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GENERAL STUDIES (TEST CODE : 1488)

Name of Candidate	**Shreya Shree**		
Medium Eng./Hindi	**English**	**Registration Number**	**850984**
Center		**Date**	

INDEX TABLE

Q. No.	Maximum Marks	Marks Obtained
1	12.5	
2	12.5	
3	12.5	
4	12.5	
5	12.5	
6	12.5	
7	12.5	
8	12.5	
9	12.5	
10	12.5	
11	12.5	
12	12.5	
13	12.5	
14	12.5	
15	12.5	
16	12.5	
17	12.5	
18	12.5	
19	12.5	
20	12.5	

Total Marks Obtained:

Remarks:

INSTRUCTIONS

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

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. What do you understand by the phenomenon of El-Nino? How does it influence the Indian Monsoon? [12.5].

El Nino refers to the phenomenon of occasional warming sea surface temperature around South Pacific Ocean [Peru, Ecuador]. It usually occurs around Christmas and lasts for a few weeks to a few months.

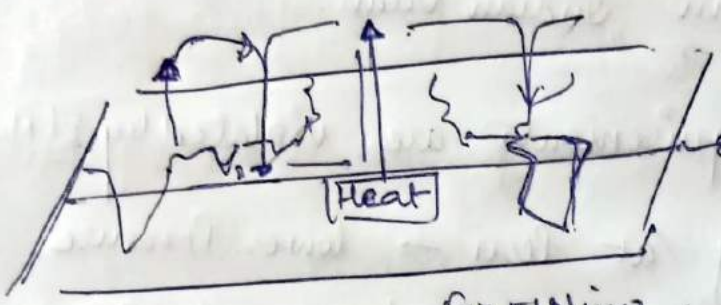


fig El Nino.

Features:

- weaker than usual surface winds across tropical Pacific
- Warmer ocean temp in Pacific
- High surface pressure, dry conditions in SE Asia.
- Low P area around S America, Africa.

Impact on Indian Monsoon

- Requirements of a normal monsoon
  - ↳ High P/o Pressure at Peru than Australia; SE Asia
  - ↳ Warmer Indian Ocean.
  - ↳ much lower pressure on Indian land than Indian Ocean.

→ These requirements are violated by El Nino

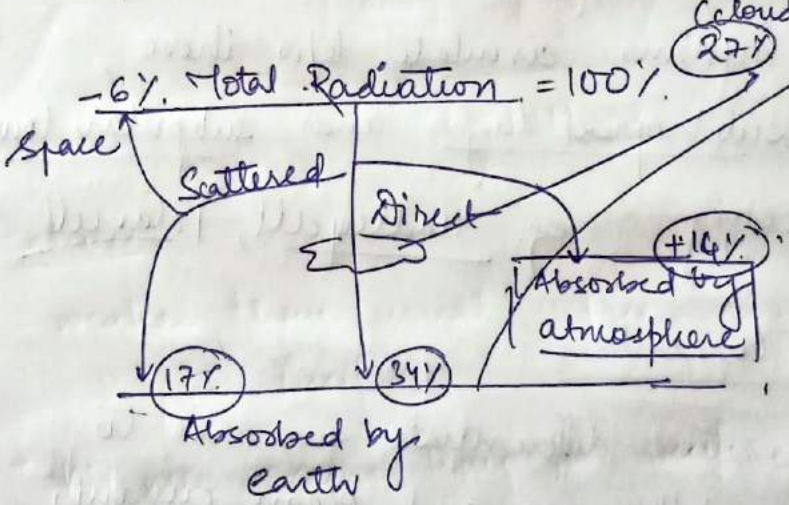
- ↳ Warming at Peru → lower Pressure
  - → direction reversal/weakening of trade winds
- ↳ Moisture laden winds flow away from Indian Ocean towards S. America
- ↳ High pressure conditions lead to dryness and low rainfall in Indian subcontinent

→ Thus ElNino is associated with water shortage and droughts due to below average rainfall in India.

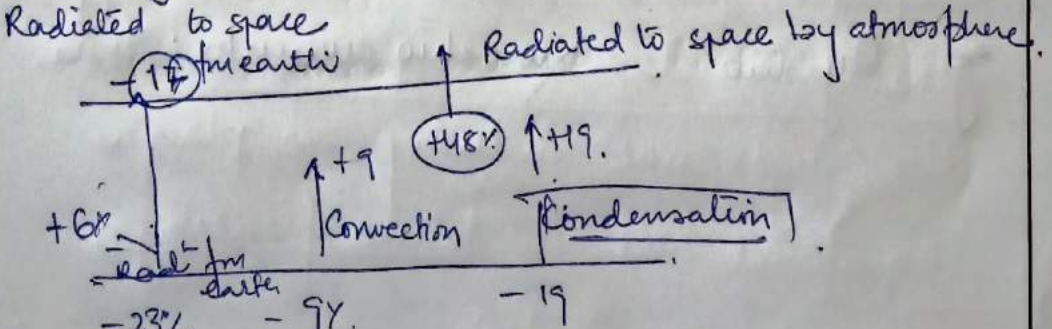
Q2. Illustrating the heat budget of earth, explain the mechanisms through which redistribution of heat takes place b/w latitudes on earth. (12.5).

Heat budget of the earth refers to the amount of radiation absorbed by the earth and its atmosphere. It provides an explanation about the near constant average temperature of the earth.

