GS SCORE

An Institute for Civil Services

IAS TOPPER'S

TEST COPY

KUMARI SOMEYA

AIR - 502

(CSE 2022)

GEOGRAPHY OPTIONAL

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Geography Test Series 2022

TEST - 03

140

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.

Name Somya Kumari

Mobile No.

Date

Signature

1. *Invigilator's Signature*
2. *Invigilator's Signature*

Roll No._____

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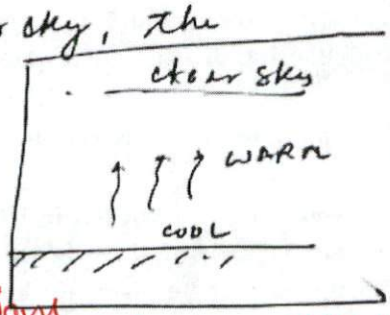
Section - A

1. (a) Write a short note on Temperature Inversion. Also discuss its role on local economic activities. (150 Words) (10)

Temperature inversion is atmospheric condition when the normal lapse rate becomes negative, there is rise in temperature with altitude that brings stability of atmosphere.

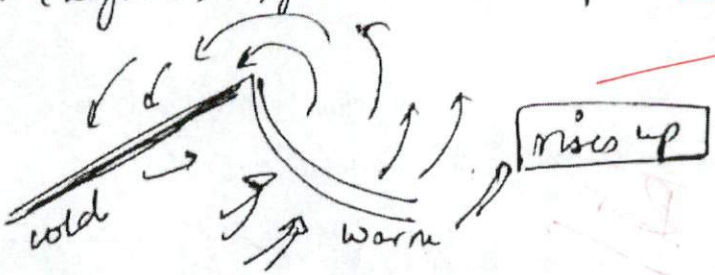
Types → ① Radiative inversion:

- In long winter nights, with clear sky, the ground loses heat & cools down, & low wind shear ⟹ inversion takes place. (ex) in polar regions & desert regions



② Advection inversion: → Frontal

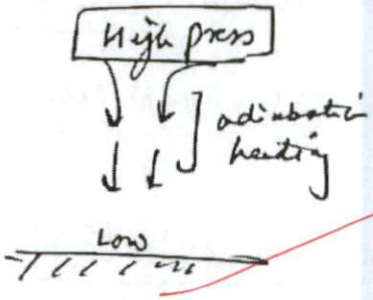
- when cold air mass pushes the warm air mass, (lighter) gets risen up. (ex) in occlusion stage.



Remarks

Subsidence inversion:

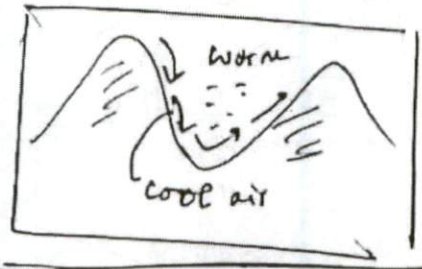
→ when anticyclonic conditions prevail (eg in horse latitudes), due to adiabatic heating the subsiding air ~~rises~~ warms



5.5

③ **Valley inversion**:

- at night time, katabatic winds flow down valley as its cold and denser,



There is inversion in valley causing ~~hoar~~ or frosting

Economic : Role

① Atmospheric Stability: pollution, smog in urban cities (eg. Delhi)

② Agriculture not practiced in valleys, settlements on hill slopes (eg, Uttarakhand)

③ Desert areas in horse latitudes impact economic presence.

↳ give some beneficial aspects like eg) coffee plantations in Yemen would benefit from this.

Remarks

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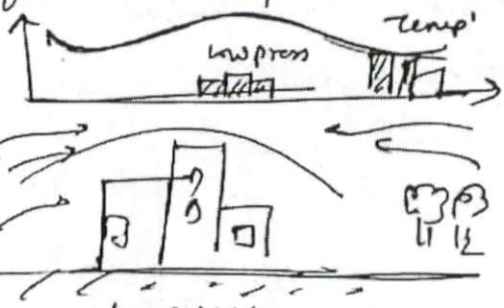
1. (b) Write a short note on Urban climate (150 Words) (10)

Urban climate is the climate system in urban areas marked by changes in atmosphere through industrialization, built up area, population pressure.

Urban climate vary as functional aspect changes.

① Micro climate developed

- ↑ built up area
- Atmospheric condition



Low pressure in urban climate:

High temperature

GHG composition in air is high

Pressure gradient from rural areas

⇒ causes urban floods as micro low pressure with ⇒ attract wind & convectional current,

[eg Patna 2015 floods, Hyderabad]

Remarks

• Also give on brief about wind pattern, temperature & humidity aspects in urban landscape

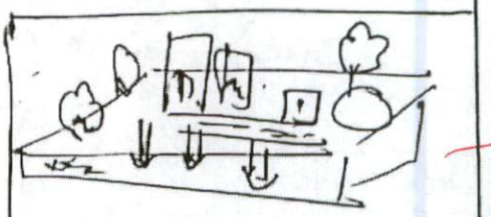
5.5

Hydrological cycle variation

① Urban climate is impacted by low percolation & infiltration of water (rain) in ground ⇒ **water crisis**

(eg. **cape town**: Africa: Zero day water)

② Water pollution & less blue spaces.



Sponge city: ↑ green & blue space

Solutions:

→ good example

③ **Albedo effect**

- dark concrete & road surfaces absorb ↑ heat
  ↳ Urban heat island formed.

(eg heat waves in California, Canada, Delhi)

Way ahead:

UN Habitat's green building proposal & planned sustainable cities approach need to be followed **Singapore model**.

Remarks

* Also said some dimentions of solution in India ie Nagar van scheme, Green India mission in improving urban eco-space.

1. (c) Chernozem Soil (150 Words) (10)

Marbut classified soil types into pedocal and pedalfers based on climatic evapotransipration precipitation & other abiotic factors.

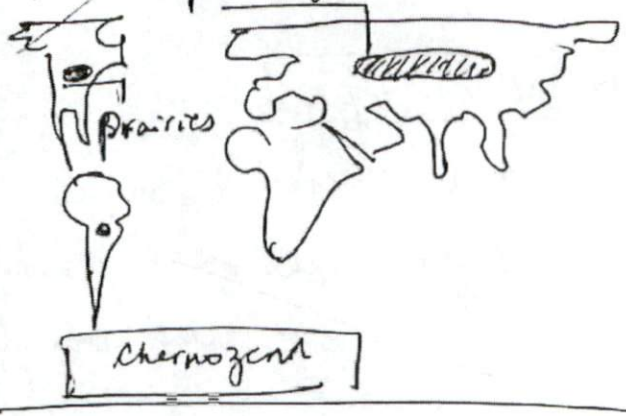
5.5

Chernozem soils have been classified as pedocals, with high calcification process dominating in it.

