



NEXT IAS (Head Office) : 27-B, Pusa Road, Metro Pillar no. 118, Near Karol Bagh Metro, New Delhi-110060

Bhopal Centre: Plot No. 46, ZONE-2, M.P. Nagar, Bhopal-462011

Ph: 8081300200, 8827664612 | **E-mail:** mts@nextias.com | **Web:** www.nextias.com

ADVANCED INTEGRATED MENTORSHIP

GEOGRAPHY ASSESSMENT TEST-9

(To be filled by candidate)

Test Code : TC310

Name of Candidate : Abhishek singh

NEXT IAS Roll No. : AIM24GCL1035 **Date of Examination :** 20-08-2023

Exam Centre : Old Rajinder Nagar ☐

Bhopal ☐

Online ☒

GENERAL INSTRUCTIONS

This Question-cum Answer (QCA) Booklet contains 32 pages. Immediately on receipt of the booklet, please check that this QCA booklet does not have any misprint or torn or missing pages or items, etc. If so, get it replaced by a fresh QCA booklet.

Candidates must read the instructions on this page and the following pages carefully before attempting the paper.

Candidates should attempt the questions strictly in accordance with the instructions specified in the question paper and in the space prescribed under each question in the booklet. Any answer written outside the space allotted may not be given credit.

Question paper will be provided separately and can be taken by the candidates after conclusion of the exam.

SUBJECT/PAPER
GENERAL STUDIES

Invigilator's Sign. :

[To be filled by the STUDENT]

Student's Queries for the Evaluator (if any write them below)
plz, plz.... write your comments and feedback in good handwriting

[To be filled by the EXAMINER]

Evaluator's response

(For filling by Examiners only)

Evaluator Code :

Q.No	Pg No.	Maximum Marks	Marks	Total
1	1			
2	3			
3	5			
4	7			
5	9			
6	11			
7	14			
8	17			
9	20			
10	23			
Grand Total				

Signature

MACRO COMMENTS

Q1] How do recent advancements in studies related to gravitational waves, Hubble telescopes, & black holes help in understanding origin of universe?

Gravitational waves are ripples in space time created due to violent & extreme events in universe.

Hubble telescope was launched in 1990 to study deep universe.

Black holes are region in space with huge density/mass through which even light can't escape.

Recent advancements

① Gravitational waves $\rightarrow$ Recently very low frequency gravitational waves were detected by studying pulsars (rotating neutrons)

$\rightarrow$ A new LIGO observatory was approved in Hingoli district of Maharashtra to study Gr. Waves.

- (2) Hubble telescope : has recently discovered ultra massive blackhole.
- (3) Black holes : Recently first ever image of black hole was created by Event horizon telescope project.

Significance in understanding universe

- (1) Unexplored regions : Part of universe not detected by Electromagnetic spectrum can be known by Gravitational waves.
- (2) Dark energy : which is driving expansion of universe can be better known
- (3) Dark matter : 95 % of universe can be explored.
- (4) Gravitational lensing : Black holes can give powerful insights into origin of universe.

Recently James webb telescope was launched as Complementary to Hubble telescope, which along with other developments is unfolding mysteries of origin of universe.

Q.2) Weathering is a complex phenomenon involving number of processes & is influenced by multiple factors. Explain