Short Wave Heat Budget.



Long Wave Heat Budget.



Redistribution of heat across latitudes

(1) Atmospheric Circulations.

→ High temperature surplus at equator and Deficit at poles gives rise to low pressure & high pressure areas respectively.

→ Wind systems circulate b/w these, with subtropical highs and subpolar lows intervening. eg. Hadley cell, Polar cell

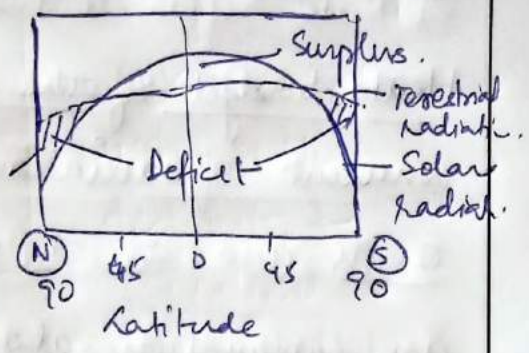


Fig. Latitude distribution of heat Budget

(11) Ocean Currents

- Temperature differentials give rise to density differences. and ocean currents equalise these.

eg: Oyashio & Kuroshio currents.

प्रश्न संख्या (Question No.)

U.P.S.C.

9:50

इस भाग में कुछ न लिखें (Don't write anything in this part)

Q3. Give a brief account of location of sugar industry in India. (12.5).

In 2018, India beat Brazil to become the largest producer of sugarcane. The sugar industry in India is based on both sugarcane (80%) and sugarbeet (20%).

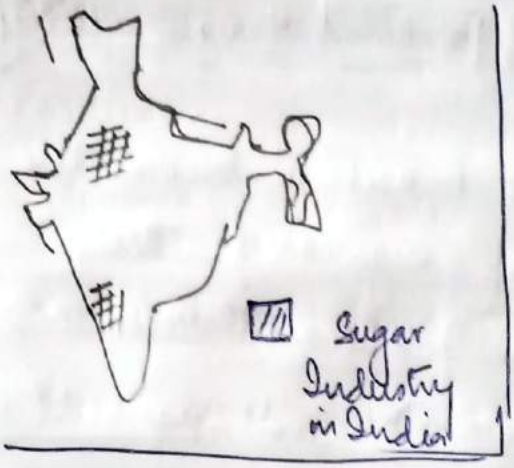
Location factors.

(i) Weight losing raw material. →
located close to sugarcane producing areas.
ie. Punjab-Haryana and
Maharashtra-Karnataka belt.

(ii) 2 varieties
↳ Tropical:- in Southern India.
↳ more juice-produced.
↳ Temperate: in Northern India
↳ withstands difficult climate.
(Cold waves & heat waves)

(iii) Labour intensive
↳ in areas where cheap immigrant labour is available

(iv) Seasonal industry — harvest seasonal in north India.



(v) Highly water intensive crop
↓
concentrated in areas with electricity & irrigation.

(vi) Short crushing season in North India → shifting to South to have year long crushing season.

Challenges.

(i) Low sucrose content of Indian varieties
(ii) Poor yields.
(iii) Groundwater overexploitation
(iv) Lack of modernisation → stagnant profits.

The Govt of India envisages increasing the ethanol blend levels in petroleum. Thus, the sugar cane industry can play a significant role in future of energy security in India.

7:45'

Q4. Giving a brief account of temp distⁿ of ocean water, highlight the factors responsible for the same. (12.5).

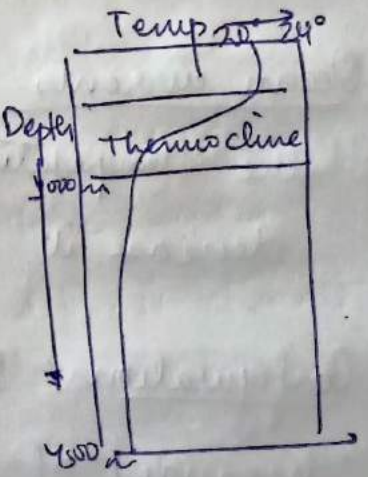
The specific heat capacity of water is higher than that of earth. Combined with the convection in large ocean masses, this results in slower heating and cooling of ocean water than surrounding land.

Temperature Distribution.

(1) Latitude wise: waters near the tropics are the warmest, with decreasing temperatures at poles and equator both.

(2) Vertical distribution

The temperature of ocean water at surface is higher. Thermocline is the region of sharp drop in temperature.



Factors :

(i) Latitudes – decreasing insolation towards the poles

(ii) Distribution of land – Northern hemisphere has more land → more heat absorbed → higher average temperatures than southern hemisphere (19°C v/s 16°C).

(iii) Wind : Offshore ~~Land~~ breeze . cause upwelling and decline in temperature close to coast.
Onshore winds lead to ↑ in temp at coast.

(iv) Ocean currents : Warm currents increase the temperature while cold currents decrease it .

(v) Configurations : Enclosed seas are warmer because of less mixing .
Eg. Mediterranean

प्रश्न संख्या (Question No.)

U.P.S.C.

6:40

इस भाग में कुछ न लिखें (Don't write anything in this part)

Qs. Highlight the characteristic features of equatorial vegetation, explain why these regions remain largely underdeveloped. (12.5).

