ForumIAS

(Don't Write anything in this Area

GS Advanced Program 2023

Generic Booklet

Test Name/Code/No. : ...37.....

Name			
Email ID.			
Roll No.			
Mobile No.		Date	

Allotted Time : 60 Minutes

Instructions to Candidates -

- There are 7 Questions in this Question paper.
- All Questions are Compulsory.
- For all updates, please visit the noticeboard – https://noticeboard.forumias.com/gsap-2023/

Important –

- Answers must be attempted in the QCA Booklet only.
- To upload the Answer Copies please visit to "My Course" section on – https://academy.forumias.com/
- Only those copies will be evaluated which will be submitted before the next class.

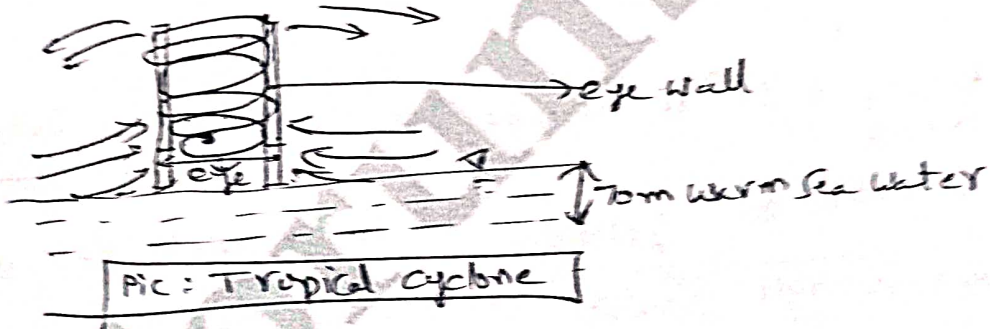
Q. No.	Grade/Score
1	
2	
3	
4	
5	
6	
7	
Overall Grade/Score	

PAGE INTENTIONALLY LEFT BLANK

Start Writing Here

Q.1) Tropical cyclones are largely confined to the South China Sea, Bay of Bengal & Gulf of Mexico. Why?

Tropical cyclones are secondary circulations which are violent storms that originate over oceans in tropical areas and move over to the coastal areas bringing large scale destruction.



Pic: Tropical cyclone

Tropical cyclones are largely confined to South China Sea (typhoons), Bay of Bengal (cyclones) and Gulf of Mexico (Hurricanes) as:

→ Presence of warm water in these regions due to water surrounding by land (causing excessive heat) and continuous inflow of water from drainage of rivers to these huge

water bodies. These prevent mixing of water in these huge water bodies providing 70-80m warm continuous supply of moist area with temperature of more than 27°C and creating low pressure conditions

→ Higher value of Coriollis force in these locations of water bodies creating continuous low pressure conditions. (LP)

(Mainly 5-25° N latitude) areas.

PIC: Cyclone due to coriollis force

→ Remnants of typhoons of North West Pacific move across South China sea to the Indian ocean.

→ Shift of ITCZ to warm these water bodies in summer and warm ocean currents from equitorial region.

With Global Warming and oceans absorbing 90% of heat even cyclones are common in Arabian sea. So, proper mitigation, adaptation as per sendai framework is needed

Overall Grading (√)

