Next IAS ID: MT24GEORA007, GEO001, 02-08-2024 08:15 PM

NEXT IAS

(To be filled by candidate)

Name of Candidate : MANISH

Roll No. : MT24GEORA007 Contact No. .....

e-mail: ——— Date of Examination : 2/08/23

Exam Centre : Old Rajinder Nagar ☐ Online ☑

CSE (MAINS) TEST SERIES-2024

Test-01	GEOGRAPHY OPTIONAL
Dated : 30-06-2024	PAPER - I (SECTIONAL)

Time Allowed : Three Hours | Maximum Marks: 250

QUESTION PAPER SPECIFIC INSTRUCTIONS

(Please read each of the following instructions carefully before attempting questions)

*There are **EIGHT** questions divided in **Two sections** and printed in **ENGLISH**.*

*Candidate has to attempt **FIVE** questions in all.*

*Question No. 1 and 5 are compulsory and out of the remaining, any **THREE** are to be attempted 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.

Attempts of question shall be counted in sequential order, unless struck off. 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 (QCA) booklet must be clearly struck off.

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(For filling by Examiners only)

Q. No.	Page No.	Max. Marks	Marks	Total	Signature
1. (a)	4	10			
1. (b)	6	10			
1. (c)	8	10			
1. (d)	10	10			
1. (e)	12	10			
2. (a)	14	20			
2. (b)	18	15			
2. (c)	21	15			
3. (a)	24	20			
3. (b)	28	15			
3. (c)	31	15			
4. (a)	34	20			
4. (b)	38	15			
4. (c)	41	15			
5. (a)	44	10			
5. (b)	46	10			
5. (c)	48	10			
5. (d)	50	10			
5. (e)	52	10			
6. (a)	54	20			
6. (b)	58	15			
6. (c)	61	15			
7. (a)	64	20			
7. (b)	68	15			
7. (c)	71	15			
8. (a)	74	20			
8. (b)	78	15			
8. (c)	81	15			
Grand Total					

Remarks

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Observations:

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SECTION-A

Write notes on the following in about 150 words each: (10 × 5 = 50)

Q.1 (a) Describe the geomorphic and ecological importance of weathering.

weathering is the physical or chemical breakdown of rocks into smaller pieces.

eg weathering by winds in deserts leading to formation of mesas.

Geomorphic importance

(1) weathering provides the sediments for agencies of erosion.

eg Rock weathering → sediments to rivers

(2) formation & evolution of landforms (Process Geomorphology)

eg congelifraction leading to creation of cryoplain

(3) Provides the basis of sedimentary rocks.

eg weathering of granite sedimentation into gneiss

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Ecological significance

(1) weathering provides sediments & leads to formation of soils.

- Creation of ecosystems
- Primary succession happens on soil

(2) Provides minerals & helps in biogeochemical cycle

eg Phosphorus in Rocks → Soil → Plants → Animals → Soil

(3) Provides essential nutrients to soils

eg Calcium Carbonate rocks → Terrossa and rendzina soils → Calcium Tolerant grass

Thus weathering acts as the bases of all further Process & landforms

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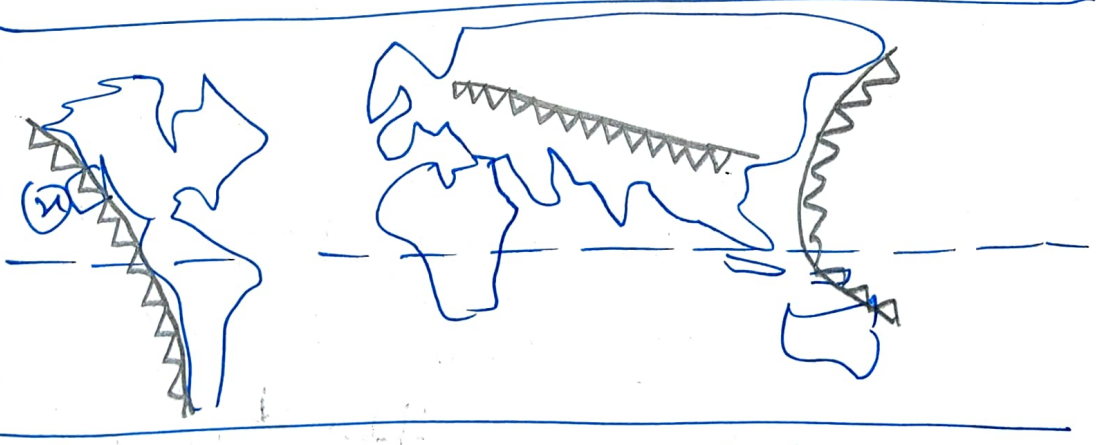
Q.1 (b) Define earthquake and discuss its geographical distribution.

Earthquake may be defined as vigorious shaking of the surface of Earth. It is measured on logarithmic scale - Richter Scale & Moment Magnitue Scale

Distribution of Earthquakes

→ According to Plate Tectonics, Earthquake distribution is correlated to Plate boundary interaction.; mainly found Along convergent Plate boundries

→ Major zones of earthquakes are



(1) convergence zone between Pacific - American & Pacific ~~&~~ Eurasian Plate (Circum Pacific Belt)

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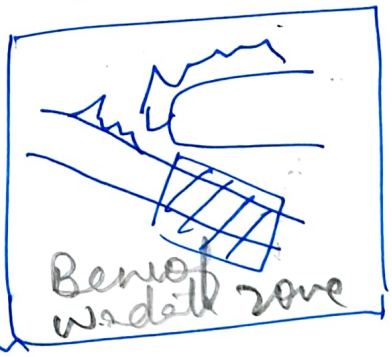
(2) Erosion Mountain chain due to C-C collision boundry between Indian & Eurasian Plate & Presence of Faults (eg Main Central Thrust fault)

eg Nepal Earthquake of 2015

(3) Presence of Transform fold boundaries eg Juan de Fuca Plate (U).

(4) Human induced earthquakes are more evenly distributed along Dam sites & Mining areas eg Zipingpu dam earthquake, Sichuan

(5) Apart from this, there are also deep earth earthquakes at 300-400 km depth along 35° Axis. These are due to mantle dynamism & are called Benioff wadeti zone Eqs



Early warning system (like Japan) & Hazard Mapping are must to mitigate the impact of earthquakes

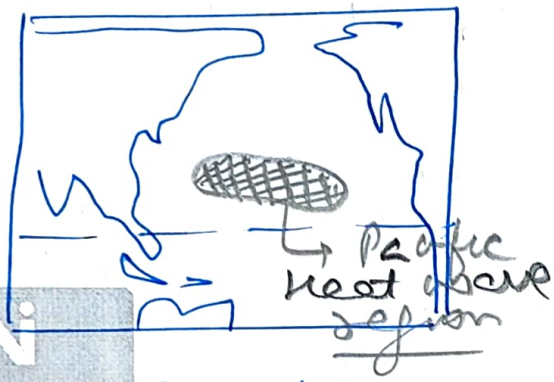
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Q.1 (c) What do you understand by Marine heat waves? Discuss how it impacts the marine ecosystem.