Equatorial regions are found between 5° - 10° N and S of equator, with largest extent in Amazon, Congo and Malaysia

Characteristic Features of Vegetation

(I) Tropical rainforests due to high rainfall and temperature

(II) Evergreen vegetation, as no dry season

(III) All round growing season.

(IV) Multiple variety of vegetation

↳ mahogany, ebony, mangrove, ~~greenho~~

(V) Presence of epiphytes as sunlight unable to penetrate canopy.

(VI) Distinct stratification of trees; with very thick canopy

(VII)

Highly Underdeveloped Regions

(i) Dense vegetation → lumbering unviable.

(ii) Poor soil quality due to leaching → low productivity of agriculture

(iii) General low availability of minerals

(iv) Sparse populations → low growth of urbanisation or industrialisation.

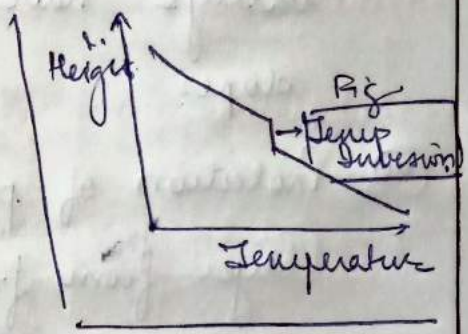
Thus, equatorial vegetation is shaped by the equatorial hot and wet climate with two rainfall peaks. The economy remains underdeveloped.

6:50

Q6. Define the phenomenon of temp inversion. What are the factors for it to take place? Also, enumerate its prominent effects. (12.5).

When temperature deviates from usual trend of decrease with height and instead increases with elevation, it is called inversion of temperature.

Factors for temperature inversion.



(A) Surface inversion
- ↳ long winter nights with cloudless skies
- ↳ dry air, low R_H.
- ↳ Calm atmosphere.
- → disappears with sunrise.

(B) Upper air inversion
- ↳ Eddies in water leads to upward transport of warm air.

(C) Frontal inversion
- ↳ due to horizontal, vertical movement of air.

↳ overlying of warm air over cold air in case of temperate cyclones.

Effects of Temperature Inversion

① Promotes stability in lower layers of atmosphere & traps smoke, particles etc.
↳ eg. Smog in London ~~1949~~ 1952.

② Air drainage in hills and mountains → valleys have colder air than slopes.

③ Protection of plants in the upper layer from frost damage

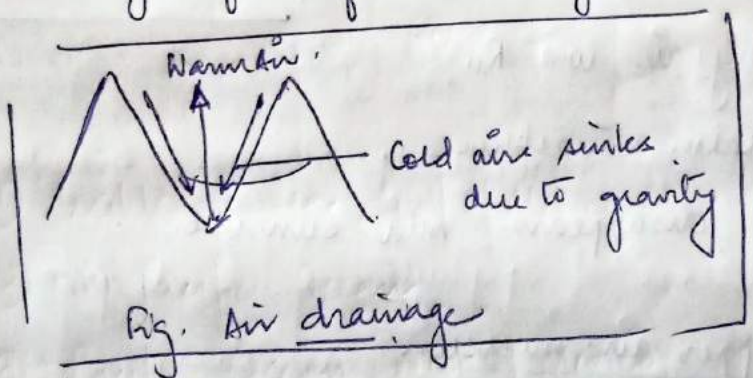


Fig. Air drainage

Thus temperature inversion is both beneficial and harmful.

Q7. Explain the formation of tropical cyclones. Also, illustrate the global distⁿ of these cyclones. (12.5).

A tropical cyclone is a low pressure system over tropical or subtropical waters, with organised convection. The winds at lower level rotate clockwise (Southern hemi) or anticlockwise (Northern hemi)

Formation of Tropical Cyclones.

(A) Conditions.

- Sea surface temperature (SST) > 27°C.
- High moisture content in atmosphere
- Presence of coriolis force.
- Pre existing weak L.P area
- ~~Calm weather~~ conditions
- Upper air divergence above sea level.

(B) Process.

(i) Release of energy from condensing of cumulonimbus clouds.