① Location :

found in temperate grassland regions (steppe grasslands in ~~asia~~ Eurasia eg Ukraine, Russia, Central asia)

temperate grassland:



② Soil pH :

- Region is characterised with low rainfall
- ∴ leaching of soil is low &

Remarks

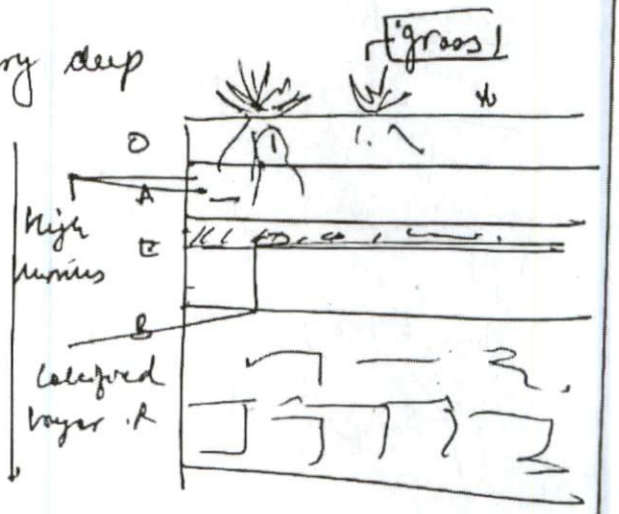
* mention some threats being faced by these soils in present day.

under dry conditions ⇒ [Calcification, Alkalinisation] to make soil basic.

③ [Soil structure] : largely blocky vs sciroziems (prismatic)

④ [Soil profile] : Not very deep

- has humus content, helps in [growth of grass],
- calcified layer



⑤ [Utility]

① Soil colour is [black] ⇒ [Bread Basket of world] ⇒ has good nutrient ⇒ [Wheat] production is high. Eg [Ukraine]

② Mechanised Extensive agri ↑

③ Ranching ⇒ Animal husbandry & related industry

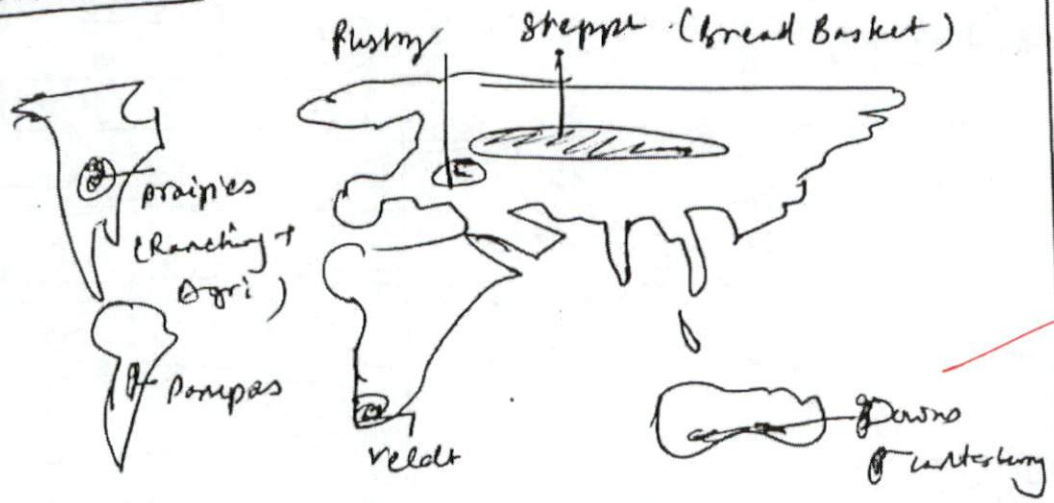
Thus Chernozem soils are very important.

Remarks

1. (d) Write a short note on temperate grassland biome (150 Words) (10)

Temperate grassland biomes are characterised by mid latitudinal climatic effects, continentality, and agri based economic activities.

Distribution:



temperate grassland

Climatic Condition:

① low rainfall due to continentality (eg steppe)

② - rain shadow areas (pampas)

- cold current effect (veldts)

good reasoning for these grasslands

Remarks

* mention also some threats being faced in this region due to Climate change, deforestation & desertification.

~~Biotic~~ factors [Temperature]: low temperature, with effects of cold airmass from poles & temperate cyclones.

5

③ [Boreal f.]: Largely characterised by grasslands, with small shrubs, non shady trees. ⇒

① soil largely: prairies, chernozem, chestnut, helps in cultivation.

④ [Animal]: largely for domestication eg cattle, sheep (Australia), (Dairy: Newzealand cattle)

→ wild fauna: with

- migratory birds breeding grounds in tropical areas when extreme winter (

then temperate grassland biome are rich biomes with high human utility.

Remarks

* Also add the agricultural practise in the region ie granary of the world, with Ukraine-Russia accounting for 20% of global wheat export.

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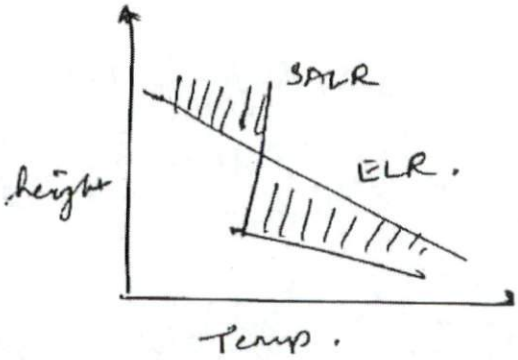
1. (e) Conditional Instability (150 Words) (10)

Conditional instability is a condition when a parcel of air is forced to rise up and upon reaching its certain height, with gain of latent heat of condensation, it rises by itself.

Conditional instability depends on the Environmental lapse rate and wet adiabatic lapse rate, Dry adiabatic lapse rate conditions.



DALR > ELR > SALR

* try to explain the phenomenon using numerical values to better explain the phenomenon.

Remarks

the parcel of air when attains enough ~~heat~~ latent heat rises up, causes atmospheric instability and rainfall/precipitation.

6.5

Utility:

① Sometimes ~~in~~ when storm passes, rainfall occurs after some time as the instability conditions not reached.

② Temperate cyclones, the atmospheric phenomena depends on latent heat of condensation, ⇒ formation of clouds along fronts depend on it

③ Local storms like Kal Baisakhi, (monsoon showers) also depend on conditional instability.

Good Internalisation of concepts

Remarks

3. (a) Extreme climatic events are on rise both in terms of their number and severity in our country. Discuss the major causes and vulnerable areas in the backdrop of National climate vulnerability assessment report. (250 Words) (20)

Intro: National climate vulnerable assessment report highlighted the climate risks that India faces in the wake of climat change, same was highlighted in global climat risk index. (India: 7th most climate risk prone nation)

good usage of report

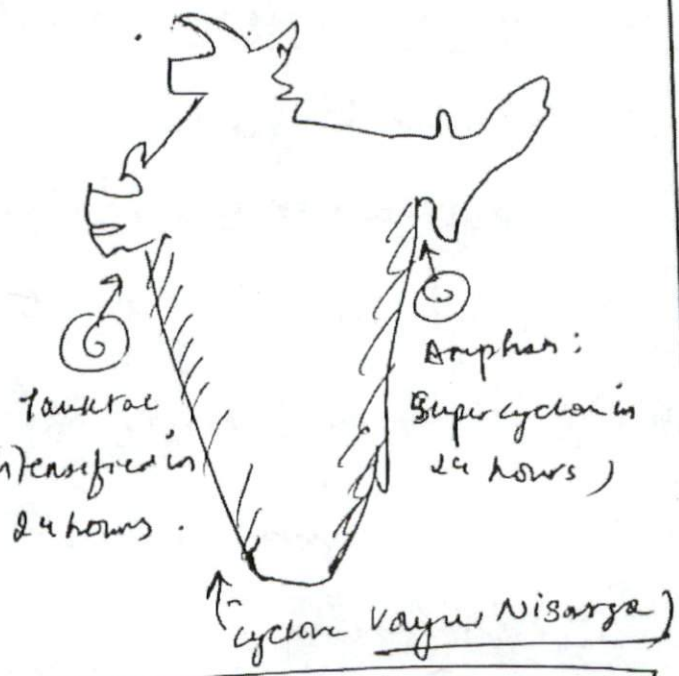
* Extreme climatic events on rise | Atmospheric events

① Cyclonic events:

IMD reports, ~~arabian~~ Indian ocean temp. rising at rate of 1°C.

mention - Increased No. of cyclones in Arabian sea area from late 2020's

→ Causes: climate change, thermal pollution in oceans, → polar ~~arctic~~ glacial melt →



Coastal areas: Vulnerable

Remarks * mention the causes of severe events under some different headings to give it a completedness approach.