Marine heat waves are regions where localised rise in T°C upto 2-5°C is witnessed for a time period which may extend upto Months

eg Pacific heat wave of 2023



Reasons

- increased solar insolation
- warm ocean currents
- ENSO / IOD events

Impact on Marine Ecosystem

(1) Reduces upwelling & hence nutrient availability to Nekton species in Neritic waters

(2) coral bleaching and Macro Algal regime shift

As per IPCC Special Report on Ocean & Cryosphere, 2°C Rise will lead to 90% of the corals getting bleached. (Stenothermals)

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(3) Increases the frequency of Ocean Extreme events
↓
Threat to coastal vegetation & ecology

(4) leads to Ocean stratification

(5) weakening of Deep Ocean Thermo haline currents

(6) It leads to upward movement of carbon compensation depths & dissolution of calcareous lifeforms like Pteropods & Globegerina.

Therefore, Global cooperation, based on the principle enshrined under Article 192 & 194 of Part XII of UNCLOS (Preventing ocean ecology) must be done.

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Q.1 (d) Write explanatory note on principle of denudation chronology

Denudation chronology is a branch of historical geography which deals with studying, analysing & arranging landforms & erosional surfaces in a chronological order. This was developed by William Davis.

Methods of study

(1) Direct empirical evidence as done by Davis.

(2) Carbon & Radioactive dating of erosional surface

This approach helps in the understanding of Past landforms & Processes based on modern observation. It was inspired by Hutton's concept of Uniformitarianism

The emergence of climatic and Process form Approach by walter

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Penck has undermined this field & it subsided with the death of Davis.

Limitations

(1) overemphasis on role of time in this approach.

(2) As per Thornbury, not much of erosional surfaces are older than Pleistocene times (due to ice age) hence older surfaces could not be studied.

(3) modifications of erosional surfaces by marine transgression, deposition etc.

(4) As per Strahler, Geographers are not trained in historical studies & hence may give wrong result

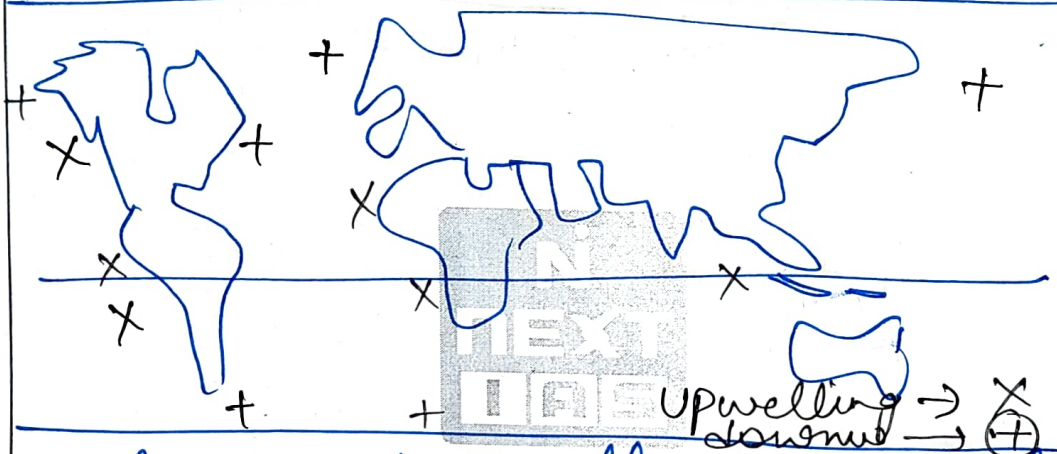
The decline of this historical approach led to emergence of equilibrium & Time independent theories by Gilbert, J T Hack & Schumm.

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Q.1 (e) Describe different types of oceanographic conditions that produce up-welling and down-welling.

Upwelling is the movement of bottom water to the surface due to favourable conditions whereas downwelling is sinking down

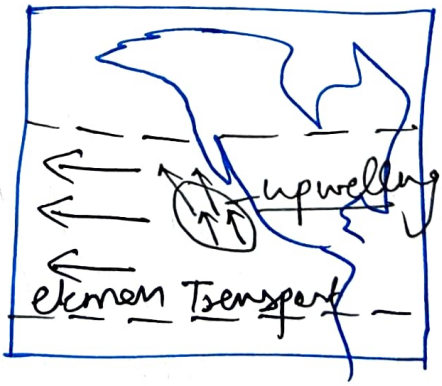


regions of upwelling / downwelling

Conditions for upwelling:

① ekman Transport driven upwelling

Movement of water by Ekman Transport in Tropical waters causes upwelling eg coast

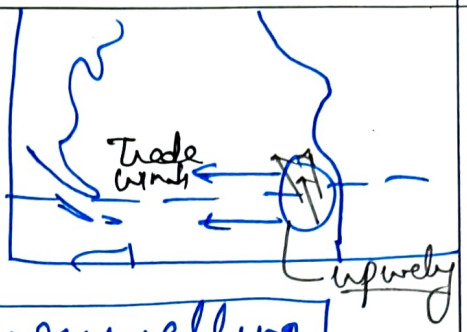


② Divergence induced upwelling

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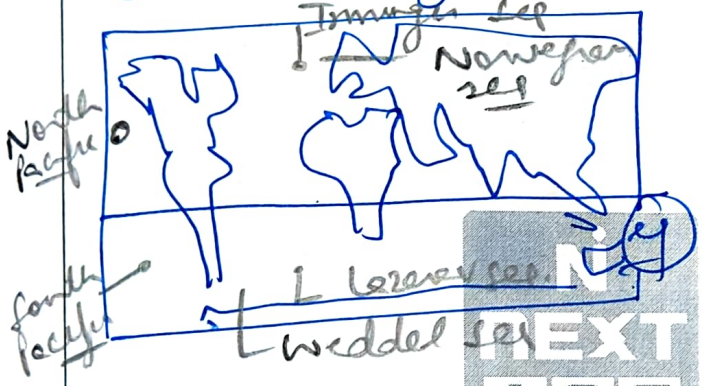
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- Near equatorial regions due to wind divergence by trade winds



Conditions for downwelling

① Brine Rejection → Ice formation & water gets Heavy → Sinks down



Regions of downwelling

② convergence of currents
eg warm-cold currents meet off Newfoundland.