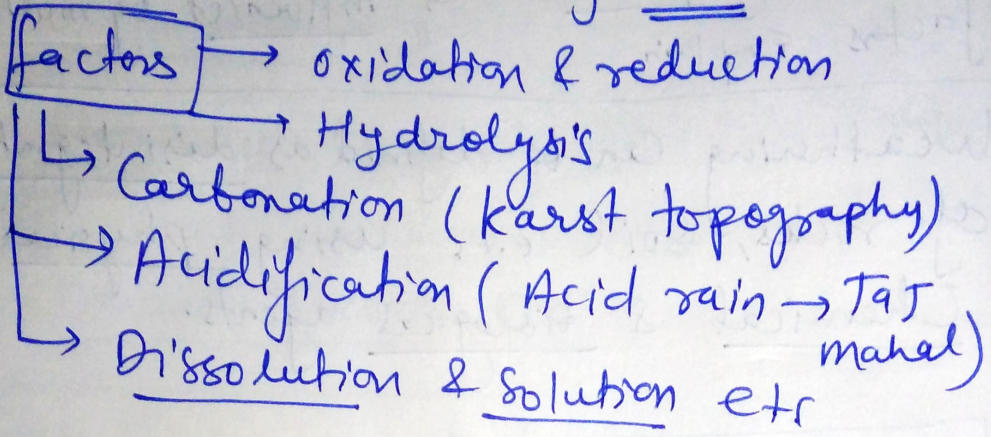
Number of processes

Factors involved

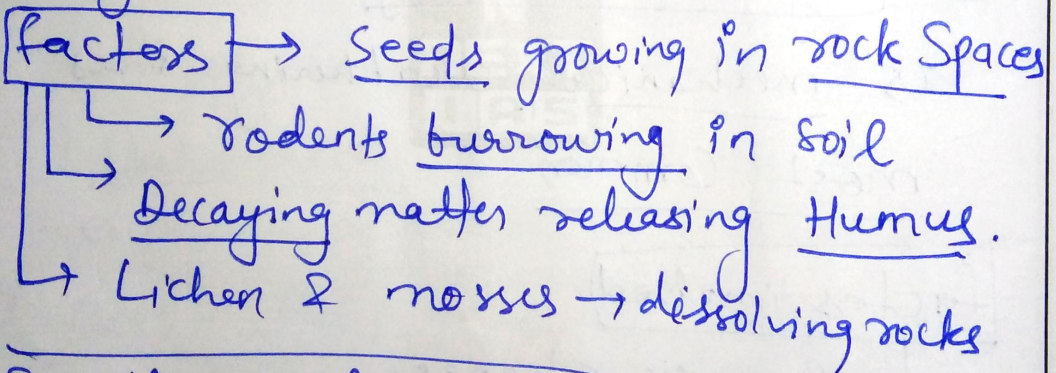
- Pressure changes
 - Temperature changes
 - freeze-thaw cycle
 - Cold-wet cycle
 - frost wedging (winter ice expands)
- } can lead to { exfoliation }

for eg! Due to repeated cycles of increase and decrease of temperature rocks disintegrate $\Rightarrow$ Sheeting.

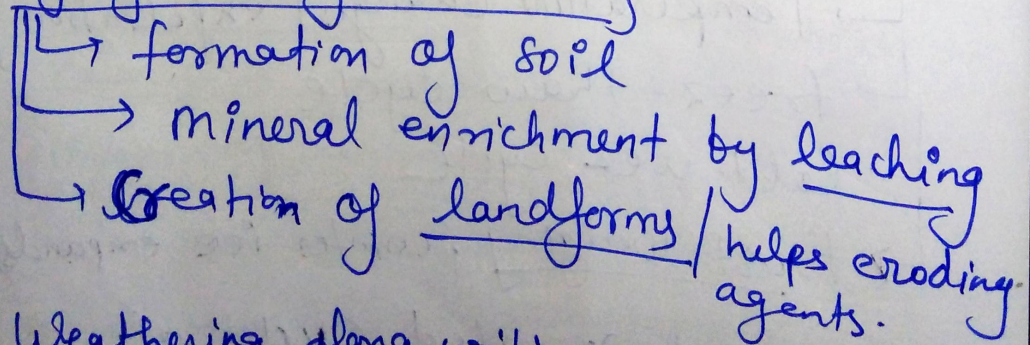
② Chemical weathering : It involves loosening of bonds.



③ Biological weathering : In this living organisms are involved.