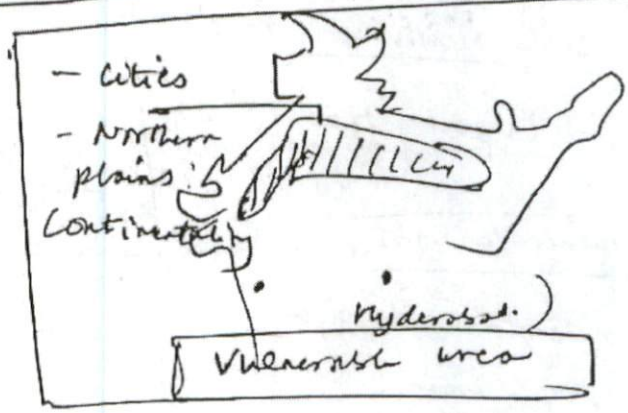
impact on sea surface Temperature.

Vulnerable areas: coastal plains of India, Konkan, Malwan, Malabar Coast ⇒ Climate refugees issue (P) → use words don't use symbol

(eg Sagar Island >2 Lakh climate migrants to Kolkata Bengal)

② Heat wave phenomena:

① March 2022 recorded highest temperatures in 27 years ⇒ with GHG emission increasing ⇒ green house effect



⇒ Urban Heat island effect (eg Delhi)

⇒ Forest fires have cause & effect due to heat waves (eg Uttrakand, Odisha & Nilgiris in western ghat.

③ Vulnerable areas: Urban cities: micro climate disturbed, northern plains: continentality

Remarks: Also add Increased climatic events, Include more on the lines of Intensity ie flash flood, cloudburst etc.. to show Intensity.

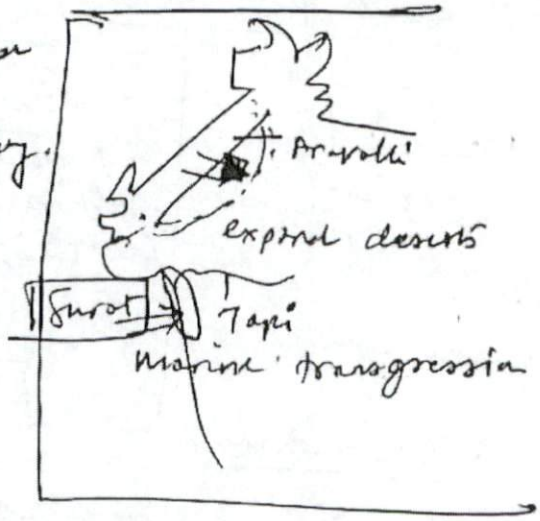
(c) Climate change and lithosphere events

(1) Land degradation due to ↑ erosive activities on coastal areas,

(2) Desertification expansion: deforestation & high droughts & dry conditions (eg Aravalli hills)

(3) soil moisture decrease
↳ impact food security.

⇒ Vulnerable areas:
dry land, drought prone areas.



(d) Climate change and Hydrospheric events:

(1) With rising temperatures, the extreme event like cloudburst, flood, Avalanche, impact channel flow ⇒ flooding
Eg Assam floods 2022.

* don't use symbols, mention the word completely.

Climate change extreme events ; biosphere

① Extinction of flora & fauna : as the biological activities ~~inst~~ hint by '

(6 of 13 species in India are endangered, especially western ghats hotspot,

CASE

Studies show parrots have grown by 10% since 150 years to maintain body temperature balance ⇒ Adaptation

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good case study to explain the argument. keep it up.

Need to adopt ecological sustainable approach to ensure decreased ~~to~~ enviro hazard & climate disasters as per the report.

Remarks

3. (b) Discuss the possible impacts of introducing Genetically Modified crops on biodiversity? (200 Words) (15)

Genetically modified crops are crops whose genes have been altered with use of biotechnology to achieve required properties & yields.

Genetically modified crops ~~prove~~ usage prove Malthusian fears of food insecurity to be ~~fatal~~ less.

Impact of GM crops on Biodiversity:

①. Positive impacts:

① With GM crops modified to be less harmful for nature: ie soil nutrient efficiency, water use efficiency ⇒ can help in rejuvenation and replenishment of resources.

②. Drought resilient crops: Ensure

Remarks

Briefly give some general advantages of GM crops.

Also add GM crops can add some positive impact ie these crops can improve resistance of crops to certain pests & disease & hence can overcome threat of extinction.

food security in wake of climate change.

(eg. GM soyabean crop in Argentina)

(2) Allelopathic / chemical based self control of weeds/ insects ⇒ help farmers, ↓ input cost →

(eg HtBt cotton, in Maharashtra)

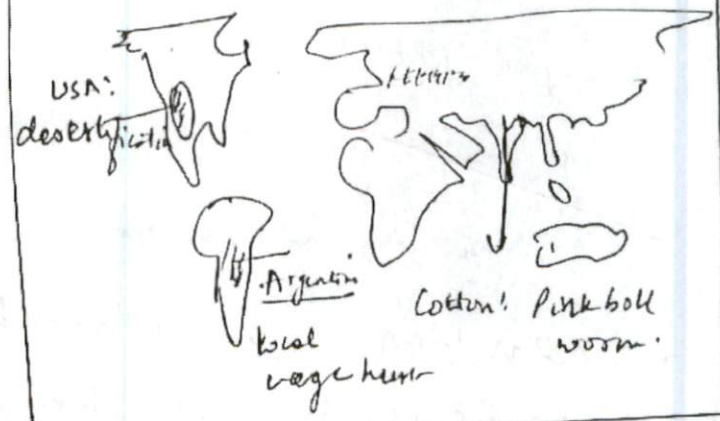
(B) Negative impacts :

good Interlinkage of concept.

(1) GM crops can act as invasive species affect the local ~~bio~~ vegetation ~~in~~

(eg Eucalyptus ~~in~~ and GM rubber in Assam)

(2) Introduce or be attacked by insects / pests harmful



Remarks

threat of monoculture of GM crops leading to reduction in diversity is high

local vegetation also. Eg pink bollworm pest on Bt cotton);

(3) Antimicrobial resistance of pests against GM crops, insecticides ⇒ harm the food chains challenge the local fauna

biotic interaction: (predations, competition)

(4). GM crops may also alter the soil nutrients, soil carbon ⇒ affecting soil microbial activity. + HUMAN HEALTH

Even though GM crops can help in assuaging food problems but its harmful aspects of human and biodiversity impacts too need to be studied.

8

* mention some brief on India's experience in GM crops & its various traits & bodies to check the GM crops ie India.

Remarks

3. (c) Discuss the major processes and factors involved in the soil formation. (200 Words) (15)

Soil formation is a complex process involving different climatic factors, biotic and time factors affecting its formation.