③ convergence of winds
eg off western shores of continents like Madagaskan coast

Upwelling & downwelling helps in Thermohaline circulation, Nutrient distribution etc

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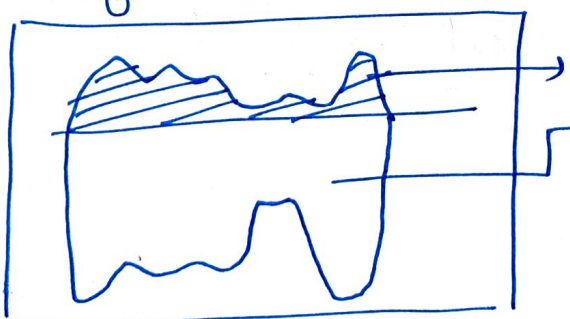
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Q.2 (a) Discuss the concept of isostasy and explain the global isostatic adjustment. [20 Marks]

Isostacy may be defined as the mechanical stability of various landforms on the surface of Earth. It was propounded by Charles Dutton based on works of Bogur & George Everest

concept according to different Scholars

① Airy's view - Sir George Airy believed that landforms are stable because they are balanced by underlying substratum i.e. concept of Floatation. He proposed varying depth with uniform density.



~~density beyond this b~~

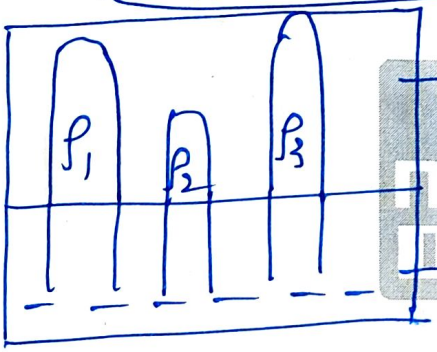
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This idea also resonates in the works of Jolly

(2) Archdeacon Pratt's view: believed in the idea of varying densities with uniform depths. i.e. land-forms stabilised as the mountains are lighter

$\rho_{mountains} > \rho_{plateaus} > \rho_{plains}$



As per Pratt

$\rho_3 < \rho_1 < \rho_2$

→ density beyond the compensation is same

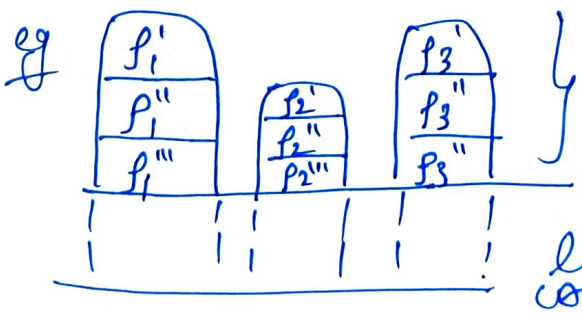
Others

Jolly proposed a plane of compensation

Heford & Bowie proposed a zone of compensation

Heiskanen proposed Horizontal variations in densities of land forms

eg



→ Variation in density horizontally

line of compensation

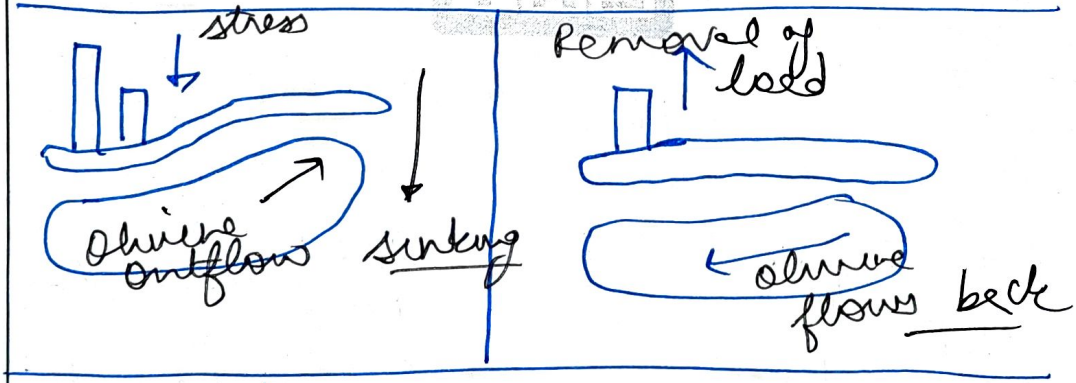
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Modern Tectonics theory and Global isostatic Adjustment

Modern PTT attributes isostacy to the nature of Ovilvine or Peridotite in Asthenosphere.

Earth's surface can be conceptualised as stretched membrane which posses flexturel Rigidity. This gets deformed on application of stress & rebounds on removal of overlying load (Fg)



Thus isostacy is also a regional phenomenon

Evidences of isostatic Adjustments

① Since Pliestocene Age, removal of stress due to ice melting has led to emergent coastlines along

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Scandinavian regions

eg 1 cm rise every 27 years & 900 mts rise Pliestocene ice age

(2) Emergence of canadian shield due to isostatic rebound

(3) Sinking of dem sides due to increased load on land

(4) Reduction in hydrostatic pressure & sinking of coastal cities

eg Mumbai sinking at 2mm/year

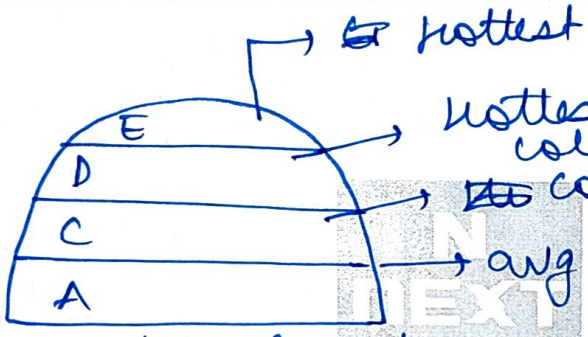
Isostacy helps us understand the geomorphic stability of earth's landforms and hence has many applied aspects in Disaster Planning, Geohazard Mapping etc

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Q.2 (b) Examine critically the drawbacks of Koppen's classification of climates. Explain how Thornthwaite attempted to overcome Koppen's limitations. [15 Marks]

Koppen's climatic classification was based on de Candole's map with vegetation as basis. It was a genetic scheme based on reverse engineering



B = arid climates where net losses were higher

Koppen's classification

Drawbacks

1. very complex and had limited applied aspects
2. does not accound for all factors like impact of winds, ocean currents etc.
3. According to Oliver, it considered environment to be static & ignored climate change.

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(4) could not differentiate between leeward deserts like Atacama & continental Deserts like Gobi. both were termed Bd.

(5) Boundries were abritrary & often very wide

eg Thornthwaite criticised the Polewards boundry of C which covered california to Alaska

Modifications by thornwaite

(1) Thornwaite tried to make his scheme empirical & have applied significance. It was used by USDA in Agroclimatic classification.

(2) Based on Actual field surveys and Precipitation measurements He gave 2 schemes

1931 Scheme

(1) Precipitation Index

(2) Moisture index

1948 Scheme

(1) Included Potential losses

(2) included transpiration losses

or

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Potential Evapo Transpiration

→ Thus minute details like Transpiration losses were also accounted for

→ Based on 1931 Scheme, he categorised world into 32 regions

However this scheme also suffered from many defects

(1) explicit use of symbols criticised by Trewartha

(2) Not possible to draw world map.

