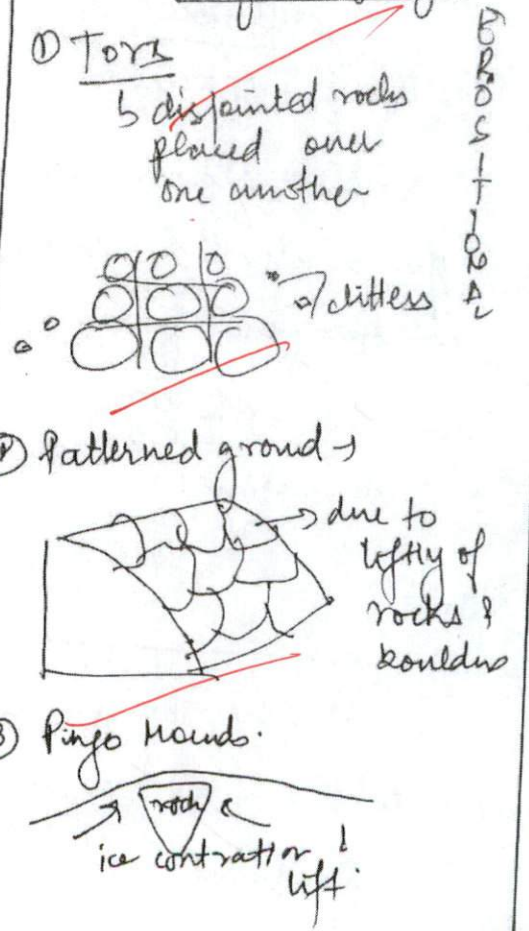
Glacial areas, also called perfrafrost, are those which have remained frozen for atleast 2 years. Periglacial areas form the boundary of these glacial areas.

However the landforms found in these areas differ across time and space

Landforms of Glacial



Landforms of Periglacial



Remarks

Reasons for variation

① Physiographical factors

Glacial Areas	Periglacial
- fully covered with a thick layer of glacier	Active layer: freezes & thaws permafrost (frozen)

② Process operating

Glacial	Periglacial
① Agent = glacier	① Agent = frost
② Process = glacier plucking, glacier attrition, glacial ablation (melt flow) (generally both erosional and depositional)	② Process Congelifraction = frost shattering Congelifluction = superficial flows in active layer Frost heaving = loading and unloading of rocks.

Thus despite being located in proximity to each other, the agent of weathering in glacial and periglacial regions differ significantly.

Remarks

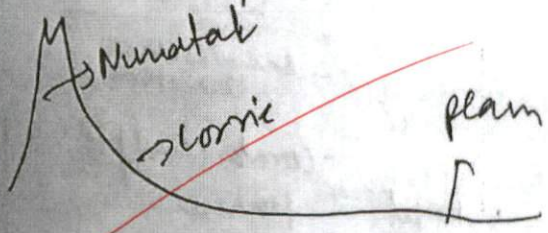
GS SCORE

Identification of glacial and Periglacial landscape

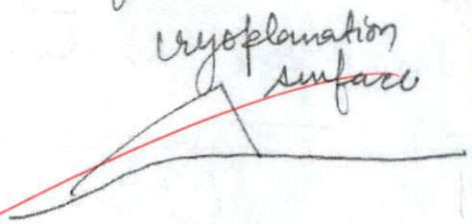
This can be through the diagnostic (unique) landforms of each region as suggested by Peltier in his morphogenetic classification.

Glacial

① Outwash plains, corrie depressions



Periglacial.



However, despite differences, climate change has affected both these areas and their processes.