MAJOR ~~PROCESS~~ FACTORS : SOIL FORMATION

① Climatic factors :

→ Temperature, pressure, or relative humidity affect the soil processes

eg wet regions ⇒ leaching dominant ⇒ Litosols, Podzols

② Parent Material

this affects the colour, mineral composition of

Remarks

soil, (eg. Black soil from Deccan Lava basaltic plateau, Red & yellow soil from granitic metamorphic)

8

③ Time factor:

- The soil profiles depend on time

(eg Azonal & zonal soils)

Heterozem: cactus

Zonal soil

Azonal soil

good presentation:

④ Biotic factors:

- add nutrients to soil (nitrogen fixation)
- also help in weathering (eg earthworms)

add a brief on role played by burrowing animals, trees in soil formation.

Processes:

① Denudation process is involved in soil formation

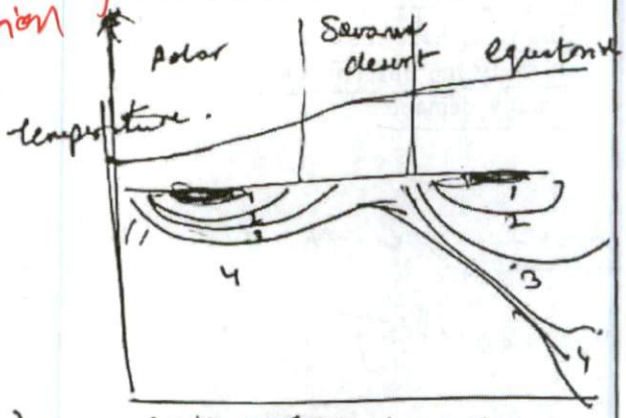
- Weathering
- erosion
- Transportation
- Deposition

Remarks

*mention more on desilication, gleyisation, role of plants in soil formation

Weathering: Depends on rock structure & chemical composition

(eg Karst ~~top~~ region: high chemical dissolution) → Basic soil)



Soil profile based on weathering

② · Temperature & precipitation also increase weathering

eg. Freeze thaw in polar regions, Exfoliation & granular grains, sand in dry regions: Thermal effect)

③ Erosion: wind, fluvial process, glaciers impact soil form (eg Alluvial soil:

④ Transportation: leaching of soil nutrients (eg desilication), iron and Aluminium concentrate → Laterite soil

→ Translocation: illuviation & eluviation processes form mineral & soil profiles.

The soil formation takes years for formation thus need conservation & restoration.

Remarks *mention some threats being faced to soil profile these days due to soil erosion

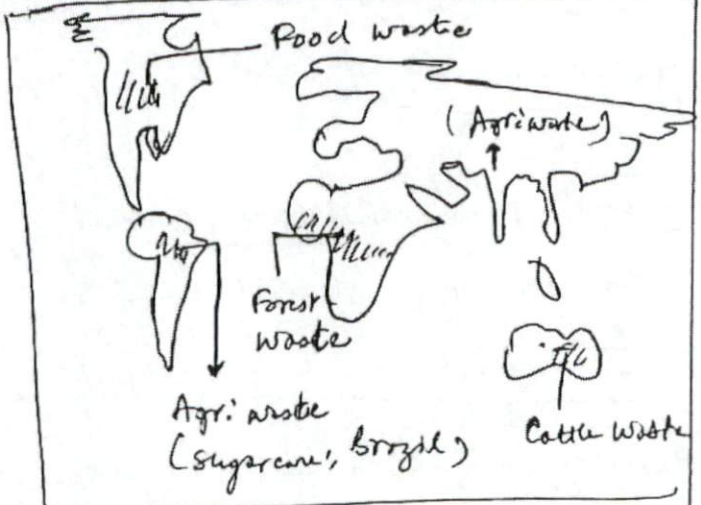
4. (a) Bio-fuels have the potential to fulfil our future energy demands. In this context identify the different biofuel and also analyse its viability in fulfilling our future energy demands. (250 Words) (20)

Biofuels are the next oil of 21st century which has capability to be a replacement to petrochemicals and thermal sources of energy.

Potential of Biofuels

1) Circular Approach in (Resource management)

→ Recycle & Use waste as energy (eg Food waste: USA)



Biofuel : prospects

good presentation.

② Rural Area Development :

→ Food waste and agri-wastage can be converted to energy ⇒ ↑ income of farmers.

Remarks * Show some biofuels prospective regions in India as well.

* potential of Biofuels → Cleaner & greener
→ Energy security to nation
→ doubling of farmers

[eg: Gobar Dhan scheme] & ~~Jaitra~~ Mlo Jal : Livestock waste to biofuel)

③ Develop least developed nations :

④ eg [African nations] can use natural resource for energy generate.

④ [Women] play major role in Biofuel

(eg. [Bihar govt: Ethanol policy] & capital subsidy to women.

good gender dimension

[Types]
- → [Agri waste based]
- → [Food waste]
- → [industrial : paper, forest based, waste]
- → ② [Algae based] : specialized
- → ③ [Genetically modified plants based]

The [National Biofuel policy], India has divided

properly classify them in Ist, IInd, IIIrd & IVth generation of biofuels

Remarks

Ist – agri waste
IInd gen – woody crops
IIIrd – Algea
IVthgen – GM organism to sear better carbon & being used as Biofuels.

*mention some GoI initative ie Biofuel policy 2017/18; methanol economy by NITI aayog etc..

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biofuels is 4 categories based on level of development

Viability : meeting future Demands

10.5

① ~~Ethanol~~ Blending fuel based issue: Ethanol blending beyong 20% needs modification in engine system.

② Demand supply gap: Raw material or feedstock need to be continuous [eg maize or bagasses from farmers]

⇒ need contract farming / land over devoted to biofuel crop] eg Jatropha

③ Capital intensive:

- Need local level (Bottom top approach) for for grassroot level use & generation.

④ Biofuel grid: Regional disparity : meet

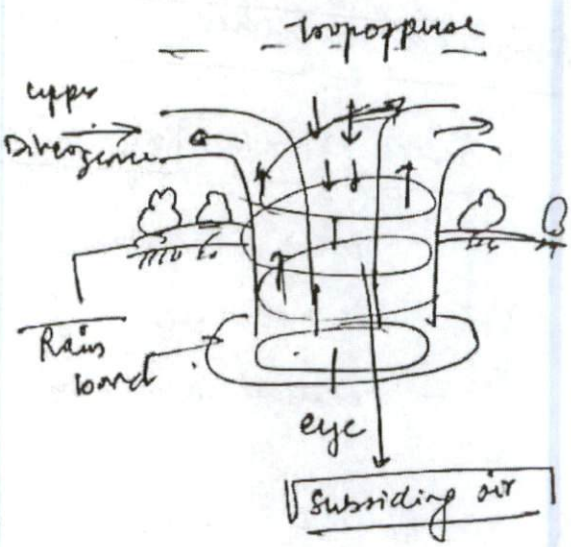
the Biofuel can be potential energy source but need institutional, infra, behavioral change.

Remarks * Also write debate of Food crop V/S fuel crop in the answer, which is major threat in enlarging continuous raw materials for Biofuels.

4. (b) Write the favourable conditions for the formation of tropical cyclone. Also illustrate associated weather conditions. (200 Words) (15)

An tropical cyclones are thermally induced low pressure systems developed in tropical and subtropical regions that play major role in meridional heat transfer.

Favourable conditions



① Sea surface temp. > 27°C, ⇒ warm condition (low pressure)

② Low vertical wind shear help in spiralling of winds

③ Rotational force : helps in circulation of winds, → ∴ not formed in 5-10° N/S latitude.

④ upper air divergence and already a

Remarks * would mention some tropical cyclone vulnerable areas in the world with a map.

low pressure area developing.

the tropical cyclones are fuelled by latent heat of evaporation and need constant supply of moisture for its survival.