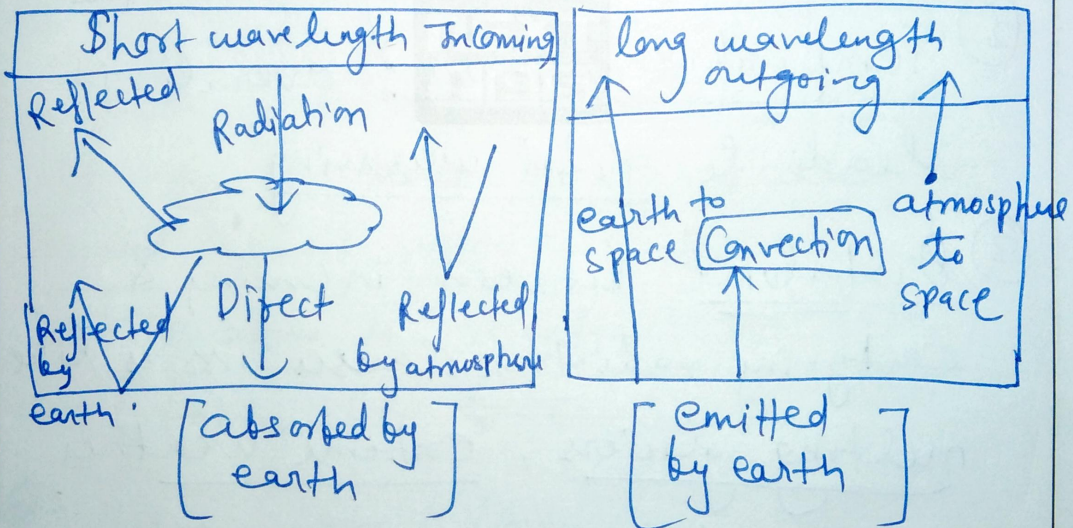
Significance of weathering



Weathering along with erosion and mass wasting regularly change the face of earth surface.

Q-3 Explain the Concept of heat budget & its role in maintaining the earth's temperature.
How does the greenhouse effect impact the heat budget of the earth's atmosphere?

Heat budget refers to the balance between incoming (short wavelength) ultraviolet radiation and outgoing (long wavelengths) Infrared radiation. Through Heat budget earth maintains its temperature.



Role in maintaining temperature

- (1) Clouds: Some wavelengths absorbed & reflected by clouds in both direction.
- (2) Atmosphere: many particles

like aerosols, dust also absorb and emit radiation

③ Earth Surface : It absorbs short wavelength & emits larger wavelength.

Effect of greenhouse gas on heat budget

- ① More greenhouse gases in atmosphere block the radiation emitted by earth which are going to space.
- ② Temperature increases : overall it leads to global warming
- ③ Disturbance between incoming & outgoing radiation causes issues like melting glaciers, extreme weather events etc.
- ④ Post industrial revolution temperature of earth has increased by More than 1.5 °C.

Greenhouse gases have negative impact on heat budget & must be curtailed.

(Q→4) Tropical cyclones are largely confined to South China Sea, BOB & Gulf of Mexico. why?

Tropical cyclones are low pressure, violent, circulating storms which are formed in tropical ocean regions.

Confined to South China Sea, BOB & Gulf of Mexico (all lie in North hemisphere)

① Temperature difference : Northern hemisphere oceans are at higher temperature than southern due to more land mass in North. This temperature is greater than 27°C . (favourable to cyclones).

② Warm Ocean Currents : These regions are characterised by currents like Gulf stream, Kuroshio etc which makes conditions favourable.

- ③ Low wind shear : In these locations compared to Southern hemisphere counterpart, the wind shear is low.
- ④ Tropical equator : mostly the equator shifts to these regions due to high temperature.
- ⑤ Ocean stratification : more fresh water inflow into these areas $\Rightarrow$ prevents intermixing of ocean layers $\Rightarrow$ uniform temperature $\Rightarrow$ favours cyclones.
- ⑥ Presence of upper level divergence in these regions.
- ⑦ Presence of unstable cyclonic conditions

Tropical cyclones are more common in above regions but climate change is making it more unpredictable & severe.