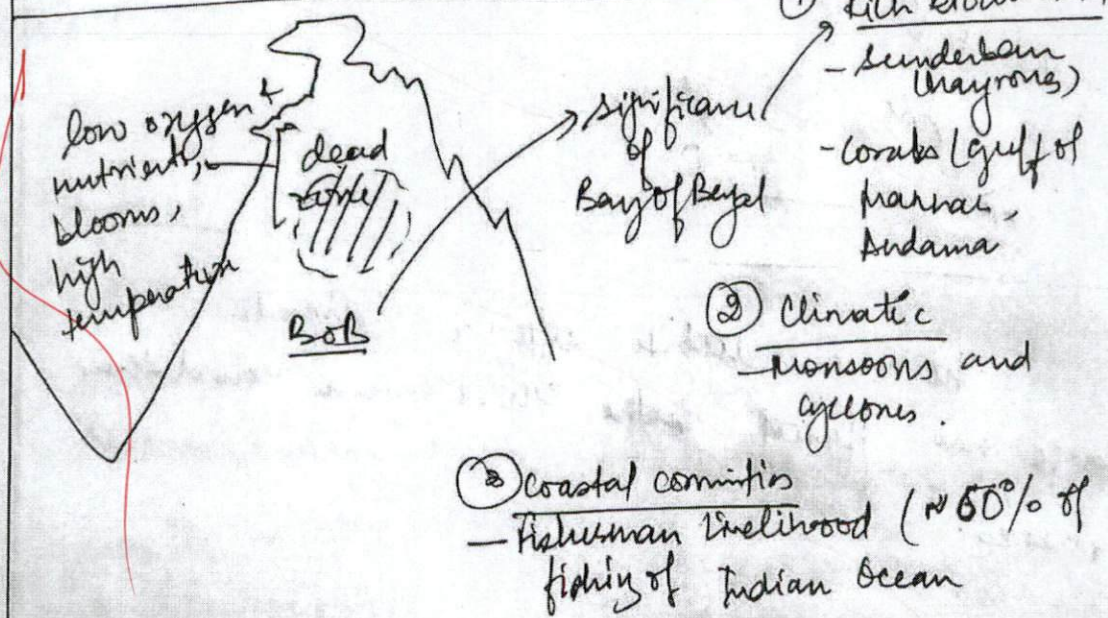
Remarks

GS SCORE

8. (c) A Dead Zone in the Bay of Bengal, nearly half the size of Bangladesh and at depths 70m and below, has been discovered in recent years. Discuss its ecological and socioeconomic ramifications. Suggest lasting remedial measures. (200 Words) (15)

As per the recent report by IPCC, oceans are warming at a higher rate of around 0.7°C globally. this rate is even higher in Indian ocean at 1.3°C. This explains the discovery of recent dead zone in Bay of Bengal.

what is dead zone



Ecological Ramifications

① Impact on biodiversity

- creation of 'hypoxic zones' will lead to harmful algal blooms
- Affect the survival of critical species of

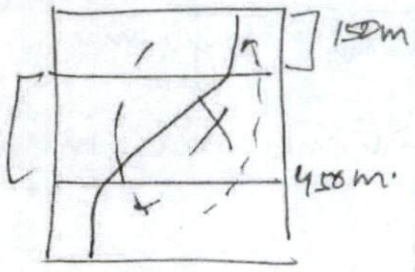
Remarks

GS SCORE

corals found in Andaman, Gulf of Mannar.

(2) Changes in Ocean Water Chemistry
→ Chages in temperature and salinity patterns,

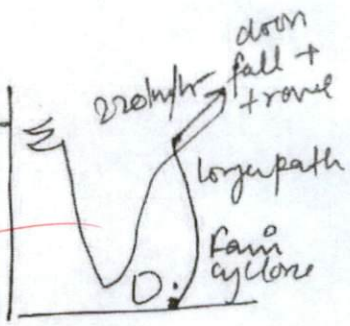
reduces mixing of water & nutrients. ← stronger thermocline =



(3) Chages in climate (SST > 27°C)
- Due to higher Sea surface temperatures → increase in frequency and intensity of Tropical cyclones.

Socio economic Ramifications

(1) Increased disaster vulnerability
- Case: Fani → Duration = October
  b) speed = 220 km/hr
  b) Duration sea = 9-10 days
  Landfall + further moment till 3-4 days



(2) Affect coastal fishing and community settlements which will lead to increased migration due to submergence risks.
Eg: IPCC predicts that by 2100, Kolkata, Chennai to be drowned.

Remarks

The Bay of Bengal links the developing economies of the region like Srilanka, Bangladesh, India, Myanmar. This can lead to deeper economic crisis in such countries.

Remarks