Poor			Average			Good		
1	2	3	4	5	6	7	8	9

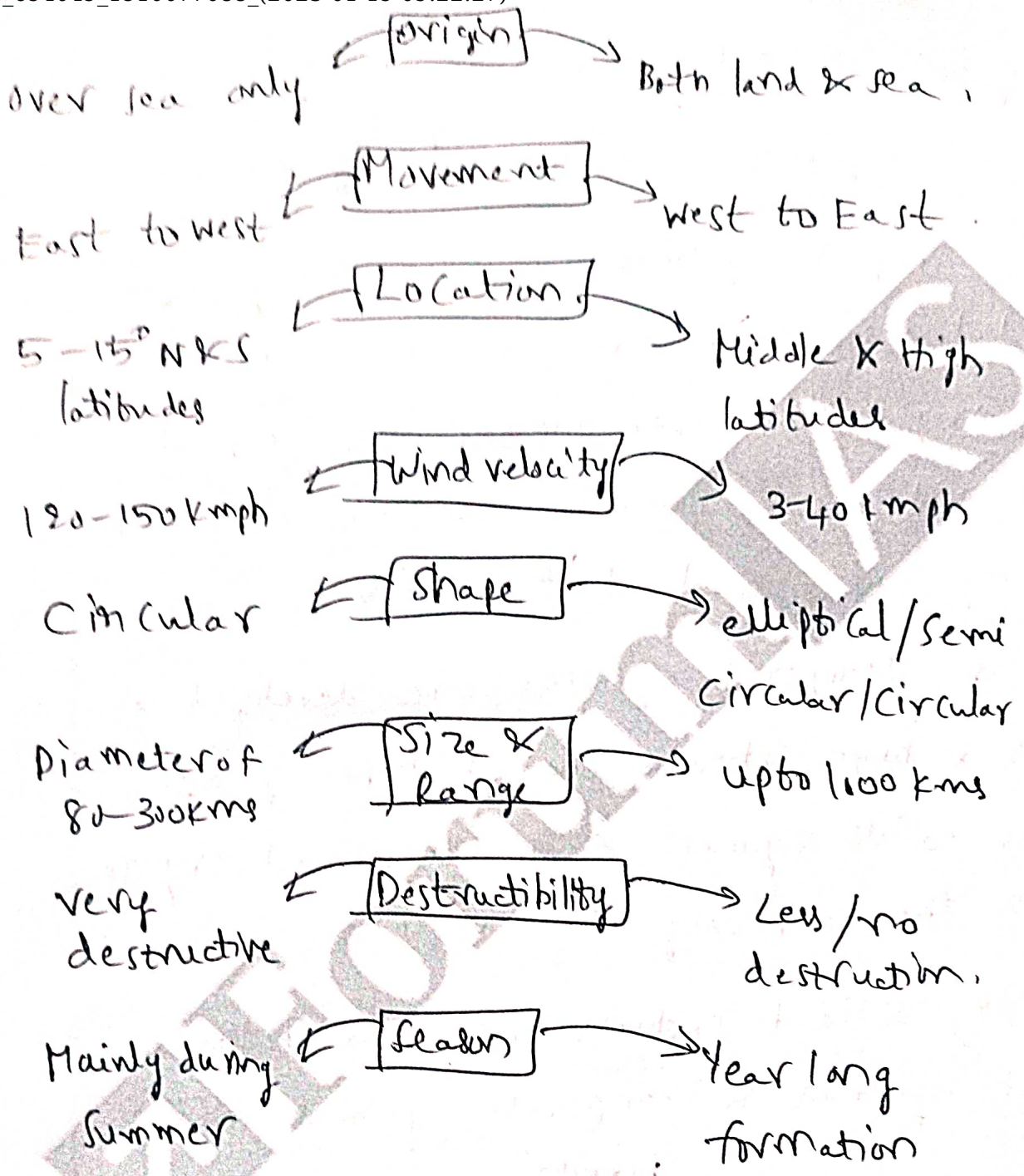
Q.2) Bring out salient differences between tropical cyclones & temperate cyclones.

Tropical cyclones are secondary circulations which are violent storms that originate over oceans in tropical areas and move over to the coastal areas bringing large scale destruction.

Where as Temperate cyclones are developed in middle & high latitudes when 2 opposing air masses collide against each other and try to attack the territory of another.

Further, salient features differences between tropical cyclones & temperate cyclones are

Parameter	Tropical Cyclones	Temperate cyclones
Mechanism	→ Formed by heat engine energized by latent heat of Condensation	Formed by well developed frontal system of 2 contrasting air masses



Proper prediction of tropical & temperate cyclones by early warning systems is key for proper disaster management to prevent human, material loss

Overall Grading (√)

Poor			Average			Good		
1	2	3	4	5	6	7	8	9

Q.3) Define Bombogenesis. How Bomb cyclone is different from a temperate cyclone?