8.5

Associated weather conditions:

① weather at the eye of cyclone

- calm conditions, ~~upper air~~ divers
- air subsidence => warm conditions
- relative humidity is high.

② weather at the walls of eye:

- marked by strong winds and instability.
- the winds from surrounding ~~rise top~~ blow in as the water evaporates and region has high relative humidity.

Remarks

③ Weather conditions near rain bands :

- the cumulonimbus clouds are formed
- There is very high relative humidity
- strong winds with speeds > 150 kmph, and precipitation occurs.

④ Weather condition during cyclone :

→ ~~winds~~ cyclones have wind system in anticyclonic direction (N. Hemisphere) ⇒ wind > 200 kmph : Super cyclone ⇒ (Flooding / Storm surge)

⑤ Weather after Landfall :

- When cyclone reaches the land, the moisture supply is cut ⇒ rainfall stops ⇒ clear sky and fair weather.

The Tropical cyclone's frequency and intensity has increased with climate change & need ~~a~~ cyclone management plan.

Remarks: Mention some recent trends in cyclones in tropics & why are they on the rise & their vulnerability in Indian coasts.

4. (c) Discuss the Thornthwaite's scheme of climatic classification. (200 Words) (15)

Thornthwaite's climatic classification scheme of 1930 and 1948 were an improvement over Koppen's classification with mathematical inputs of better indices.

Thornthwaite's scheme in 1930s:

(1) Adopted Koppen's classification based on mean monthly temperature & precipitation & vegetation as indicative factor of climate.

(2) Developed precipitation efficiency as ratio of monthly precipitation to evaporation ratio.

$$P/E = \sum_{i=1}^{12} 115 \left(\frac{P_i}{t_i} - 10\right)^{10/9}$$

Based on P/E ratio, he identified

Remarks ✗ could briefly mention why & how thornthwaites was better then Koppen's classification or brief loopholes of Koppens classification.

5 humidity provinces :

	P/E	vegetation
A	≥127	Rainforest
B	64-127	Forest
C	32-63	Grassland
D	16-31	Steppe
E	<16	Desert

(2) Developed thermal index :

$$T/E = \sum_{i=1}^{12} \frac{t_i - 32}{4}$$

6 thermal provinces

(6) Permafrost (1) Megatherm (2) Meso Microtherm Taiga Tundra

Thornwaite also incorporated seasonal variation of rains : r, s, w, d. for rain throughout yr, summer dry, winter dry or dry throughout year.

Thus Thornwaite got 5×4×6 = 120 types of climate but identified 36 climates with 3 variables (of Aar')

In 1948 classification : thornwaite

Remarks

developed concept of potential evapotranspiration where losses of evaporation & transpiration were accounted for water balance study.

$$PET = 1.6\left(\frac{10t}{I}\right)^{a} \quad : \quad I = \sum_{i=1}^{12}\left(\frac{t_i}{5}\right)^{1.514}$$

8.5

a : complex function of soil type.,

thornthwaite also developed moisture index, incorporating PET, rainfall & seasonality aspects.

$$MI = \frac{100S - 60d}{PET}$$

S: total surplus rain

Thus thornwaite's 1948 classification was through, → can be used in local ~~as~~ area climate study → soil moisture & land use planning helps.

However, it is too complex & mathematical & data availability & world map depiction is an issue. → mention more of these shortcoming in elaboration.

Remarks

Section - B

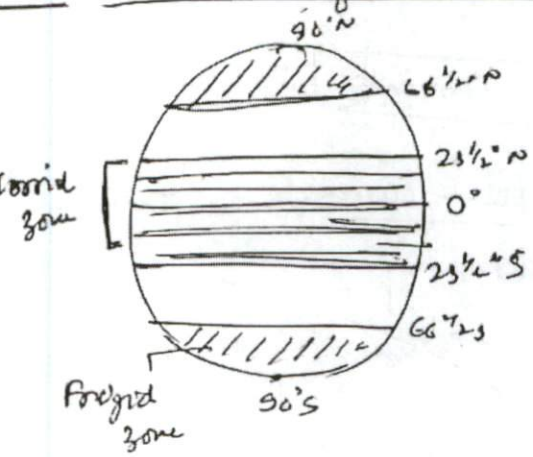
5. (a) Write the factors affecting distribution and variation of temperature (150 Words) (10)

Temperature is the measure of degree of hotness & coolness of a region and ~~is affected by~~ its study is important to study the heat budget & climatic events.

Factors affecting Distribution & Variations of Temperature

① Latitude:

Mainly, temperature decreases with latitude from equator to poles



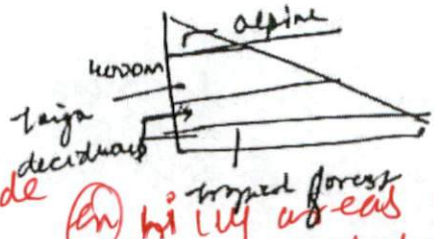
→ but temperature of ~~tro~~ subtropics & tropics more than equator as convectional rainfall & temperature moderation occurs.

② Insolation: Depends on the earth's tilt, angle of inclination & latitude. (eg radiation cooling is polar : low ~~Pa~~ isolation)

→ give more figures to explain the concepts

Remarks

③ Altitude : temperature decreases with altitude, that is visible in vegetation types also.



* Altitude mimics latitude

(Ex) hilly areas cooler than plains etc.

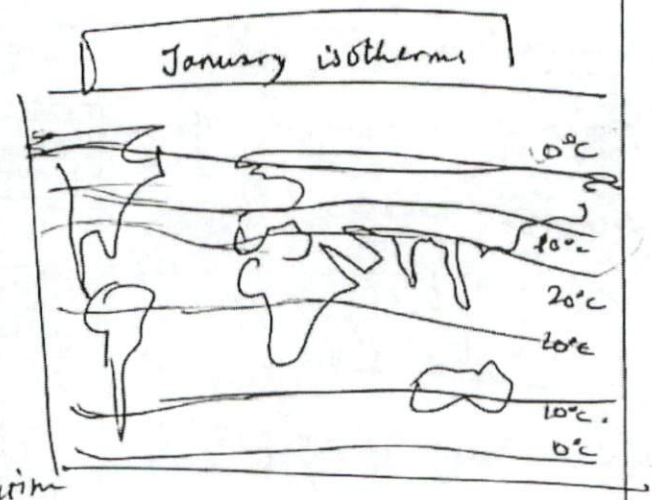
④ Land sea distribution :

- specific heat of water is high, land cooling & heating faster affects temperature

5.5

⑤ Ocean Currents :

- cold ocean current, have dessicating impact → Deserts



(b) warm ocean current increase the air mass temperature (eg. ~~total~~ maritime polar air mass)

⑥ Revolution of earth : Seasonal variation (Fig) → where it is?

⑦ Man-made impacts : urban heat island, climate change due to GHG → disturb temp.