(ii) Continuous supply of moisture

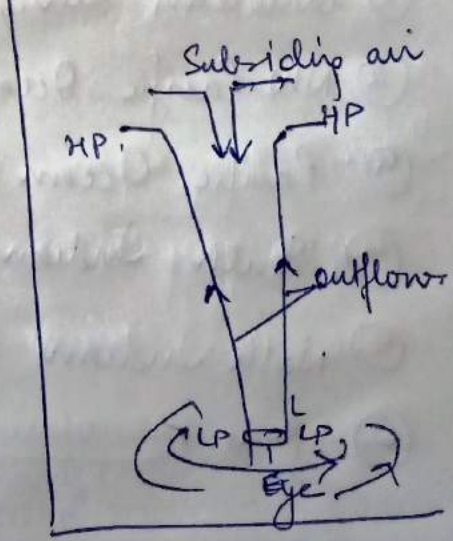


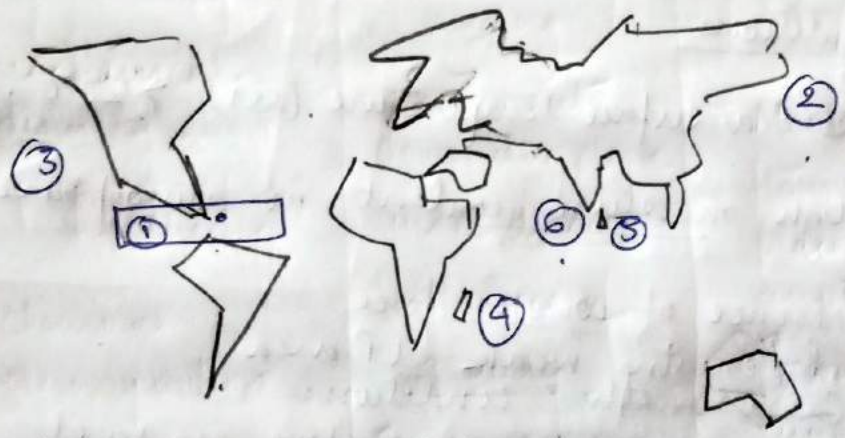
fig Tropical Cyclone

from sea ⇒ strengthening of cyclone.

(iii) Mature phase: strong spiral winds around 'calm centre 'eye'

(iv) Dissipates after landfall because water and hence supply of moisture is cutoff.

Global Distribution



(1) Caribbean Sea, Gulf of Mexico.
(2) NW Pacific Ocean
(3) Pacific Ocean west of Mexico
(4) South Indian Ocean (Madagascar)
(5) North Indian Ocean & Bay of Bengal
(6) " " & Arabian Sea.

Q8. What are geomorphic processes? Briefly describe different types of geomorphic processes. (12.5)

Geomorphic processes are those that affect the formation of or modification of land landforms on the surface of earth.

These are mainly categorised as :-
(A) Endogenic and (B) Exogenic.

(A) Endogenic Forces

- These are internal forces that create new landforms.
- Forces of construction

- Endogenic
  - Slow
    - Epeirogenic
      - vertically acting
      - uplift / downwarps of continents
    - Orogenic
      - mountain building processes
      - formation of secondary relief
  - Sudden
    - Earthquakes
    - Volcanoes

(B) Exogenic processes

- Act on external surface of earth
- Forces of degradation
- Determined by 3 factors - pressure, temperature, humidity.

- Exogenic

Weathering	Mass Wasting	Erosion, Deposition & Transportation
- mechanical disintegration (physical weathering)	- movements down the slope under direct influence of gravity.	- Movement from one place to another
- chemical decomposition	eg. landslides	- eg. wind, running water

Thus, geomorphic processes shape the topography of earth which plays vital role in human geography and thus economic development.

Q9. With the help of diagram, give an account of various landforms resulting from intrusive & extrusive igneous activities. (12·5).

Igneous activities result from movement of magma within and above the Earth's crust. The Magma is basically molten rock from the earth's mantle.

Intrusive landforms.

- Landforms formed due to magma freezing within the surface of the earth.

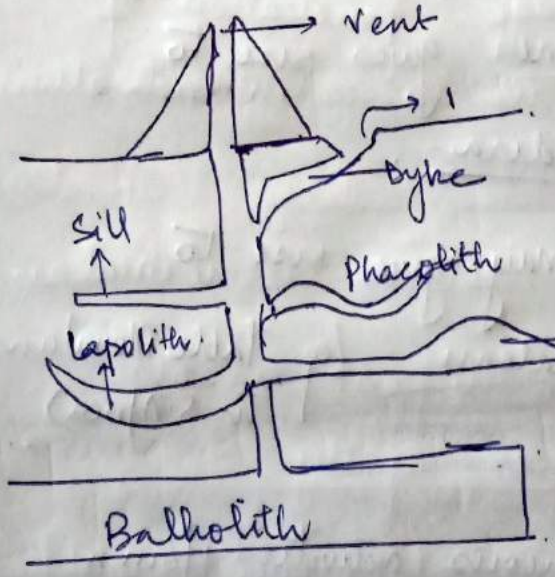
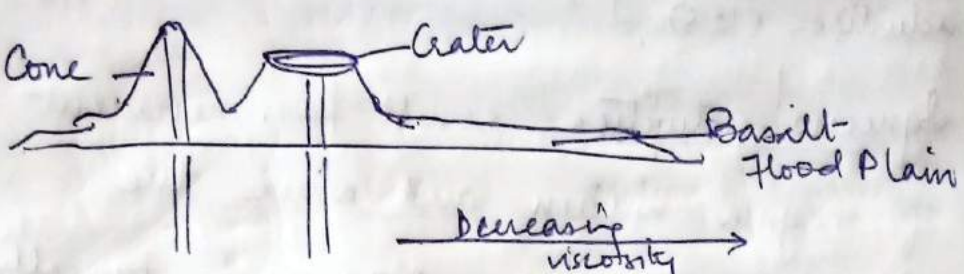


Fig Intrusive landforms due to magma.

The intrusive landforms depends on viscosity of magma and hardness of intervening rocks.

Extrusive landforms



The extrusive landforms depends on composition and viscosity of magma.

Viscous magma leads to cones (-steep), flowing magma makes vast flood plains

- Collapse of cones gives rise to craters / caldera.
- Denudation may give rise to volcanic plateau (eg. Table Mountains in S. Africa).

Thus, volcanic igneous activities form a variety of landforms.

[7:35]

Q10. What are 'air masses'? Highlight their role in the formation of extra-tropical cyclones. (12.5).

An air mass is a large body of air having little horizontal variation in temperature and moisture. Thus, they have distinctive characteristics.

