Weather and Climate

Q/A

1. Difference between —

(a) Weather and Climate.

Weather	Climate
1. Weather stands for actual atmospheric conditions for a shot period.	Climate is composite pictures of atmospheric conditions for a longer period (30 years)
2. The weather changes from day to day.	The climate is everlasting and does not change often.
3. Weather is actually present at a places. It is what you get.	Climate is what you expect.

4. Weather refers to a particular place.	Climate refers to a particular area.
5. Weather is uncertain and we can only forecast it for a short time ahead.	Climate has a high degree of accuracy and it is similar year after year.

(b) Condensation and Evaporation

Condensation	Evaporation
1. Condensation is the process by which water vapour is changed to water	Evaporation is the process by which water is changed to water vapour.
2. Cooling of air leads to condensation.	High temperatures favour evaporation.

3. This change takes place from gaseous to liquid condition.	This change takes place from liquid to gaseous condition.

(C) Relative Humidity and Absolute Humidity.

Relative Humidity	Absolute Humidity
1. It is a ratio between the actual amount of water vapour present in an air at the temperature and the maximum amount of water vapour that the air can hold at the temperature	The total amount of water vapour present in an air at a particular temperature is absolute humidity.
2. It is a ratio between the absolute humidity	It is defined as weight of Water vapour per unit

	and vapour capacity of the air.	volume of air.
3.	It is maximum in equatorial region, but is lowest in hot desert	It is maximum over oceans and lowest in high pressure areas.

(d) Dew and Dew Point.

	Dew	Dew Point
1.	The droplets of water deposited on rocks, grass, leaves and the ground are termed as dew.	The temperature at which an air becomes saturated is called dew point.
2.	Air, near the ground is condensed to form drops.	Condensation of air begins at this temperature.

3. Frozen drops of dew are known as frost.	The relative humidity at dew point is 100%.

(e) Fog and Mist

Fog	Mist
1. Fog is condensed water vapour hanging in the air.	Thin fog is called mist.
2. The visibility is less than 200 metre.	Visibility is more than 200 metre.
3. Fog is formed due to cooling of air on dust particles.	Mist is formed due to cooling of wet air by radiation.

(f) Precipitation and Rainfall.

Precipitation	Rainfall
1. It is the collective name given to different forms of release of moisture after condensation.	It is a type of precipitation when moisture falls on the earth in the form of droplets of water
2. Precipitation has two forms: (a) liquid (b) solid	When cloud particles grow heavy, they falls as rain drops (in liquid form)
3. Rainfall, snow, hail are the common forms of precipitation.	Three types of rainfall are convectional, relief and frontal.

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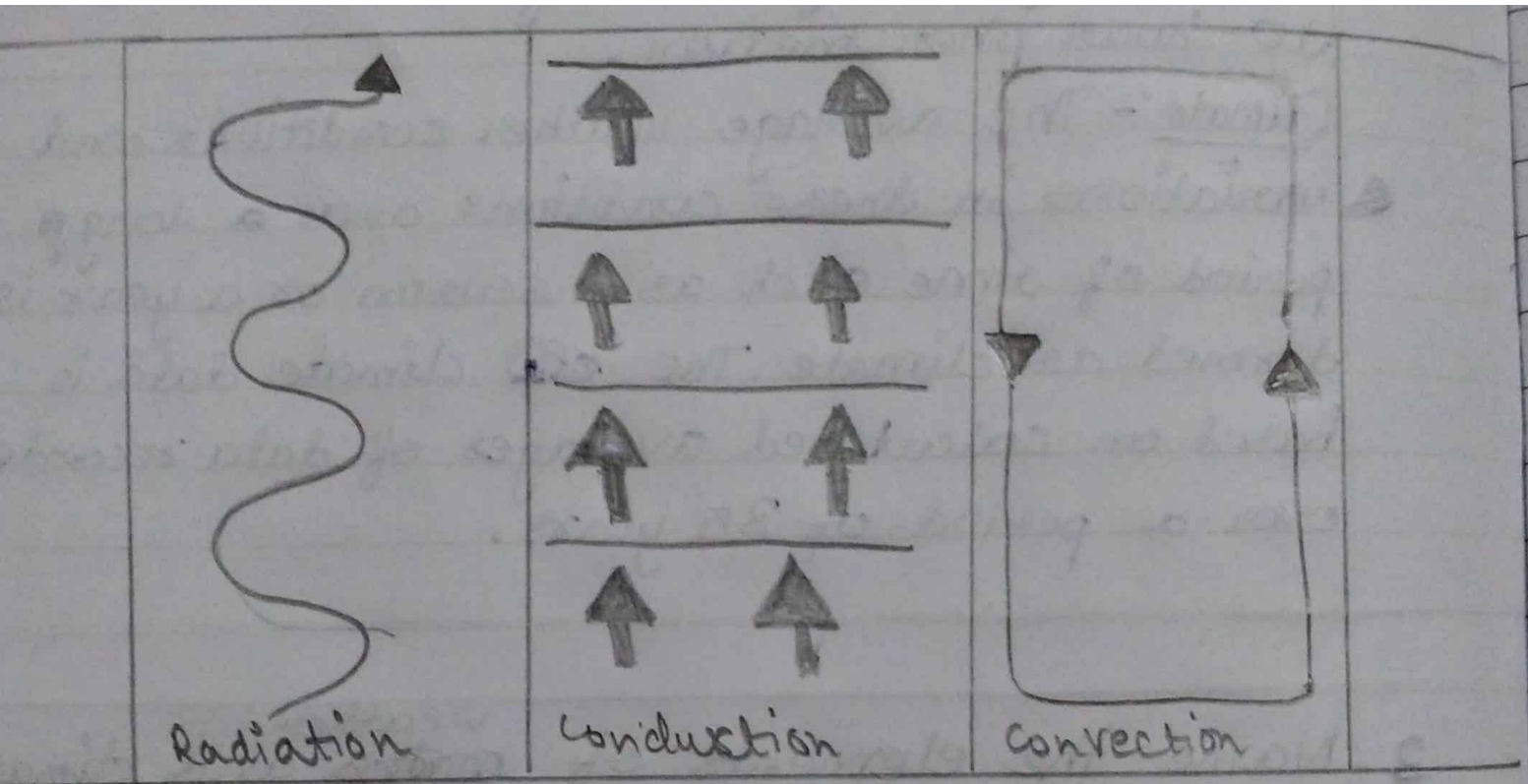
2. What is weather and climate?