Remarks

* Also mention role of axial tilt; revolution of earth around sun; sunspot cycle;

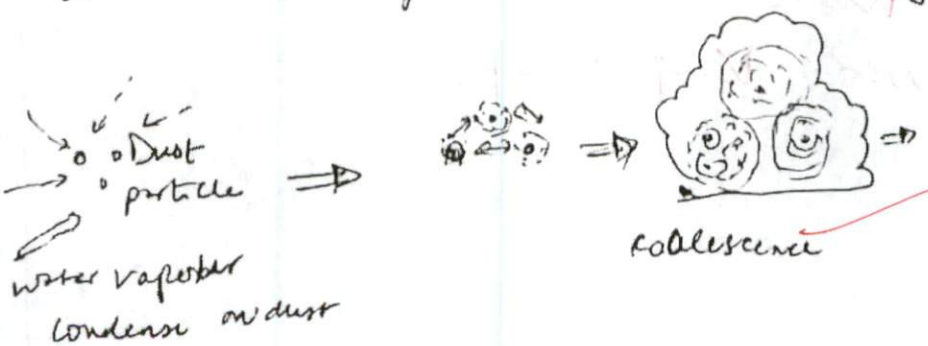
5. (b) Write a short note on Collision-coalescence process of precipitation (150 Words) (10)

Collision - coalescence process of precipitation is given by Longmuir that was an alternative to the ice crystal theory of Bergeron.

Collision - coalescence theory explains the precipitation ~~are~~ ~~in~~ due to coalescence of water vapour around a condensation nuclei.

→ the nuclei can be a dust partical or aerosol, hygroscopic particle.

with time ~~the~~ due to turbulence these small particles collide and coalesce to become large droplet & ultimately cloud



Remarks

as it gets heavy, it falls on to ground & while falling, it will attract more droplets [wake process]; the droplets further grow in size & big ~~so~~ enough to rain.

5.5

The collision & coalescence theory can help explain tropical rainfall, but snowfall or hailstorm occurence cannot be explained by it.

The knowledge also helps in [artificial rain formation] & introducing hygroscopic nuclei in air.

* you have written a well structured answer Keep it up.

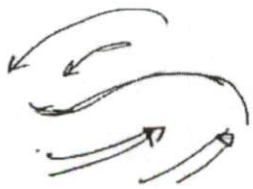
Remarks

5. (c) Polar front theory (150 Words) (10)

Polar front theory was given by (Bjerkenes & Bjerkenes) also called wave theory that helps understand the dynamic climatic conditions in mid-latitude.

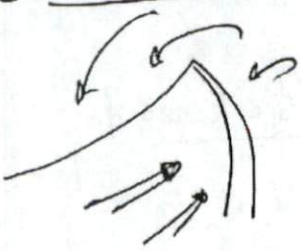
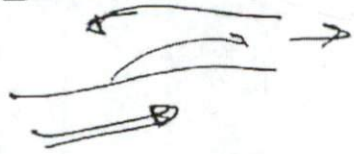
Polar front theory explains the ~~f~~ temperate cyclones & airmass interactions based on ~~for~~ frontogenesis and frontolysis*

this can be explained in 6 ~~stags~~ steps:

1) Stationary phase: ← cold ~~from~~ airmass; warm airmass. ⟹	here the cold and warm airmass stand close without interaction.
(2) Incipient stage: 	The low pressure system is triggered that ~~rotat~~ has cold front pushing warm front

Remarks

* write a brief on general characteristics of fronts, Criteria for formation of fronts.

③ Mature stage 	- Fronts are well developed. - cold front fastly pushing the warm front. ⇒ Rainfall with cloud formation occurs
④. Occlusion stage 	as cold front is faster ~~pushes~~ tosses the warm front, resulting in erratic winds & Weather conditions
5) Frontolysis : 	warm air is entirely cut off & cold air spread ⇒ Front is destroyed. ⇒ Temperate cyclone dies off

The polar front theory explains the life cycle of temperate cyclone, comprehensively,

but can't explain why low pressure is triggered,

(Baroclinic theory explains this)

6

Remarks

5. (d) Discuss the major causes of soil salinity and alkalinity. Also, suggest few measures to treat soil salinity and alkalinity. (150 Words) (10)

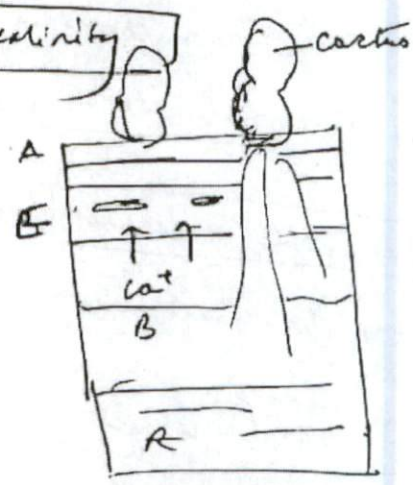
Soil salinity and alkalinity causes the pH level to increase, making soil basic. The soil alkalinity impacts the land productivity & crop yield.

Ph > 7 saline
Ph < 7 alkalinity.

Causes of soil salinity & alkalinity

① Natural causes:

Soil salinity happens when salts gets deposited in soil layers due to capillary action.



Serozem: Salt capillary action

② Dry conditions cause salinity of soil to increase ⇒ low rainfall, less washing of soil salts (solonchak, solonetz soils).

③ Soil alkalinity increases with alkaline compounds of calcium, magnesium deposited

Remarks * Show a general diagram to depict saline hit areas in the world or India.

Calcification of soil ⇒ ↓ Water percolation & ground water recharge (eg. Kankar nodules)

Manmade causes

(1) **Unsustainable farming** : (in punjab region)

- Flood irrigation ⇒ Water logging along with chemical (fertilizers) ⇒ ↑ alkalinity

(2) Industrial waste disposal → give some examples

5

Remedial Measures :

(1) treatment with gypsum, helps soil alkalinity treat.

(2) Canal irrigation, flooding conditions help remove saline soils (eg. Indira Gandhi canal),

(3). Afforestation; phyto remediation helps in soil treatment

Good solution to address salinity issue

Thus soil alkalinity & pH variations can ultimately impact food security & livelihoods.

Remarks

→ mention Soil health card benefits, drip irrigation in addressing salinity issues.

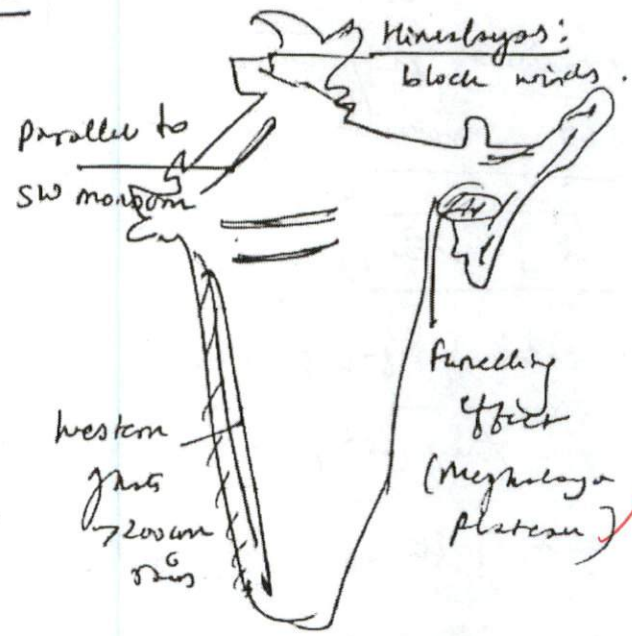
5. (e) "Topographical factors plays an important role in determining spatial and temporal variation of monsoon rainfall". Comment. (150 Words) (10)

Ans. Monsoonal rainfall ~~play~~ during its arrival & reversal is impacted by ~~physiological~~ physiographic changes.

Topographic factors : SPATIAL

(1). Orographic rainfall :

western ghats receive >200 cm rains as moisture laden wind (SW monsoon) is ~~pushed~~ & uplope (eg. Kerala, Karnataka coast.