(3) dynamic element of climate was not considered

(4) Role of slope, Height etc ignored

(5) over quantification

Methodological shift was brought about by GT Trewartha who blended Genetic factors like Ocean Currents (O-type) with empirical factors

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Q.2 (c) Bring out the relevance of Seismic study in determining the structure of the interior of the earth. [15 Marks]

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Earth's interior consists of density layers due to Nebular Accretion & density stratification which could be understood by

Study of Seismic waves

(1) direct evidence at Trenches
(2) Boring & drilling
(3) Volcanism

Study of Seismic waves

Property of the waves corresponds to density & rigidity of the layers of the earth. Hence by knowing speed of the waves, layers of the earth could be understood

Earthquake has 2 types of waves

Body waves — P type, S type

Surface waves

study of interior

(1) For the first 40 kms, speed is low 4-5 km/second

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corresponding to upper continental crust (felsic)

(2) Picks up speed after 40-45 km corresponding to mafic layers seperated by conrad discontinuity

(3) velocity drops → Mantle low velocity zone (from 7.9 to 7.2 km/s)
This signifies softer olivine and moho discontinuity.

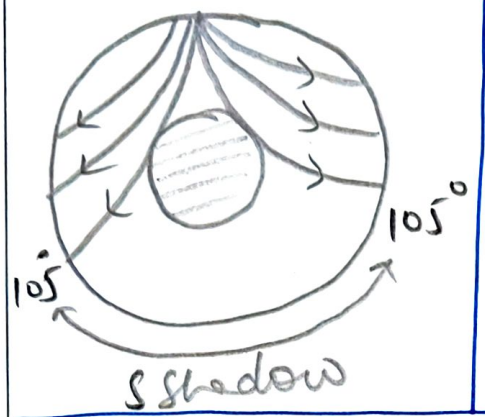
(4) Progressive increase in velocity upto 9 km/s (Mantle high velocity zone)

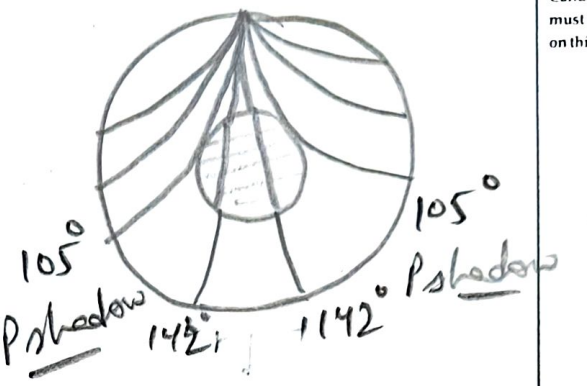
(5) waves keep on bending as density increase to upto 9 kg/m³ in Mantle. The max they emerge is at 105° angle beyond which S disappears. P again emerge at 142° angle

(6) This means that the zone corresponding to 105-142° i.e. 2900-4800 km has to be molten
This explains earth's magnetism

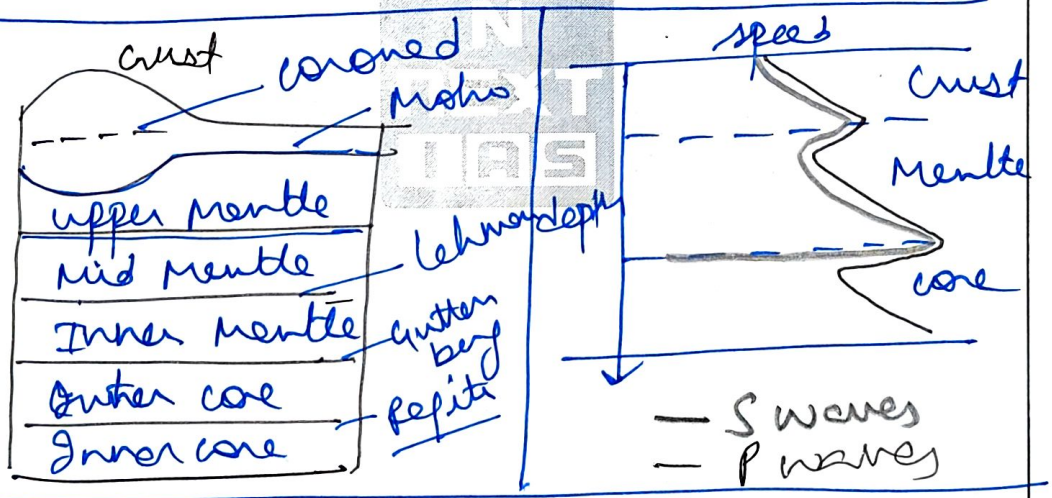
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Thus, earths density layers based on seismic study could be understood As



The evidence of seismic studies have also been validated by modern concepts like Harry Hess's sea floor spreading and Wilson & Pichon's ideas.

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SECTION-B

Write notes on the following in about 150 words each: (10 × 5 = 50)

Q.5 (a) Explain the processes of heating and cooling of the atmosphere.

Atmosphere acts as a closed system & maintains its heat balances by internal processes & distribution

Heating of Atmosphere

(1) Incoming Solar Radiation is the main source of heating.
Solar constant = 1.9 calories/second/m^2

(2) This Radiation is Absorbed by Atmosphere directly (14%) as Shortwave radiation

(2) 34% of this radiation is absorbed by Atmosphere as outgoing long wave radiation after reflecting the surface of earth.

Mechanisms → Radiation
→ Advection
→ Sensible Heat Exchange (Evaporation)

The heating is due to trapping of heat by Particulates & Greenhouse Gases like CO_2, CH_4 etc

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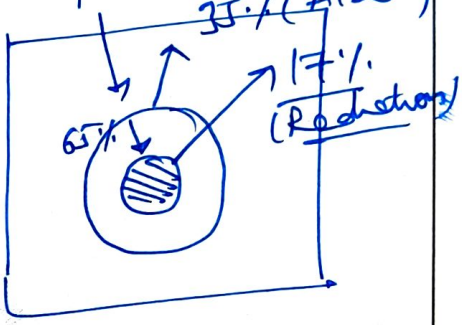
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Cooling of Atmosphere

(1) Atmosphere cools mainly by direct radiation to outer space
17% of heat is radiated directly to outer space

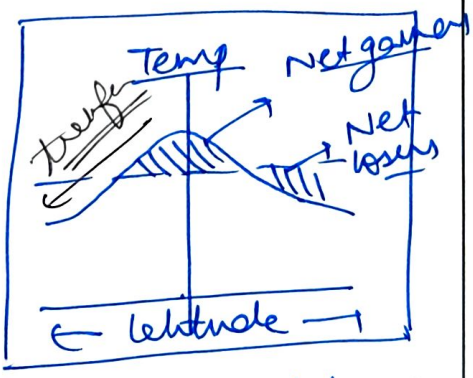
(2) Albedo from surface

(3) Sensible heat exchange between various environmental layers



Therefore environment maintains its heat balance by managing outgoing & incoming component however, the balance is not instantaneous.