These are classified into following types, based on source regions:

(i) Continental tropical } warm
(ii) maritime tropical }

(iii) Continental polar }
(iv) Maritime Polar } cold.
(v) Continental arctic }

ROLE IN FORMATION OF EXTRA TROPICAL CYCLONES.

- Extra tropical cyclones are ~~low pressure~~ low systems developed in regions beyond the tropics. ie. temperate zone.

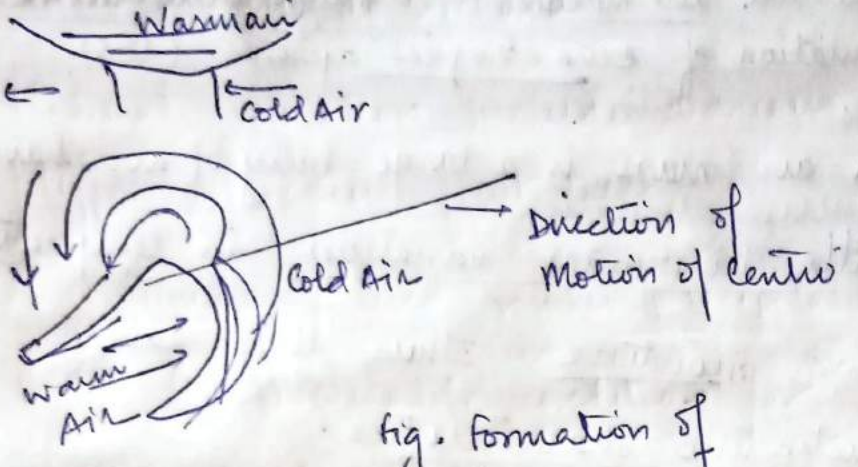


fig. formation of Temperate cyclone.

(I) Formed due to interaction of fronts

(II) Convergence of air masses of contrasting physical characteristics

(III) * Incipient stage - penetration of cold & warm air masses in each others territories

(IV) Mature phase :- isobars become circular

(V) Narrowing of warm front as cold front advances rapidly

(VI) Occlusion of cyclone: take over by cold front

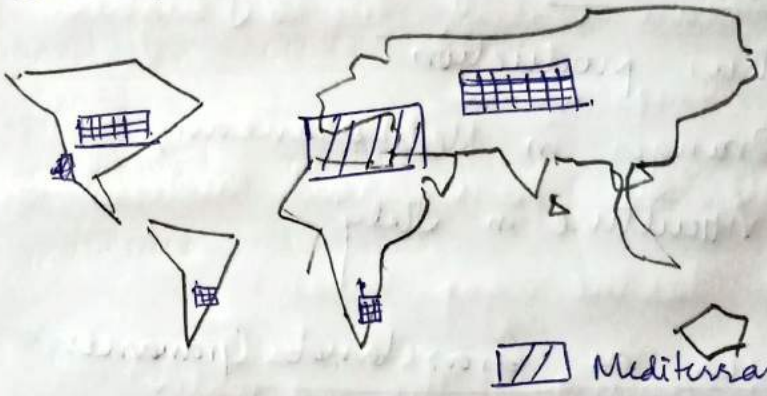
(VII) Dissipation of cyclone as warm front completely disappears.

7:25

Q11. Mediterranean lands are known as the orchards of the world whereas the Prairies are known as the granaries of the world. Explain. (12.5).

Mediterranean climates are warm temperate, western margin climates, between 30°-45° N and S latitudes.

These are formed due to shifting of wind belts.



Prairies are temperate grasslands found within the continents.

→ Lie in westerly wind belt.

→ Treeless due to lack of moisture

Mediterranean as Orchards

→ Natural vegetation includes various types of citrus fruit trees

→ Dry summers and winter precipitation lead to favourable condition for fruits development.

→ Specialisation of these regions in citrus production

eg. Oranges in Mediterranean, Viticulture in Italy

Prairies as ~~Grasslands~~ Granaries

→ Wheat grasses have suitable temperature range here

→ Extensive mechanisation led to large scale production of wheat.

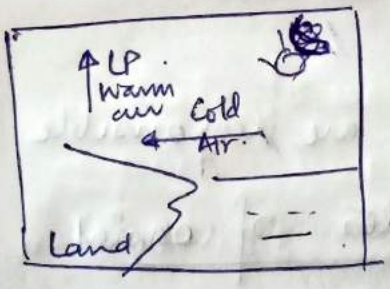
→ Also other grasses like maize and alfalfa grown — rich in carbohydrates.

Q12. With the help of a diagram, explain the formation of land breeze & sea breeze in coastal areas. (12.5).

Land Breeze and sea breeze are coastal phenomena occurring due to differential heating of the ocean water and land mass.

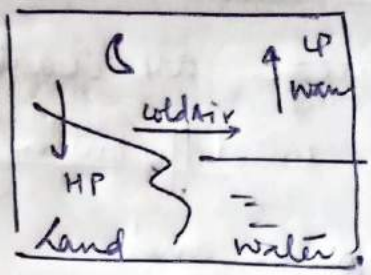
Due to large volume of water and higher specific heat, oceans warm up and cool down slower than land.

Sea ~~Land~~ Breeze



- It is a daytime phenomenon
- → Land heats up faster
- → Low pressure condition
- → Cold air from high pressure over sea rushes in to fill the gap.
- → The land faces cooler air and temperature moderation

Land Breeze.