Good presentation

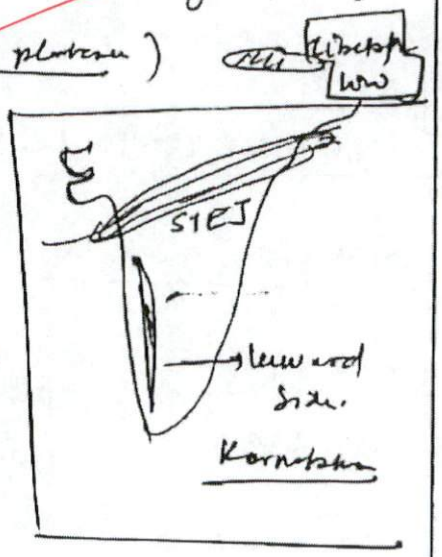
(2) North east: funelling effect due to Meghalaya plateau, Purvanchal hills, (eg Cherrapunji: >200 cm rainfall)

Remarks

(8) Aravallis being parallel to SW monsoon, ⇒ < rain in Thar desert.

(9). Windward sides vs leeward sides (drought prone) eg Telangana plateau, Karnataka plateau)

(10) Orographic plains with vast land help create thermal gradient along with ITCZ movement



Temporal variation:

→ Bifurcation of STWJ (westerly jetstream) by panir knots, the low pressure conditions over Tibetan plateau & its coupling with high pressure system in Arabsarene import flow of monsoonal winds, subtropical easterly jetstream flow (impacting monsoonal bursts)

Thus Topography plays major role in monsoon distribution.

good example.

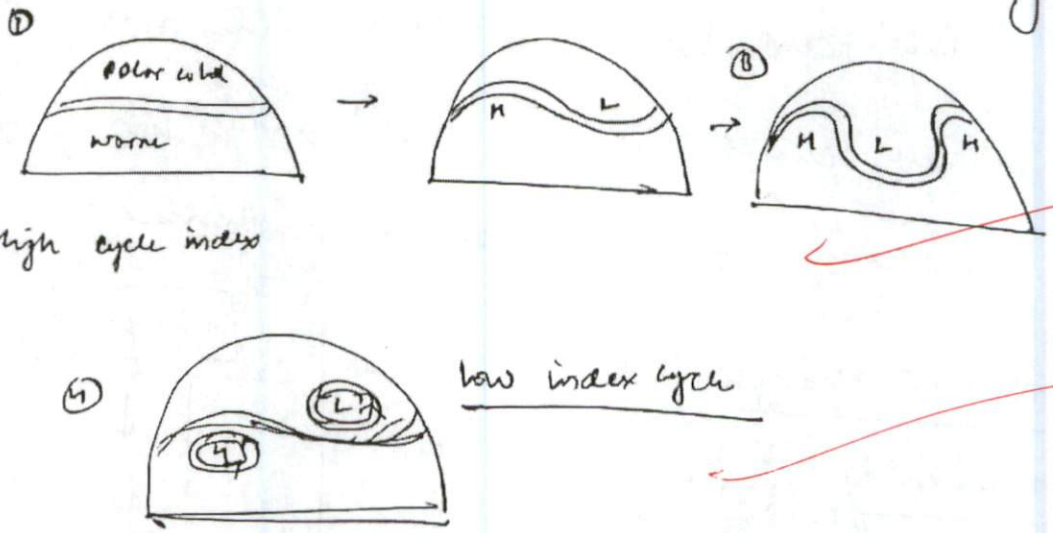
Remarks

* Also mention role of coastal alignment of coromandel coast in bringing rainfall for Chennai in North East retreating monsoon.

8. (a) What is Polar Vortex? How far climate change is responsible for erratic behaviour of the polar vortex? (250 Words) (20)

Polar vortex is the fast moving wind system in upper tropospheric atmosphere that is combined with rosby waves and acquires a meandering path.

Polar vortex are polar jetstreams that follow index cycle & jetstreams & change ~~from~~ its path from straight to meandering



Remarks

* Give a brief on polar vortex formation ie - geostrophic forces, role of differences of pressure & temperature between tropics & polar region.

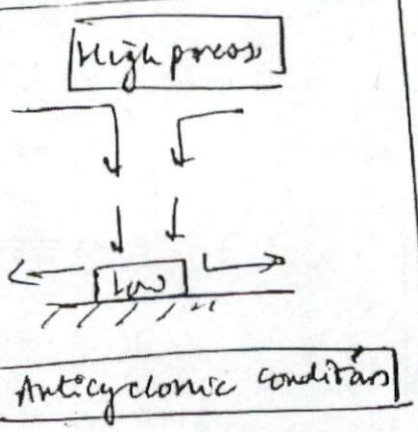
Polar vortex initially follows a straight path, but due to angular momentum conservation of its high latitude (lower circumference), it follows a meandering path, to increase its travelling path and conserve angular momentum.

11.5

This cycle follows the rossby wave formations and takes 10-15 days for one cycle.

The polar vortex thus impacts the mid latitude climate with its high and low pressure upper atmospheric system.

Climate change has led to weakening of the polar vortex due to decrease in temperature gradient



Remarks

Also briefly mention its role in stratosph evil - ozone depletion in Antartica region.

Sea level & temp. ↑ → Land - Sea temp. gradient low → Pressure system vary → polar vortex weaken

① With weakening of polar vortex as low pressure upper atm. system causes precipitation is lower tropics.

Case

- Texas in tropics: had heavy snowfall in 2020
- power outage

good example to justify your argument.

② Extreme temperate cyclones ⇒ impact wind system in mid latitude.

Case

heat waves in Canada, USA California

2022: F

good example

(B) 2022 (2021) SAD heatwaves in N. American continent & floods in Europe due to polar vortex high & low pressure system.

thus need sustainable development for climate control.

Remarks

8. (b) Analyse the impact of deforestation on climate change. Also discuss its effects on humans and animals. (200 Words) (15)

In State of world forest report has highlighted decrease in world forest by [100 million ha], making or ~3% of world area under forest; due to high deforestation.

[Impact of deforestation on climate change]

9

① Impact on [hydrological cycle]

→ The evapotranspiration rate is affected ⇒ imbalance in evaporation precipitation ⇒ causes drought and floods.

Eg. Sahel region: desertification

Case

Amazon forest: 75% of rain through its own evapotranspiration & micro climate ⇒ Deforestation impacts world climate system

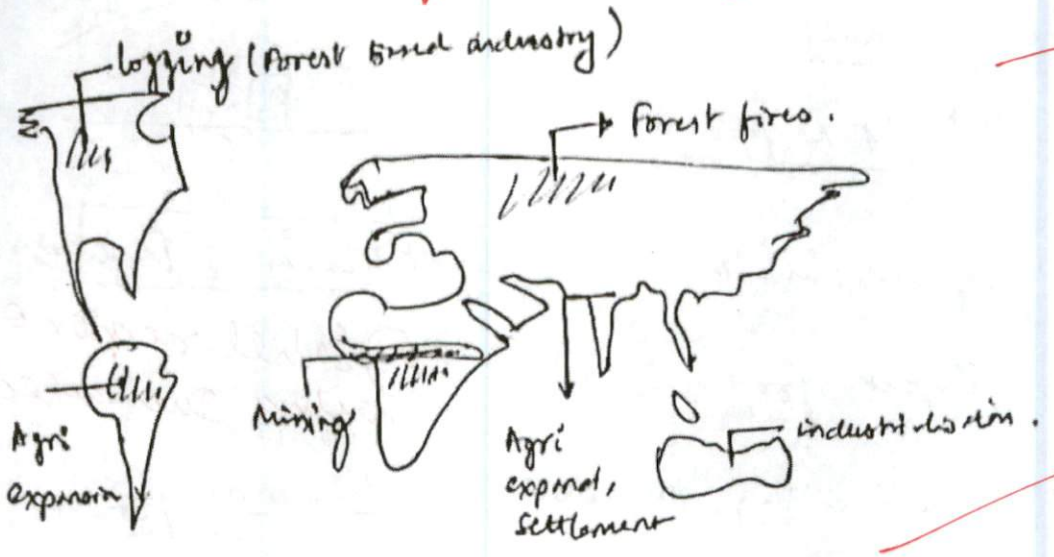
good conceptual Interim Page.