- Transfer of heat from net gainers to net losers is also an important part of cooling



of late human beings have altered this budget considerably

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Q.5 (b) Write short note on Desert Ecosystem.

Ecosystem is a interdependent organisation of biotic & abiotic components in their climate & habitat. It is inspired by Clarke & Berry's System Approach & was given by Tansley

Desert Ecosystem

(1) Desert Ecosystem exhibit very low Species richness and Numbers
- Mammels are less as poorly adapted
- insects & under-ground living animals domineate snakes
- vegetation is scanty

Producers	Secondary	Apex Predator
- Plants like cactus, Keekar etc	- Rats - Ants - Small Mammels	- Vultures - Snakes

(2) Climate & vegetation
- low Precipitation (< 50 cms)
- Dry vegetation which has high sense of tolerance.
- Temperature extremes

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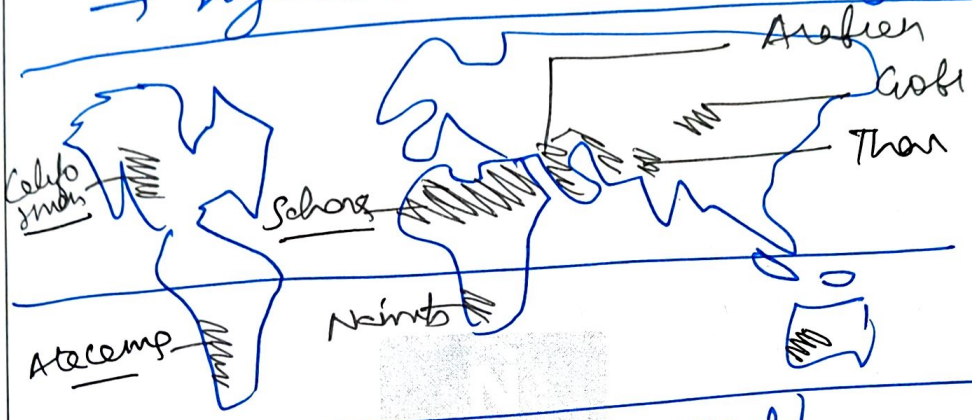
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- Seirogem soils

(3) Distributions

→ Eastern Margins of continents due to offshore Trades

→ Highlands + leeward regions



Major deserts of the world

(4) Economy

Mainly Animal based - Ranching Herding & Animal husbandry

Low Population density

Desert ecosystem are delicate ecosystems and any disturbance can lead to far reaching impacts

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Q.5 (c) Why volcanic eruptions are environmental hazards?

Vulcanism is the ~~solidi~~ formation, movement & eruption of Magma out of earth.

Volcanism

- **Andesitic**
  eg Chimborzo, Krakatau etc
  - Violent / Pelean type
- **Basseltic**
  eg Hawaii
  relatively calm

Volcanoes as Environmental Hazards

(1) Destruction of wildlife & human life due to accumulation of magma
eg Pelean eruption killed the entire forest & human settlement

(2) disbelances earth's Heat budget
eg Krakatau eruption → cooling for 50-60 years → death of Geothermal Plants

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(3) Geomorphic instability
- Volcanoes cause earthquakes and Tsunamis due to vigrous shaking of earth.
- loss of lives, Properties and ecosystem

(4) can cause forest fires and vegetation loss.

However, Not always are volcanoes Hazards

Benefits

(1) release of ~~rock~~ internal heat of earth
(2) formation of landforms & lakes
(3) Provids minerals & soil Nutrients eg cotton soils of Indo.

A geomorphic understanding based on applied aspects is must to mitigate the negative consequences of Volcanoes

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Q.5 (d) Write the short note on paleomagnetism and geomagnetism.

Contrary to



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Q.5 (e) Compare and contrast the terms exogenic process and endogenic process

Process Geomorphology deals with the study of processes on earth which can be classified as

(1) Endogenetic	(2) Exogenetic
Genesis	
(1) residual heat of earth + Radio Active heat of earth	(1) Differential heating of earth + winds & currents
(2) Processes	
I) diastrophism	(1) erosion
II) vulcanism etc	(2) deposition

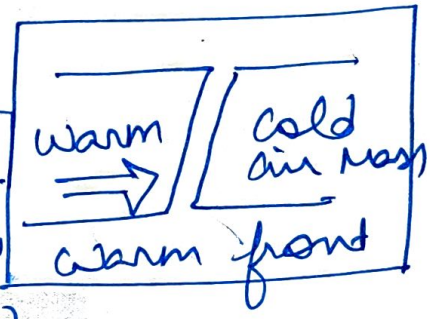
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Q.6 (a) Explain frontal depressions and its associated impacts on weather conditions. [20 Marks]

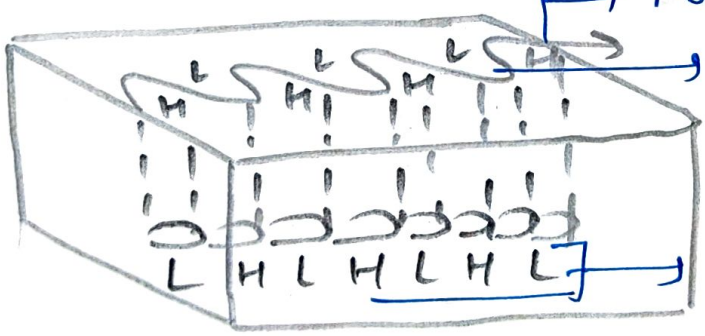
Fronts according to Vilhelm Bjerkens are areas of air mass interactions where gradients of Temperature and Pressure are steepened

Frontal depressions



(1) Frontal depressions are areas of low Pressure (closed loop isobars) that have their origin in upper troposphere circulations. (UTC)

(2) Due to UTC & Rossby waves Index cycles, series of low & high Pressure cells are formed on land & upper Troposphere



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(3) These low pressure cells on surface leads to interaction maritime Tropical (mT) & continental polar (cP) airmass leading to formation of temperate cyclones



Impact on weather conditions

(1) movement of frontal depressions cause atmospheric instability due to higher Environmental lapse Rate.

(2) Genesis of Extra-Tropical cyclones leads to alteration of weather

(1) observation warm frontal airmass, witnesses subsequent rise

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in temperature and fall in air pressure. This is followed by huge bursts of rain due to cumulonimbus clouds but for shortlived conditions

(2) When the observer is in cold airmass, he experience gradual rise in air temperature & fall in atmospheric pressure. This followed by long periods of light drizzle. & eventual clearing of sky.