- This is a night time phenomenon.
- Land cools faster than sea water.
- Low pressure conditions over ocean water due to higher temperature
- Cooler air from land rushes in to fill the gap.
- Aids cooling of the sea water.

These effects together are responsible for moderate climates of coastal areas. The lack of these is called 'continentality'.

Q13. How does the plate tectonics process theory help in understanding the mountain building process? (U.P.S.)

The plate tectonic theory postulates that the lithosphere is broken into several fragments - called plates. These plates are in constant movement, wit each other. These movements are responsible for several geomorphological phenomena

(A) Convergence

(A1) (B) Continent - Continent

- Both plates push against each other

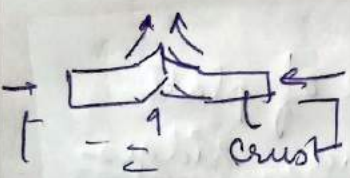


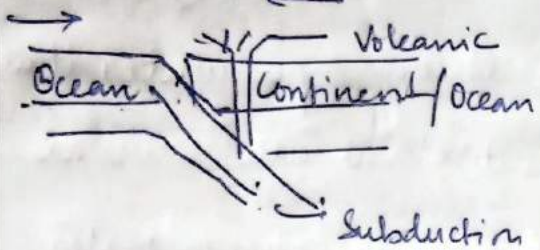
fig. C-C convergence

- Neither can subduct

→ Uplift of land masses causes formation of fold mountains at margins of plates

eg Himalayas, Andes, Alps.

(A2) Ocean - Continent / Ocean - Ocean

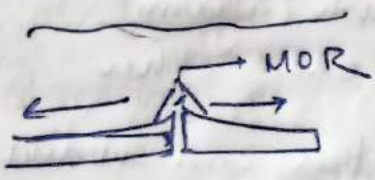


In case of Ocean-Ocean / Ocean-Continent convergence, one of the plates subducts below the other.

- Volcanic activities occur on the surface.
- Cone formation can lead to mountain chains

eg. Mauna Kea (Hawaii)

(B) Divergence



In case of plate divergence, ridges are formed in between.

- These ridges are slightly higher than surrounding abyssal plains and may rise up to be sea mounts.

eg. Mid Atlantic Ridge.

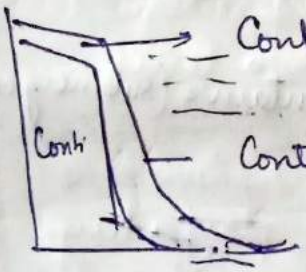
Thus, plate tectonics are orogenic processes.

Q14. The ocean floor is not just a vast plain but it is full of relief. Describe the various relief features of the ocean basins. (12.5).

The relief of the ocean floor are shaped by volcanic, plate tectonics and depositional processes.

These are mainly classified as-

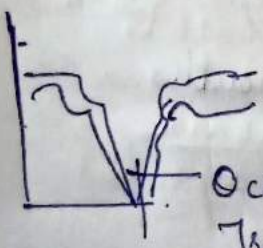
(i) Continental shelf
(ii) Continental slope
(iii) Abyssal plains
(iv) Trenches.



Continental shelf → gentle slope close to continents

Continental slope → steep fall

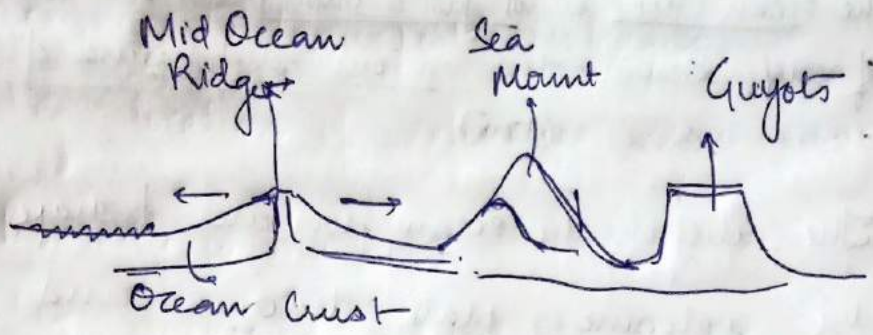
Abyssal plains → undulating surface



Oceanic Trenches

- Formed at O-C convergence
- Zones of subduction of oceanic plates
- deepest points on surface of earth

eg. Challenger Deep in Indian Ocean



MOR: - O-O divergence zone
- creation of new ocean crust
eg. Mid Atlantic Ridge.

Sea Mounts - mountains from oceanfloor,
- completely submerged.
- volcanic origin