When a mid latitude cyclone rapidly intensifies, dropping at least 24 mb pressure over 24 hours. giving rise to quick pressure difference/gradient between 2 air masses with strong winds called bombogenesis. where as

Temperate cyclone is a middle & high latitude storm formed by frontogenesis (occluded front) if 2 opposing air masses against each other.

Bombogenesis is different from Temperate ~~Tropical~~ Cyclone as.

Parameter	Bombogenesis	Temperate cyclone
Intensity	More intense due to rapid pressure drop	Less intense than bombogenesis.

Mostly In North West Atlantic, north west Pacific ← Location → Mostly in Europe, UK is in Mediterranean belt.

Mostly In cold months ← Occurence Season → Throughout the year.

High damage ← Damage → Less damage.

very high ← Wind speed → 3-40 kmph.

150-200 kmph Sea + Land based ← Origin → Land based.

However, they have similarities like

- Both formed by frontogenesis of 2 opposing air masses
- formed in mid latitudes
- Low pressure at core

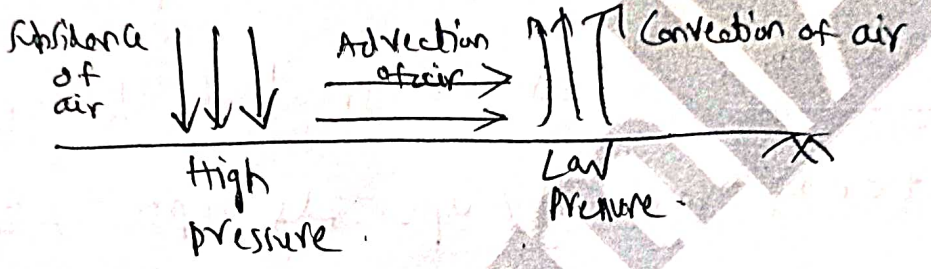
Better Models predicting cyclones are need of hour to prevent disasters in event of climate change.

Overall Grading (√)

Poor			Average			Good		
1	2	3	4	5	6	7	8	9

Q.4) Discuss the forces which govern the air movement on the earth surface.

Air in movement (motion) is called wind which blows from high pressure to low pressure.



PIC : Air Movement

Factors governing the movement of air on the earth's surface :

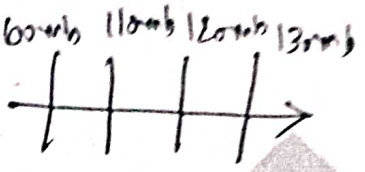
Horizontal winds at the surface are affected by Combined effect of 3 forces

- Pressure gradient force
- Frictional force
- Coriollis force

→ Pressure gradient force : Difference in

atmospheric pressure produces a force. (driven by temperature differences)

strong pressure gradient due to ~~high~~ close isobars



weak pressure gradient force due to distant isobars.

Pic: Pressure Gradient Force

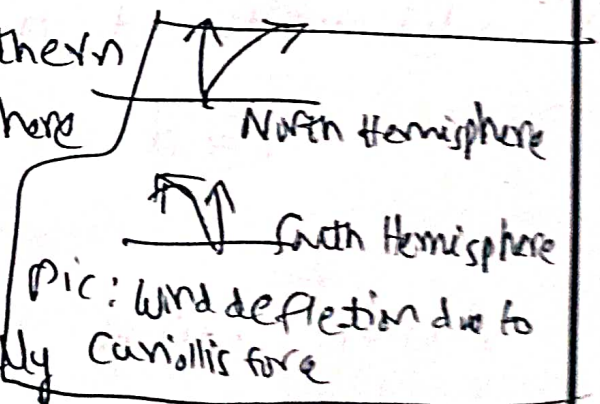
→ Frictional Force ; It is greatest at surface & extends vertically upwards upto 1-3 km

It is minimum over the sea surface

→ Coriollis Force : Apparent force caused due to the rotation of earth around its axis

It affects / deflects wind to right in Northern hemisphere & left in Southern hemisphere

Ex: Responsible for cyclonic formation in tropical areas



Pic: Wind deflection due to Coriollis force

→ Gravitational Force acting vertically downwards

Air movement around the world is responsible for heat distribution, varying weather phenomenon

Overall Grading (√)

Poor			Average			Good		
1	2	3	4	5	6	7	8	9

Q.5) Discuss dew point and various forms of condensation.