Q→5. Discuss the Concept of air masses & explain its role in macro-climatic changes.

Ans Air masses are characterised by uniform temperature and pressure of mass of air over a large area.

Conditions for formation

- ↳ Large area ex: Sahara desert
- ↳ Anticyclonical Conditions to
Cause subsidence of air
ex: Sub tropical regions.
- ↳ stay of air over same area for longer time
- ↳ high pressure with little pressure difference

Source region of air masses: (5 major)

- ① Tropical & Sub tropical warm ocean
- ② Snow covered high latitude
- ③ Arctic & Antarctic region.
- ④ high latitude Cold oceans.

Types of air masses

- | | |
|-------------------|-----------------------|
| Continental → dry | tropical → warm |
| maritime → moist | Polar / Arctic → cold |

Air masses have widespread influence on weather of an area.

Q-6

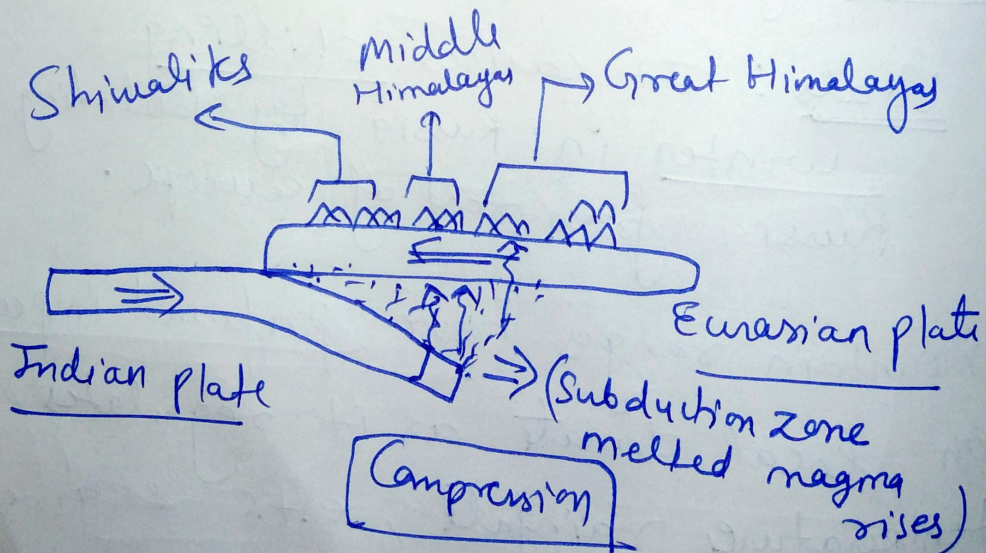
Explain the various stages of formation of the great Himalayas. How eastern Himalayas is different from western Himalayas?

Ans

Himalayas were formed due to Continent - Continent Convergence between Indian and Eurasian plates.

Stages of formation

① There are three broad phases of formation of Himalayas.



② Phase I : formation of Great Himalayas around 45 to 50 million years ago.

⇒ Sediments of Tethys sea were folded & uplifted

③ Phase II : formation of Middle Himalayas around 35 to 45 million years ago.

④ Phase III : Youngest : formation of Shivalike range between 2 to 20 mya

Difference between Eastern & Western Himalayas

Western	Eastern
① Extends from <u>Indus</u> river to <u>Kali</u> .	① Extends from <u>Kali</u> to <u>Brahmaputra</u>
② <u>Slope</u> : More gentle & long extending	<u>Slope</u> : Steep & Sharp rise.

③ Located at high latitude $\Rightarrow$ So more colder

③ Located at lower latitude $\Rightarrow$ So relatively warm

④ Altitude of snow line is lower to snow line of eastern Himalayas

④ Altitude of snow line is upper than western one

⑤ plain areas are at larger distance from highest peaks due to gentle slope

⑤ plain areas are at closer distance from highest peaks due to steep slope

⑥ Examples of peaks = Nanga, Karakoram etc.