Guyots - flat-topped mountains (submerged)
- denudation

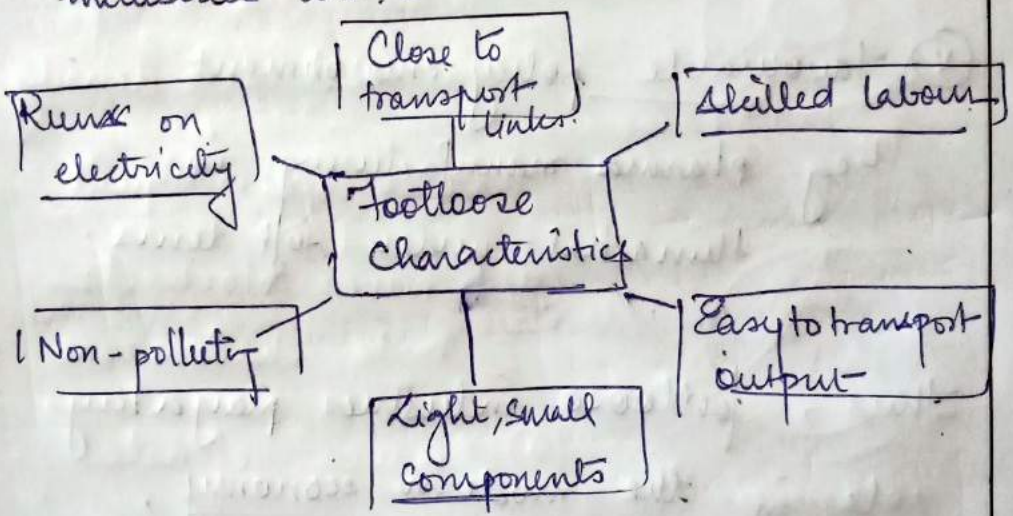
Submarine canyons - deep valleys under sea water
- often open upto river mouths.
eg. Hudson Canyon.

The oceanfloor is full of relief as well as strategic resources - Poly Metallic Nodules.
Deep Ocean Mission is crucial for exploration.

Q15. What are footloose industries? Identify the factors that influence the loc" of these industries, w the help of examples. (12·5).

Footloose industries are those whose location is not constrained by that of raw materials, ie. they do not have weight losing or weight gaining processes.

The key characteristics of footloose industries are:-



Thus, factors affecting location of footloose industries are:-

① Electricity supply - close to areas of cheap/subsidised, uninterrupted electricity supply.

(iii) Proximity to transport linkages
Eg. location of refineries near coast

(iii) Proximity to markets
Eg. diamond market in West Coast

(iv) Availability of skilled labour
Eg. Computer chips industry around Bangalore (Silicon Plateau).

(v) Favourable policy environment
Eg. pharma manufacturing in Himachal under soft terms.

Thus, footloose industries play a key role in the modern economy, crucially adding value to exports and aiding strategic economic growth & resilience!

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[7.5]

Q6 Explain the propagation of diff types of seismic waves. Also, illustrate the formation of P & S shadow zones (12.5)

The energy released during an earthquake is transmitted via seismic waves.

There are 3 types of seismic waves:-

① P waves
- 'primary' waves.
- fastest propagation
- Mode: longitudinal propagation [through compressions & rarefactions]
- Particle movement along direction of wave movement.
- travels through ALL mediums.

② S waves
- 'secondary' waves.
- slower than P.
- Mode: transverse
- particles move perpendicular to plane of propagation
- ONLY through solid medium.

(iii) Surface waves

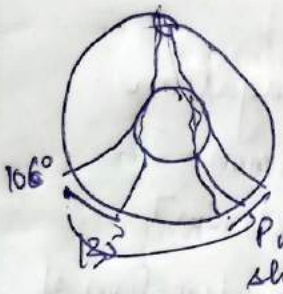
↳ slowest waves,

↳ ~~Reflected as~~ transverse movement

↳ causes rifts on surface due to vertical and sideways motion

↳ most devastating

Shadow zone



- The shadow zones are formed due to difference in medium & density.

→ Outer core is liquid:

(a) S waves blocked :- wide shadow zone

(b) P waves refracted :- leaves certain portion uncovered.

Thus these waves act as important indirect source to study interior of the earth.

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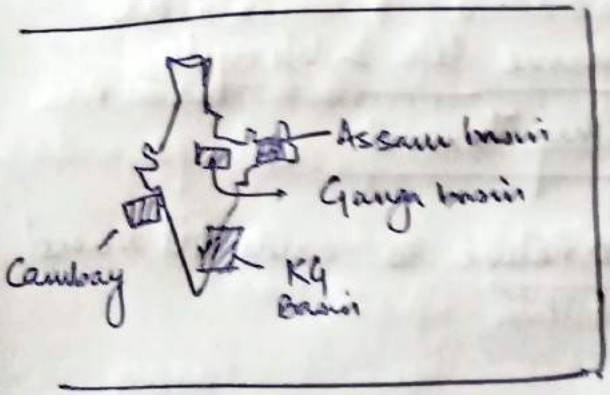
Q7: Write a brief note on the distribution of Shale Gas reserves in India. Also discuss challenges associated with its exploration (12.5).

Shale Gas is an unconventional hydrocarbon. It is found trapped in relatively impermeable sandstones — joints and fractures.

Named 'shale gas' because found associated with clayey deposits called 'shale rock'.

Distribution in India



In India, it is formed in close association with natural gas reserves.

- Known locations are :-

(i) Cambay basin
(ii) Krishna-Godavari basin
(iii) Assam basin
(iv) Ganga basin

Exploration and exploitation ~~challenge~~ Challenges

- Requires advanced technology for exploration
  - increases cost
- & Low production capability make it economically unviable.
- ∴ Exploitation prohibitively expensive at current state of technology.
- Impact on marine life & life cycle

Significance & Way Forward

- Important alternative to crude oil based energy
- 'Clean' energy.
- Reduce import dependence

∴ It is crucial to innovate and bring down costs through innovation for employment generation, energy security and economic growth.

Q18. Explain the proces of precipitation. Also, elaborate on how rainfall can be classified on the basis of origin (12.5)

Precipitation refers to the process of water returning to the earth.

Process:

(i) Continuous condensation around dust nuclei causes particle size to grow.