Dew point is the temperature at which saturation occurs in a given sample of air.

Condensation is the transformation of water vapour into water. It is caused by loss of heat. Condensation depends upon % of relative humidity, degree of cooling of the air.

→ Due to condensation, mostly temperature of air is reduced to dew point with its volume remaining constant.

Condensation occurs only when water is super saturated ie relative humidity > 100%.

↳ Dew point > freezing point (0°C) = Condensation

is in liquid form Eg: dew, fog, rainfall

↳ Dew point < freezing point - Condensation

in solid form Eg frost, snow.

Various form of Condensation are:

Dew:

Moisture is deposited in form of water droplet on cooler surface rather than hygroscopic nuclei.

Eg: Plant leaves.

Here temperature is above freezing point.

Frost:

Condensation takes place below freezing point.

Here excess moisture is deposited in form of minute ice crystals instead of water droplets

Fog and Mist:

Fog is a cloud with its base at/near to the ground. These are miniclouds in

which condensation takes place around nuclei provided by dusty, smoke & salt particles.

Mist containing more moisture than fog with each nuclei containing thicker layer of moisture.

cloud: Condensation of water droplets around hygroscopic nuclei caused by cooling of lifting of air.

Precipitation:

Release of ~~water vapour~~ moisture after condensation of water vapour.

Condensation in various forms affect ~~food~~ security (productivity of crops → frost damage), transportation (affecting sight clearance), pollution (smoke+fog=smog), Disaster (clouds by precipitation, lightning) etc.

Overall Grading (√)

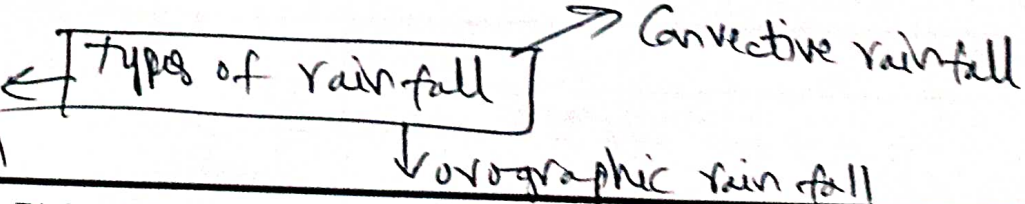
Poor			Average			Good		
1	2	3	4	5	6	7	8	9

Q.6) Give an account of the types and distribution of precipitation on the surface of the earth.

Precipitation is the release of moisture after condensation of water vapour. It occurs in various forms

→ **Rainfall**:

Warm, moist & unstable air is lifted & it becomes saturated (by decrease of temperature). Due to condensation of water vapour around hygroscopic nuclei clouds are formed. cloud droplets became so huge due to coalescence ~~of air~~ and air was unstable to hold them then rainfall occurs



Snow fall : Precipitation occurs in form of ice

Sleet :

→ Frozen raindrops and refrozen melted snow water.

→ Layer of air with temperature above freezing point overlies a subfreezing layer near the ground.

Hail storms :

→ Concentric layers of ice with drops of rain getting solidified into small rounded pieces of ice.

Distribution of precipitation on the surface of the earth :

Rain-fall : Decreases from equator to the poles.

Continentality : More rain-fall near coastal areas

than the interior of Continents.

→ More over ocean due to greater sources of water

→ 35°-40° N,S more rain on eastern coasts & decreasing towards west. (due to Easterlies)

→ Due to westerlies, 45°-65° N,S) rainfall is more on western coasts & decreasing towards East

→ Local geography → orographic rainfall on windward side of mountains

Eg Himalayas leeward side → Rain shadow region.