Remarks

Also add deforestation leads to soil structure change, which impacts global biogeochemical cycle.

GS SCORE

good presentation.



Deforestation : across world :

② loss of carbon storage system:

- carbon sinks ↓ ⇒ GHG ↑ in air ⇒ Green house effect ↑

③ Deforestation & Albedo effect :

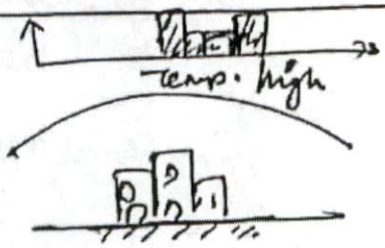
- with barren land absorbing more heat and impact heat budget.

Effects of Deforestation on human and animals

①. Microclimate variations : heatwaves, urban heat islands ⇒ to Effect

Remarks

Impacts foodcycle etc.



Human Health → sunstroke, death (eg. California)

(2). Deforestation leads to ↑ desertification of land ⇒ impact food security

(In) Sahel region of Africa desertification-which complenes already fragile ecosystem further

facing Increased

(3) ↑ vulnerability to disasters: Soil erosion, flooding, mass wasting (eg. Western ghats landslides in Kerala)

(4). Economic cost: forest based industries → Paper, Match, sports

at loss ⇒

(5) Habitat loss of Animals ⇒ edge effect that increases man-Animal conflict (eg Assam elephant - man issue)

good example also add words. like Islandization-effect given by thomas Lovejoy.

(6) loss of food resource, symbiotic relations (eg lichen)

(7) Affects natural succession & homeostasis of ecosystem.

Remarks

• loss of provisional function of forests ie
- food
- shelter
- hydrological function

8. (c) Discuss the basis of Koppen's climatic classification. Bring out the salient characteristic of 'Cs' type of climate. (200 Words) (15)

Wladimir Koppen classified the world climate based on empirical data and helped in finding vegetative, climatic & land uses relations

1) basis of Koppen's classification :

① first classified in 1900 ; used De candole's vegetative map, and established :

Vegetation = function of (Climate (Temp, press))

② Used monthly maximum temperature, monthly maximum pressure & correlated with vegetation :

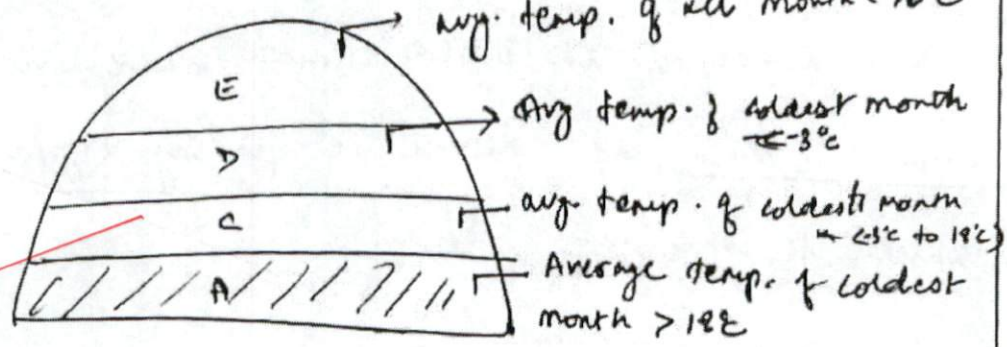
→ Two thermal consider : 5 climate types : with only 'B' having evapotranspiration > precipitation.

A - Megatherm - wet & warm -
C - Mesotherm - Humid & warm
D - Microtherm - sub humid & cool
E - Nekrotherm - very cool

Remarks

GS SCORE

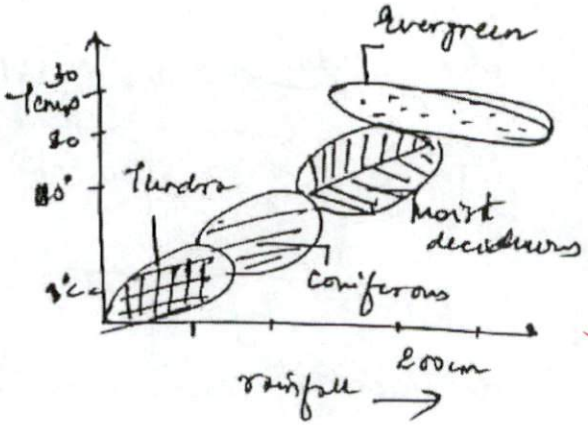
B: arid : Xerophytes.



A, C, D, E were based on thermal regime.

8.5

Koppen subdivided based on ~~mean monthly temp~~



Good prelent ation of the concept

Seasonality of rain:

S : summer dry
W : winter dry
F : rain throughout year
d : Dry throughout year

* thus Koppen based his' classification on temp., precip, vegetation type.

Remarks

mention some shortcomings in this Koppen classification.

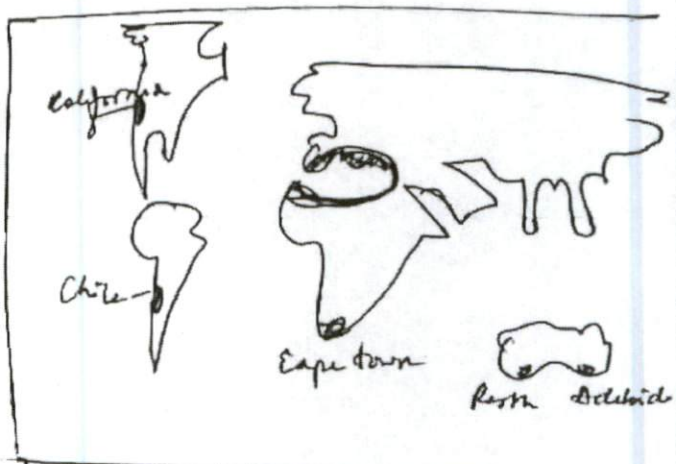
Cs type climate

'C' relates to warm humid type of climate, termed as mesotherm by Koppen, 'S' denotes the summer dry or winter rain ⇒ characteristic feature of Mediterranean form of climate.

① Due to shifting of pressure belts, the summer remains dry due to offshore trade winds & winter rains due to ~~pre~~ onshore westerlies.

good conceptual clarity

② Remain largely dry → scrub growth (rain ~ 100 - 120 cm)



Cs type

③ cool temperatures, help growth of grapes, oranges.

④ wine industry, low agri capability are economic aspects in this climate

Remarks

→ write some floral characteristics ie more of xerophytes as well in dryland regions.

REMARKS

GS SCORE

* give more examples in your answer
* classify the Biofuels into Ist, IInd & IIIrd & IVth generation biofuels
* use more of govt of India schemes for way forward or solution part
* All the Best