Peaks = Annapurna, Everest. etc

Himalayas are still rising at rate of few centimetre per year & may change its nature in few million years..

Q-7

Discuss the factors affecting the horizontal & vertical distribution of ocean temperature. How does the warming of oceans due to climate change impacted global weather patterns?

Ans

Horizontal & vertical temperature distribution are affected by many factors & are significant for studying climate change.

Horizontal changes (factors)

- ① Latitude : Equator receives more sun rays while poles receive less.
- ② Shape of oceans : Closed oceans have high salinity $\Rightarrow$ increases boiling point so high temperature.
eg! Mediterranean sea has high temperature compared to California's sea
- ③ land mass and ocean ratio :

Northern hemisphere has more landmass Contact with Ocean. So it has Overall higher temperature than Southern Oceans

④ Currents: Warm Currents like Gulf Stream increase temperature while Cold Currents like Canary Current decrease it.

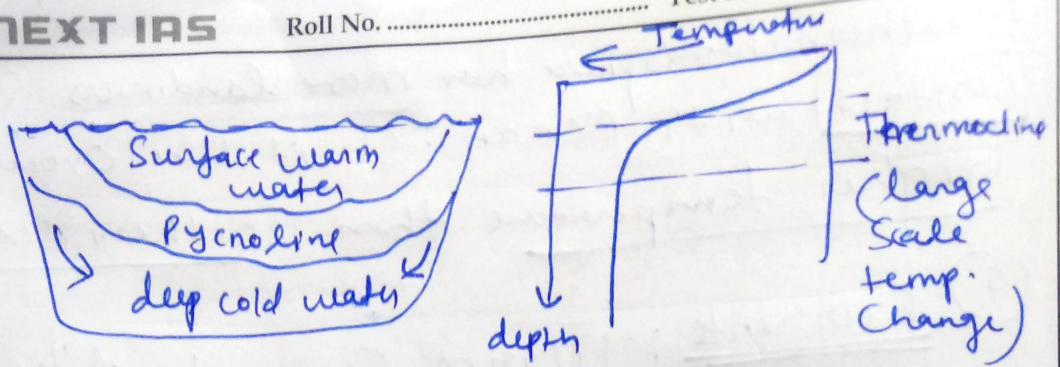
⑤ on shore & offshore winds which either [piles] warm ~~sea~~ water at Coast or removes it affecting temperature.

Horizontal Changes (factors)

① Salinity: High salinity water is denser so it goes below low Salinity water creating a Current which [mixes] water & affects temperature.

② Cold polar current sinks & warm Equatorial current flows towards pole.

③ Three layer system & Thermocline :



Warming of ocean & global weather

- ① Increased instances of El-nino & La-nina
- ② unpredictable extreme events like cyclones eg: In Hawaii.
- ③ Change in Intensity & duration of rainfall. eg: Causing flash floods in Delhi.
- ④ Increased regional variations
eg: Extreme rainfall/drought in California.
- ⑤ Droughts: prolonged droughts for eg: Southern Europe.
- ⑥ wildfires: eg: Australian Bushfire

Ocean temperature & weather patterns are intertwined & with climate change this is going to be more complex to understand.

Q8 : Explain the concept of plate tectonics & discuss its significance in explaining the geological phenomenon observed on earth.

Earth is divided into several tectonic plates whose movements cause several geological phenomenon.

Concept of tectonic plate

- ① Lithosphere is divided into Seven major & many minor plates.
- ② Tectonic plates can be a Oceanic plate, a continental plate or mix of both.
- ③ Thickness of continental plate is more than oceanic plate.
- ④ The movements of plates happen due to convectional currents arising from mantle.
- ⑤ Oceanic plate = Basaltic & Continental plates = Granitic nature.

Tectonics and Geological phenomena

① Continent - Continent Convergence

- ↳ formation of fold mountains
ex: Himalayas, Alps.

② Continent - ocean plate convergence

- ↳ formation of Continental arcs
for eg: Cascade range
- ↳ fold mountains. ex: Andes, Rockies etc.