A:- Weather :- Weather refers to the sum of the atmospheric conditions at any place or in an area at a particular time. Weather is the description of the atmospheric conditions of a particular place at a particular time or a short period of time. Weather is essentially a day-to-day or even an hour-to-hour phenomenon.

Climate :- The average weather conditions and variations in these conditions over a long period of time such as a season or a year is termed as climate. The climate data is based on calculated averages of data recorded over a period of 35 years.

3. Name the elements of weather and climate.



Process of Heating of the Atmosphere

A:- The atmospheric conditions, which make up the sum total of climate, are called elements of weather and climate. These elements vary from place to place and from time to time. All these elements comprise the following:

(a) Air Temperature (c) Cloudiness and Rainfall
(b) Air Pressure and Wind

4. How is atmosphere heated. Explain with diagram.

A:- The air is headed by the following main process:-

(ii) Radiation: It is a process by which heat waves are sent out by the earth's surface. At first, the surface of the earth is heated by the sun. The heat of the earth's surface is then radiated to the lower atmosphere. The air in the lower layer of the atmosphere gets heated.

(ii) Conduction :- A particule transmits heat to another particele in contract with it. This process is called conduction. The lower layers of air are heated by conduction of heat from the earth's surface. The upper layers are heated by lower layers through conduction.

(iii) Convection :- The air particles being heated by their contract with the earth's surface become lighter and rise up. The comparatively cool air particles in the upper layers are heavier and come down slowly. In this way air currents are formed and these are known as convection currents.

5. Name the factors which effects the air temperature. Explain any three of them.

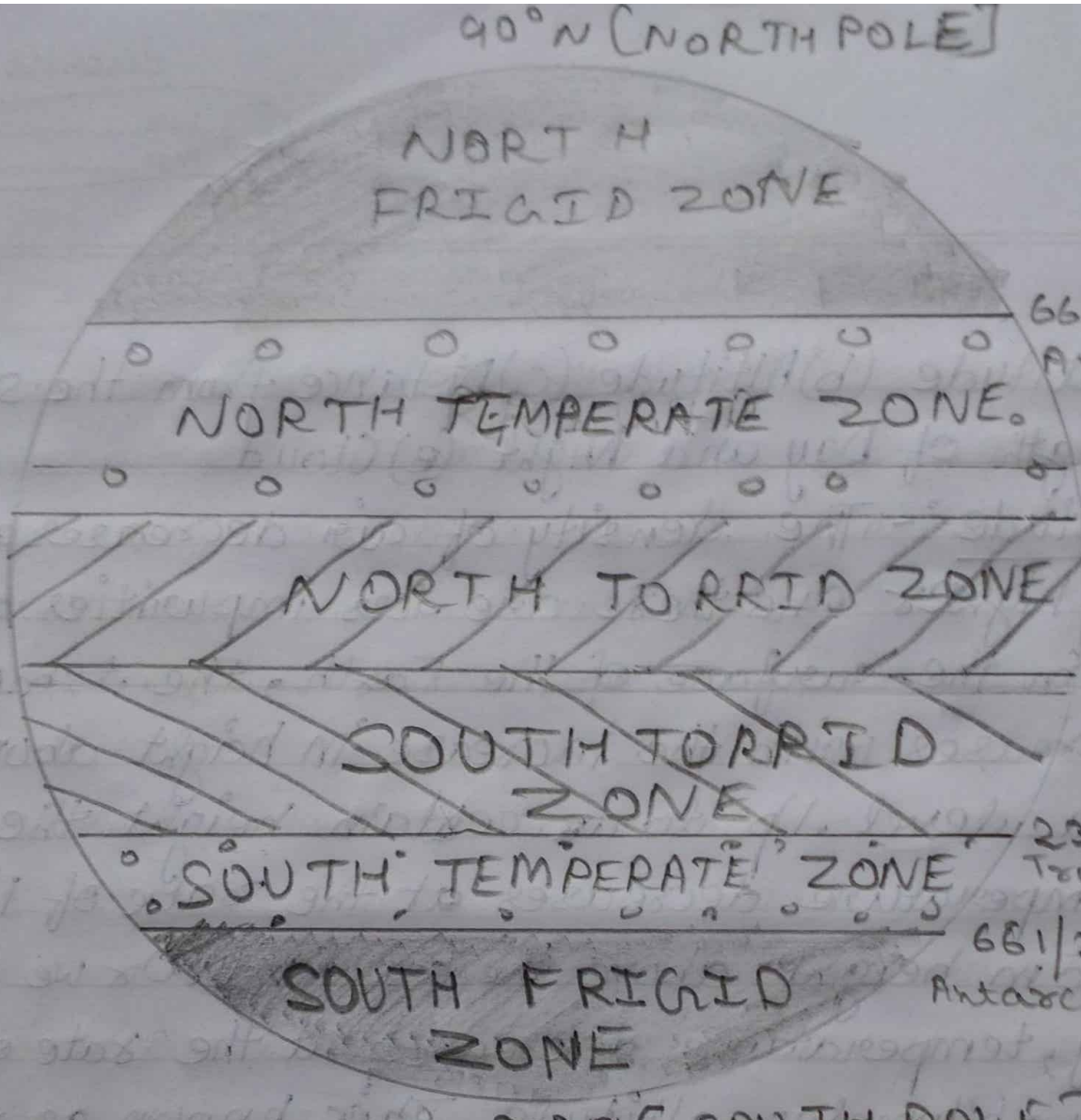
A:- The factors that effects the air temperature are :-