This eventually leads to a condition of frontolysis or occlusion of front

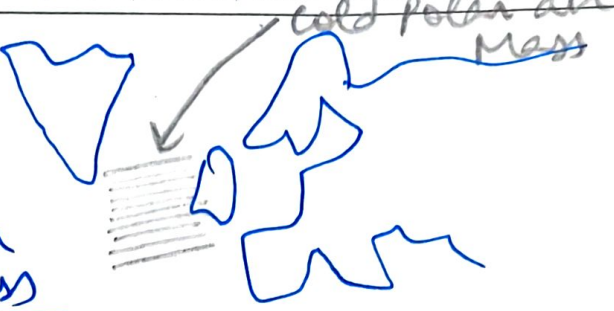
(3) Frontal depressions are also known to cause rainfall in Siberia, characteristics of Taiga climate

(4) interactions between various airmasses also leads to formation of fogs.

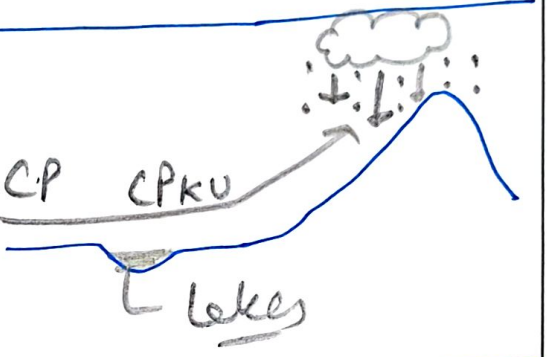
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eg formation of Arctic smoke by CPKU air mass



eg lake effect and orographic rain in the Appalachians



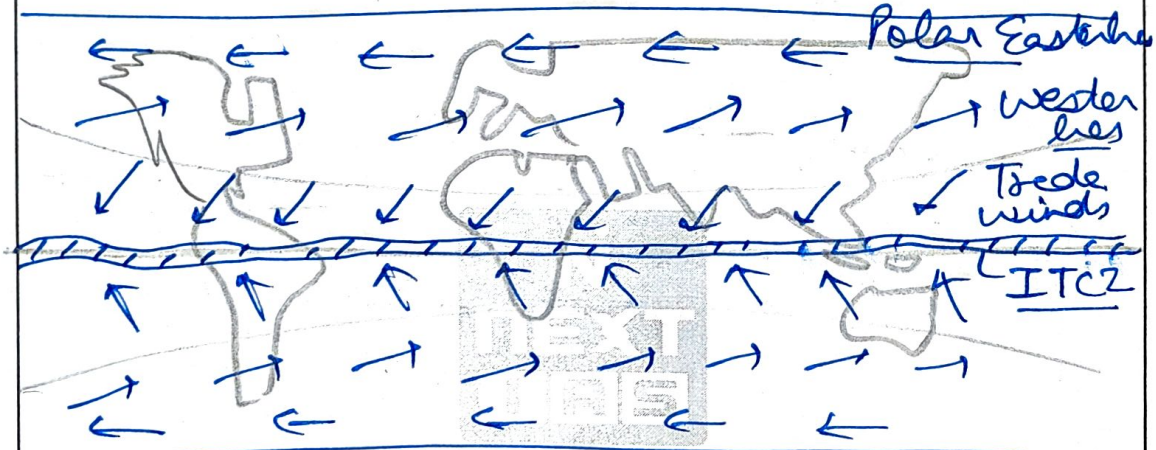
Therefore frontal depressions have profound impact on climate which in turns impact Economy & Ecology of such places

eg foggy regions
- hinders Navigation
- good fishing grounds

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Q.6 (b) Discuss the importance of the ITCZ as a climatic control throughout the tropical regions. [15 Marks]

Inter Tropical convergence zone is a narrow belt of converging trade winds (Tricellular Model of Ferrel) that generally spreads over the geographical equator



Inter-tropical convergence zone

Importance as climatic control

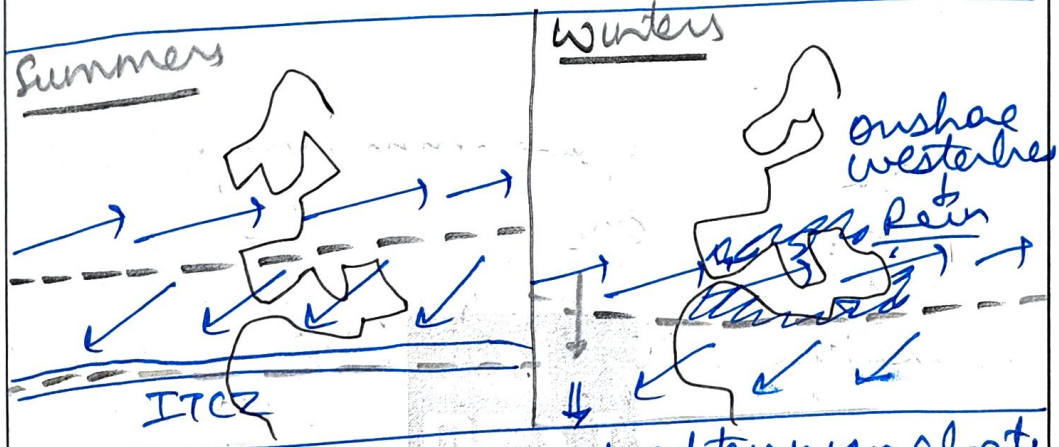
(1) Rising air along the ITCZ on either side (Trade winds) leads to heavy rainfall in Equatorial regions (upto 250 cm) leading to equatorial climates

(2) Shifts of ITCZ North during

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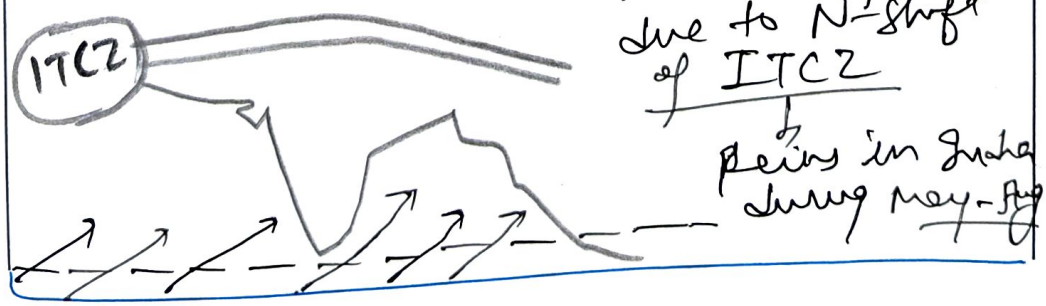
June and South during December leads to shift of Planetary wind belts. This in subtropical regions leads to on shore westerlies & winter Rains (Cs climate)