(ii) Growing particles coalesce to form clouds.

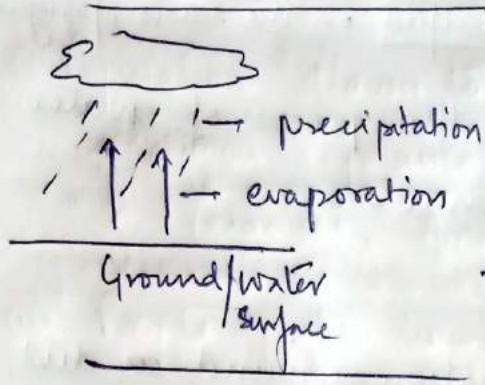
(iii) When weight of particles overpowers uplift of air resistance, falls to ground as precipitation.

(iv) Forms of precipitation
- Rainfall - as raindrops
- Snowfall :- temperature $<0^{\circ}C$
- Sleet :- frozen of raindrops.
- Hailstone :- concentric ice layers.

Precipitation plays important role in the water cycle of earth.

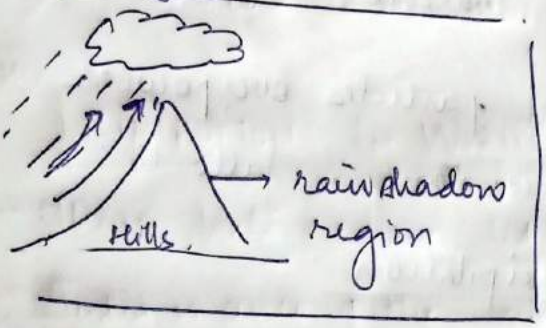
Based on origin, it is classified as follows:

① Convectional:



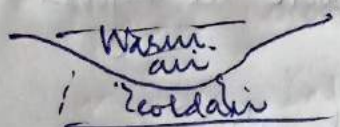
- Occurs in the equatorial and tropical regions
- Predominant determinant of equatorial climate

② Orographic.



- Occurs ~~close to~~ around hills & mountains
- when warm air pushed upwards ∟ rapidly cools & condenses.
- ~~Eg~~ eg. Western Ghats.

③ Frontal rainfall



- when warm & cold air masses meet, rapid cloud formation
- dissipates as rainfall.

eg. North Atlantic region

Q19. Give an account of the geographical, economic & socio cultural factors that influence the dist^{n} of pop^{n} in the world. (12.5)

Population of the world is around 7.8 billion, spread across several countries and continents. However, the distribution is uneven, owing to the following factors:

(A) Geographical

(i) Plains are more densely populated due to vast flat expanses & rivers basins
eg. Ganga-Brahmaputra Basin.

(ii) Mountain regions are sparsely populated
eg. Alps and Andes.

(iii) Coastal areas are thickly populated

(iv) Deserts almost unpopulated except near oases

(B) Economic

(i) Higher density in urban centres due to availability of work opportunities
eg. Shanghai.

(ii) Agricultural productivity as a determinant
eg. thickly populated Europe.

(iii)

(iv) Areas with transportation linkages densely populated

(c) Socio Cultural.

(i) Population drawn to areas of historical/religious importance
- eg. Varanasi, Amarnath.

(ii) People prefer living in areas with people similar to their own religion/class, etc.
eg. Bengali colonies in cities
'China town' in US cities

(iii) DISTRIBUTION IN WORLD.

- These factors have led to the following:
→ India is among the most densely populated country.
→ China has the highest population
→ Developed countries have decreasing population density compared to developing
→ African country populations are concentrated in the Sahel and grasslands.
→ Scandinavian nations have very low density.

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Q20. With examples of erosional & depositional landforms formed during its lifecycle, explain the role of glaciers as a geomorphic agent. (12.5).

A glacier is a mass of ice moving as sheets over land or linear flows down the slopes of mountains.

These are slow-movements, under the influence of gravity.

Erosional Landforms

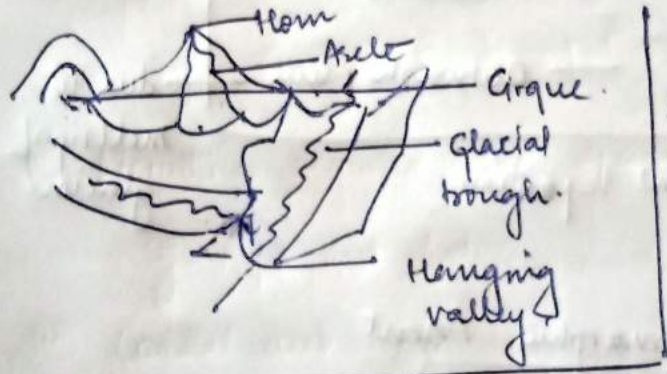

Fig Glacial erosion features.

Arete :- sharp edges between narrow glacial troughs ~~eg: Mt Everest~~

Horn :- point of intersection of several aretes eg. Mt Everest.

Cirque : depression on mountain face due to scooping away of material by glacier.

Hanging valley: When glacial troughs join a much deeper river valley, causing abrupt altitude change.

Depositional Landforms

Fig Glacial Deposition

Role as Geomorphic Agent

- Thus, glaciers shape new topographies through deposition and destruct/reshape existing topographies by erosion
- Carve out space for river flow.
- Eg:- Give rise to important and crucial topographies.