③ Ocean - ocean divergence :

- Mid oceanic ridges are formed
- Boundary of Constructive nature
(Crust is formed)
ex: Atlantic ridge.

④ Continent - Continent divergence

- formation of Rift valleys,

Lakes etc.
for eg: Great African rift valley,
Lake Tanganyika etc

⑤ Circum pacific ~~zone~~ Ring of fire

- Associated with volcanoes,
Earthquake, Tsunamis etc.
- Situated along Ocean - Continent
Convergence boundary.

⑥ Trenches : formed in ocean along
Convergence boundary.
eg: Mariana trench.

Tectonic plates are Constantly
shaping the face of earth through
its movements and forming mountains,
ridges, trenches, lakes etc

Q-9

The Earth's atmosphere is a Complex System, with different layers & varying Compositions. Analyze the Composition & Structure of the earth's atmosphere, highlighting its significance in regulating the planet's climate.

Atmosphere is the outer layer on earth surface which is home to several phenomena & protects earth from dangers.

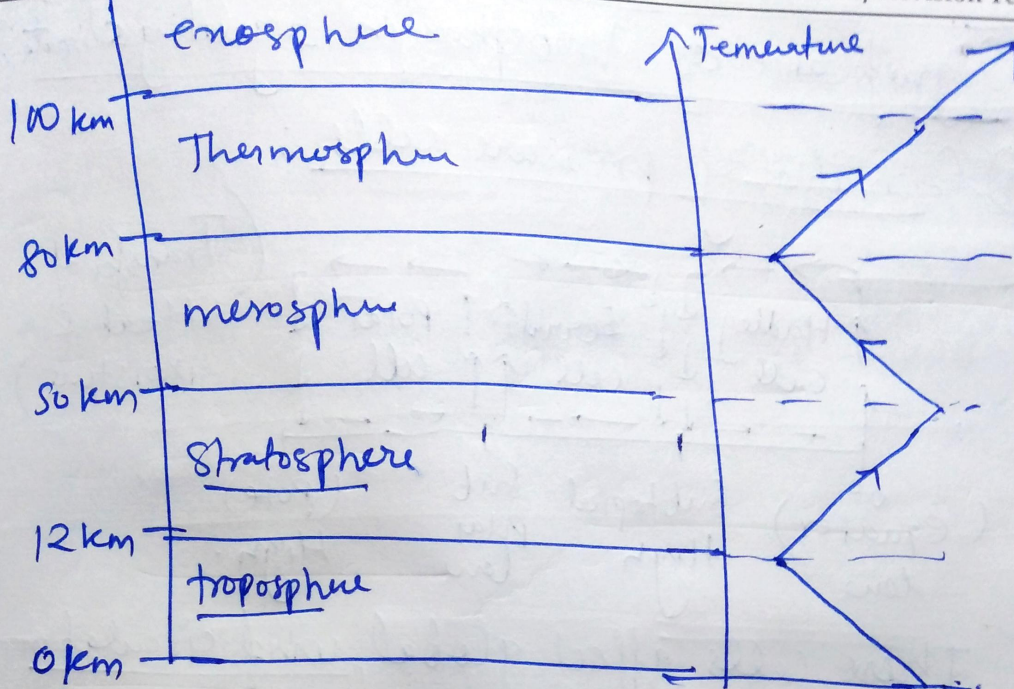
Composition.

- ↳ It consists of 78% Nitrogen, 21% oxygen & rest 1% as other gas.
- ↳ It also hosts emerging pollution like VOCs, Smog and CO₂.

Structure

- ↳ Earth's atmosphere is divided into several layers

- ① Troposphere is most important layer
 - ↳ all weather phenomenon happens
 - ↳ Passenger aeroplane flies.



② Stratosphere : → Contains ozone layer
 ↳ Polar stratospheric clouds.