Role of ITCZ in Mediterranean climate

(3) Role of ITCZ in Monsoon

Shifting of ITCZ over the geographic plains leads to low pressure over them. This leads to seasonal reversal of winds (idea by Faehn)



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(4) The doldrum belt along ITCZ is a zone of calm conditions but often erratic weather as the Trade winds do not mix

(5) Southern shift of ITCZ during December - January leads to Retreat of Monsoon & NE Monsoon over subcontinent

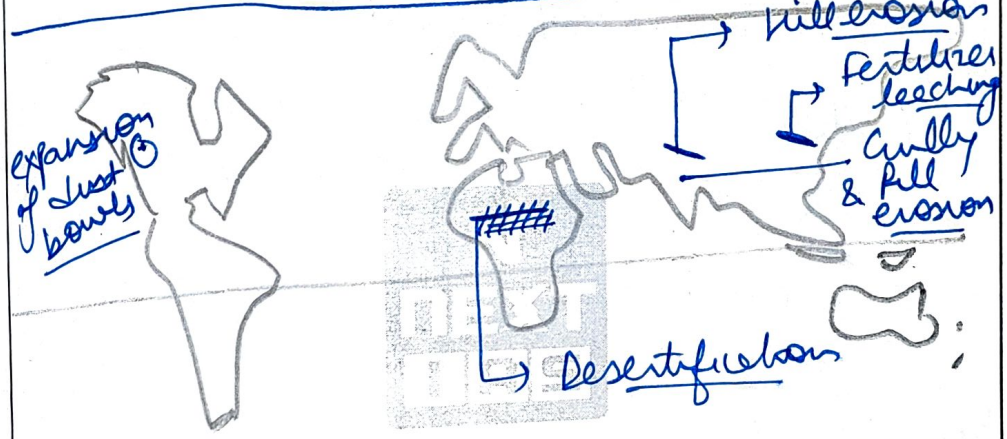
Therefore, the role played by ITCZ highlighted how the global climatic systems operate on the principle of interconnected ness

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Q5(c) Highlight major causes of soil degradation and methods of soil conservation [15 Marks]

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Soil is a biotic resource and a ecosystem which has numerous biological (geochemical cycles), Economic (Resources & Agriculture) & Social significance



Soil degradation Across the world

Causes of soil degradation

(1) Soil erosion by winds leading to desertification. This is further aggravated by deforestation eg Dust bowls of california

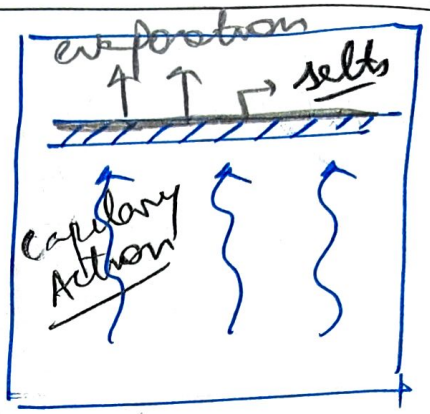
(2) Lateral Ploughing along hills leading to sheet erosion

(3) over irrigation leading to

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Salinisation due to capilary Action of Reh formation in North western Plains in India.



(4) Seepage along canal areas leading to ↑ fluvfldy & erosion

(5) Fertilizers use → case of overuse of Use in Punjab & Haryana

(6) Dumping of Industrial waste

Ways to conserve soil

(1) Structural measures
  (1) Pteropods & fencing as done on coastal areas of Mumbai to Preserve shoreline equilibrium
  (2) Bunds & trees

(2) Non structural measures
  (1) Agroclimatic cropping & water use → to reduce overextraction induced salinisation

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(2) Soil Health Monitoring & Soil Amendments eg Calcium / Lime treatment

(3) Bio & Phyto remediation using bio bacteria

(4) Dryland Agriculture / zero budget Natural farming (Zero Tillage) and organic farming.

(5) coastal soil → using mangroves over corals
eg Pichavaram mangroves shielded Eastern coast during Tsunami

(6) Afforestation by Social and farm forestry → creating shelter belts. As per Stebbles vegetation $\propto \frac{1}{\text{erosive capacity}}$

Thus the above methods can ensure healthy soils which can improve soil organic carbon & ensure land degradation Neutrality

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Q.6 (a) "How do social forestry empower local communities to actively participate in forest management, and what benefits do they bring in terms of livelihood, environmental conservation, and sustainable resource use?" [20 Marks]

Social Forestry aims to leverage the Principle of community Participation to boost forestation and sustainable development

Social forestry

- Farm Forestry along farms lines etc
- community forestry - forestry on community land
- Forestry along roads canals etc

How does it empower

(1) It incentivises community Participation in resource management

(2) leverages & builds social capital

(3) uses legislative means like Forest Rights Act, compensatory Afforestation etc

(4) women empowerment - as it has enhanced focus on women Participation

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Benifits

(1) livlihood

(1) Provisioning of Timber as raw materials

(2) Improves farm incomes eg Kinnow based Social Forestry in Abohar. Abohar, Punjab has augmented Farm incomes

(3) improves agricultural Productivity by ↓ soil degredation & erosion

(2) Environmental

(1) Builds carbon sinks

(2) Fulfils Bonn Pledge and INDC targets of Paris Agreement

(3) Prevents soil erosion especially in dry areas eg Khejri based Agroforestry in Jhunjhunu & Alwar regions of Rajasthan

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③ Sustainable resource use

① based on Principle of community Participation leads to sense of responsibility in resource use → sustainability

② Prevents & compensates for overuse of resources
eg cutting forests for Palm oil
↓
compensating by Social forestary

③ conserves land as a resource & Prevents badland topography

Thus Social forestry can adress numerous challenges and can help us ensure Resource based & community led development

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Q.6 (b) Explain how the hypothesis of sea floor spreading forms the basis of the new theory of plate tectonic. [15 Marks]

Sea Floor Spreading idea was given by Harry Hess during 1930s based on drift idea of Alfred Wegner, Holmes & Challenger Expedition.

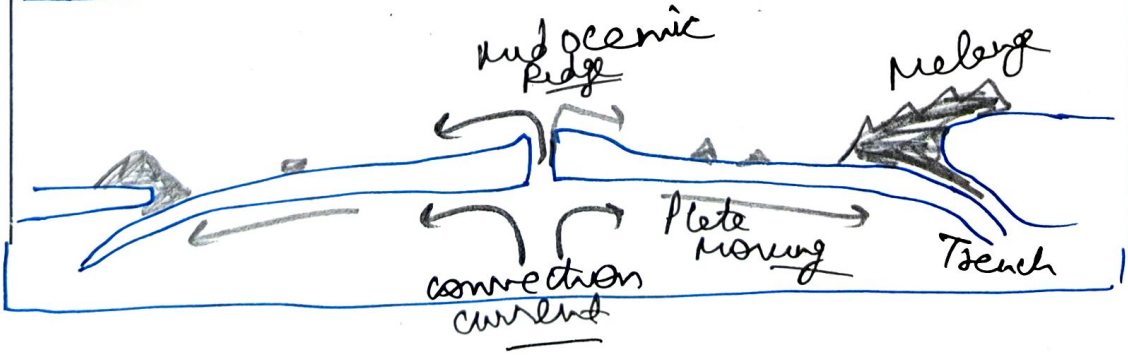
Idea of Sea floor Spreading

(1) Presence of Mid Oceanic Ridge & constructive boundry which creates continents.