Seasonally → equator: uniform rainfall distribution in a year.

→ Monsoon in South & South East Asia in summer due to shift of ITCZ

→ Cyclones (Tropical, Temperate) also effect rainfall.

Mediterranean / wet winters

Snowfall: Higher latitudes, higher altitudes.

Sleet / Hail: Winter with ~~anticyc~~ temperature inversion in land locked areas.

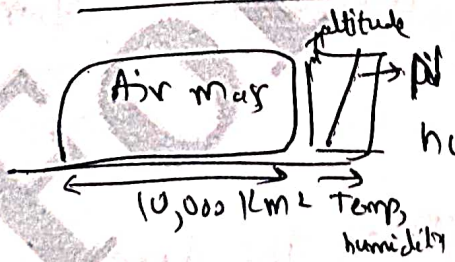
Precipitation is becoming erratic due to climatic change. So, more advanced predictions are required by IMD

Overall Grading (√)								
Poor			Average			Good		
1	2	3	4	5	6	7	8	9

Q.7) 132455_604049_1910077088_(2023-01-19 09:22:27)

Define air masses. How do they originate? And bring out their role in influencing climatic patterns around the world

Air mass is defined as a homogenous body of air in which the upward gradients of temperature and humidity are fairly uniform over an extensive area covering thousands to millions of square kilometres. However there may be little horizontal variation in temperature & humidity.

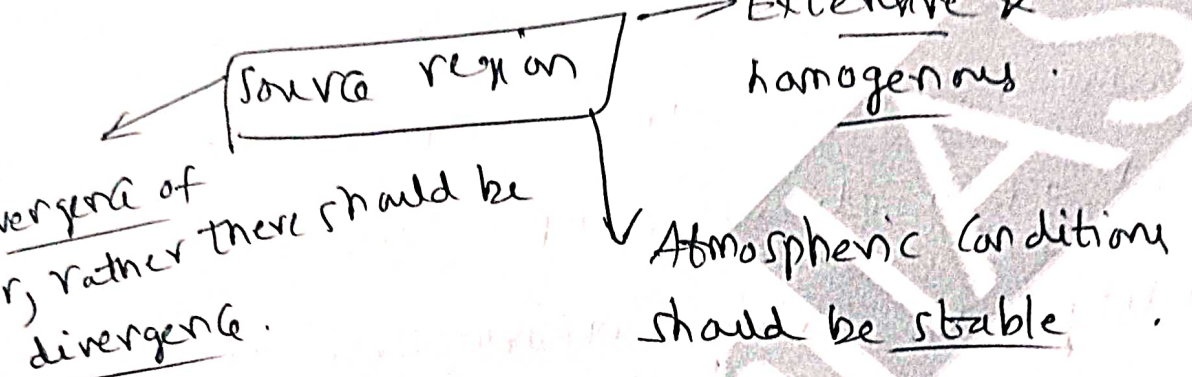


Pic: Air mass

Origination of air masses:

→ They originate when atmospheric conditions remain stable and uniform over an extensive area (source region) for a fairly long

period so that air lying above the area attains the temperature and moisture characteristics of grand surface.



Eg: Maritime Tropical (mT)
Continental Arctic (cA)

Role of air masses in influencing climate across the World:

→ Summer Monsoon: The weather of South & South East Asia is largely controlled by maritime tropical air mass giving Summer mansoons. (life line of India)

→ Western disturbances: These bring rain.

over the northern part of India during winters & it is beneficial for growing of Rabi crops.

→ Temperate cyclones : Formed by the process of frontogenesis and associated temperate cyclones are responsible for climatic instability and British type of climate

→ Draught of Great Plains of USA is caused by the dry continental air mass from Mexico moves to Great Plains causing aridity causing draught in these regions.

Air masses help in understanding the weather phenomenon around the world for better disaster Management, food security and Economic development.

Overall Grading (√)

Poor			Average			Good		
1	2	3	4	5	6	7	8	9