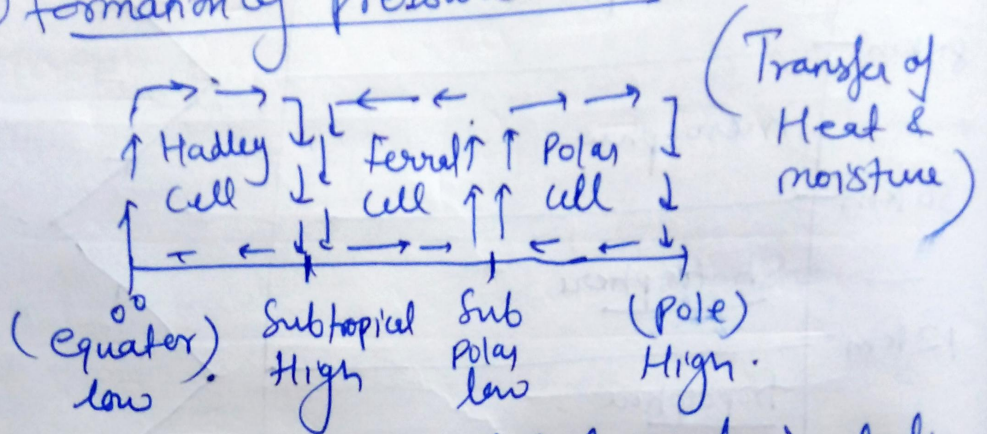
③ Mesosphere
 ↳ meteors burn here
 ↳ Noctilucent clouds get formed.

④ Thermosphere
 ↳ Contains Ionosphere → used in
 radiowave Communication.

⑤ Exosphere
 ↳ Outermost layer. → Satellites.
 ↳ Very high temperature.

Significance of Atmosphere in regulating climate:

① Formation of pressure cells:



These cells affect global wind circulation & the climate. They happen in Atmosphere (troposphere)

② Westerlies: They bring rain to western margin in high latitude.

③ Trade winds: Converges at equator & brings rain.

④ Tropical cyclones: bring rains to areas like Bay of Bengal, Gulf of Mexico etc.

⑤ walker circulation: Causing El-nino & La-nina

Atmosphere is very significant in determining earth's climate & saves the earth from Solar storms as well.

Q10] Briefly mention the alignment of major mountain ranges of the world & explain their impact on local weather conditions, with example.

Major mountain ranges in the world are created due to tectonic plate movements & they affect local weather around them.

Alignment of major ranges:



North America: Rockies, Appalachians

South America: Andes

Europe: Alps & Urals

Asia: Himalayas | Africa → Atlas etc

Impact of mountains on local weather

① Himalayas

↳ It prevents Cold Siberian air mass from entering India & makes India habitable

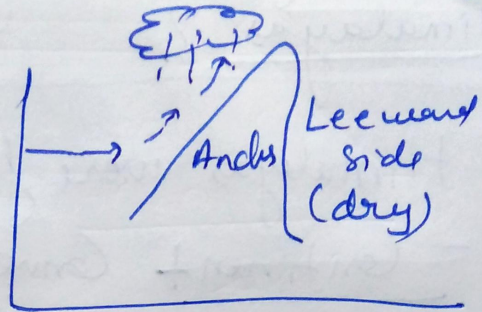
↳ It also deflects monsoon winds towards India thus causing rain

② Rockies

↳ Chinook (local wind) also called Snow eaters flows down the Rockies making inland suitable for Agriculture

eg: prairies.

③ Andes : moist wind from Pacific comes to Windward side & causes rain. Rainshadow area (Leeward side) remains dry
ex: Atacama desert



④ Alps

Here local winds like foehn & mistral blows. Foehn helps in ripening of grapes.

⑤ Atlas : It separates Sub-Saharan Africa from Mediterranean winds.

⑥ Urals : It causes chilling winter in Russia by isolating Russia from rest of Europe.

Mountain ranges have profound impact on local climate as it regulates temperature, rainfall, etc & gives the regional geography a distinct climate.