(2) These move out & new bassetic crust is formed

(3) The plates are destructed along destructive boundries (Trenches) with formation of Melange, Accrethonary Prisms & Fold Mountains

(4) Later Vine & Mathews, Affirmed bands of Reverse Polarity to validate this idea



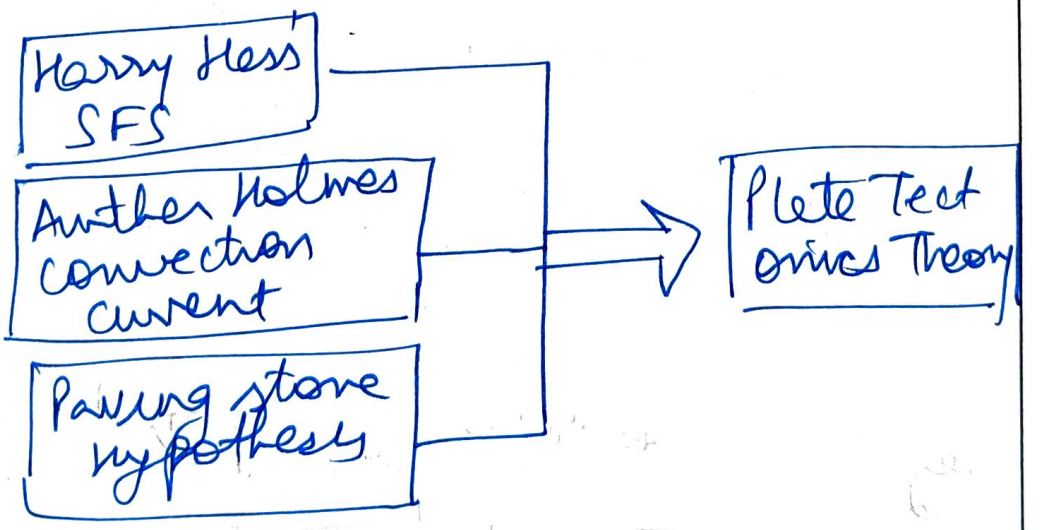
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Basis of New Theory

SFS led to consolidation of various concepts by Morgan & Pichon into Plate Tectonic Theory

1. Harry Hess' idea of SFS refuted contractionist ideas of Harold Jeffrey etc & confirmed drift Mechanism
2. It provided concepts like MOR, Trenches etc which also finds mention in PTT.
3. Unlike Edward Suess Si, Al over Sima, SFS by Hess gave the inspiration that the plates atop are moving & not just the continents



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Therfore it states that the earth is divided into numerous lithospheric plates which move atop divisive sich asthenosphere.

The interaction between these Plates leeds to all the features landforms & Process on the surface of earth

Evidences

- earlier evidences by wegner
  - matching rocks (Dutoit & Bullard)
  - matching life forms like cynognathus & Glossepthis
- Paleomagnetic evidence by irvine & matthews and Brackett (Polar wandering curves)
- Paleoclimatic evidences eg coal fields in temperate regions

PTT also helped solve other defects regarding orgin of Isostacy and Earthquakes

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Q.6 (c) Examine relationship between slope and soil development. [15 Marks]

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Numerous factors play role in development of soil as a functioning unit. These include

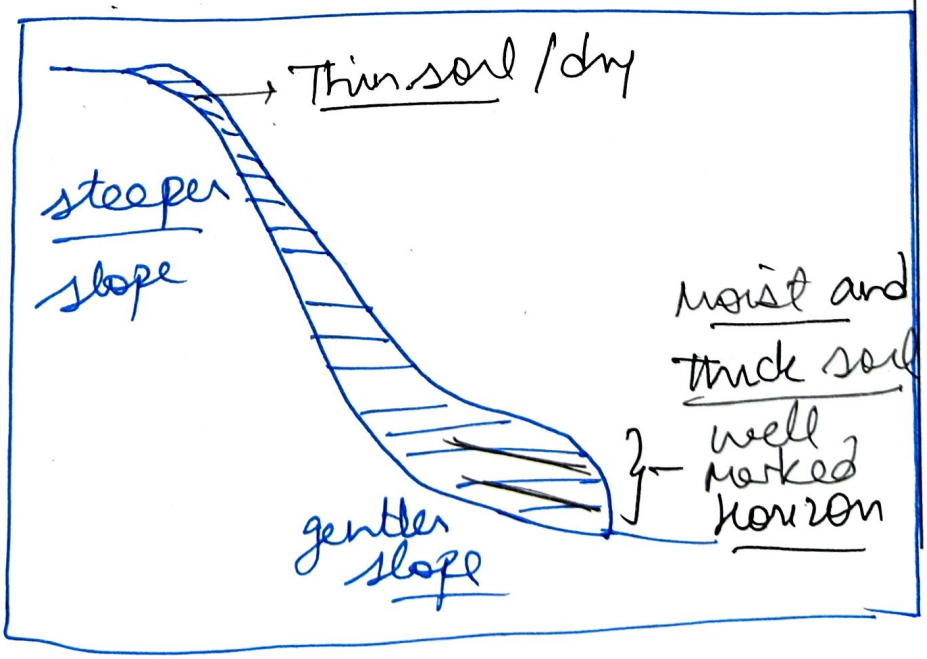
Factors
1. Climate
2. Lithology
3. Time
4. Biota
5. Slope

Processes
1. weathering
2. leterisation
3. Gleyfication
4. Podsolisation
5. Eolian Action

Role of slope

(1) Based on studies of soil catena, it can be concluded that slope angle determines Thickness / Horizon of soil and grain size of soil.

eg



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(2) Slope Angle determines the vegetation & hence Humus content. Gentler slope → more vegetation → More Humus content

(3) According to Strahler's slope Ideas & Morisawa's Tectonomorphic Model, slender slope causes more erosion to attain Equilibrium. Thus, slope impact soil Quality & erodibility

(4) Presence of leeward & windward slopes / or Aspect Uses slopes determines climate & effectiveness of agencies of erosion

Windward side → Rains → vegetation → Humus
Rains → chemical Processes

Leeward sides → Dry → less Humus
→ wind regulated erosion.

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Hence, slopes have important role in soil development. Consequently, Presence & absence and type of soil & regolith also impact slope stabilisation and associated geomorphic hazards