(a) Latitude (b) Altitude (c) Distance from the sea
(d) Length of Day and Night (e) Cloud

(a) Altitude :- The density of air decreases as you go higher and there are less impurities away from the surface of the Earth, the temperature decreases with the increase in height above sea level. Up to a certain height the temperature decreases at the rate of 1°C for 165 m height above the sea level. Or we may say, temperature decreases at the rate of 6.5°C per kilometer altitude. It is known as the normal lapse rate of temperature.

(b) Distance from the sea :- Due to the phenomena of land and sea breezes the temperatures of the coastal margins is comparatively cooler than that of a place situated far away from the sea.

(c) Length of Day and Night :- Summer days are longer than winter days. Longer periods of daylight heat the earth more. So summer temperature is higher than winter temperature.



Heat Zones of the World

6. Explain heat zone of the world with diagram.

Ans:- We can divide the globe into 5 temperature belt on the basis of variation in temperature from the equator towards the poles:

(i) The Torrid belt.
(ii) The North Temperate belt
(iii) The South Temperate belt
(iv) The North Frigid belt
(v) The South Frigid belt.

(i) The Torrid belt:- The belt extends between the Tropic of Cancer (23 1/2° N) and the Tropic Capricorn (23 1/2° S). This is the hottest part of the earth with mean temperature above 20°C. The sun shines over this belt more or less vertically throughout the year.

(ii) & (iii) The North and South Temperate belts: Temperate belt extends between 23 1/2° and 66 1/2° latitudes in both the hemispheres. This is the belt of moderate temperature (between 10° to 20°C)

The summers are not very hot, and the winters are hot very cold. The temperate zones of both the hemispheres can be divided into two parts: (a) warm temperate - zone between 23 1/2° and 50° latitudes and (b) cool temperate zone between 50° and 66 1/2° latitudes.

(iv) & (v) North and South Frigid belts :- Frigid zones extends between 66 1/2° and the Pole in both the hemispheres. Temperature is constantly low throughout the year because of slanting rays of the sun. These are the coldest parts of the earth with mean temperature below 10°C. The land remains frozen almost throughout the year.

7. Write short notes on :-

(a) Isotherms :- Isotherms are imaginary lines drawn on a map joining places of the same average temperature for a specified period, supposing them

to be at sea level (reduced to sea level).

(b) Humidity:- The amount of water vapour present in the atmosphere is referred to as humidity.

(c) R.H:- Relative humidity is the ratio between the quantity of water vapour present in the atmosphere at a given temperature to the maximum quantity of water vapour that the atmosphere can hold at that temperature. Relative humidity is expressed in percentage.

(d) Saturated Air:- Air is said to be saturated when it contains water vapour in its full capacity.

(e) Specific humidity:- Specific humidity is defined as the mass of water vapour in grams contained in a kilogram of air and it represents the actual quantity of moisture in a definite air.

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(f) Air pressure :- Atmospheric pressure is the pressure at any point on the surface of the earth due to the weight of the column of air above that point. Thus air pressure, considering total weight of various layers of air in atmosphere is maximum at sea level or on the surface of the earth.

(g) Isobar :- The pressure of air is shown on wheather maps by means of lines known as isobars, meaning 'equal weight'. An isobars is an imaginary line drawn on a map (or a weather chart) joining all places with equal atmospheric pressure.

(h) Condensation :- Condensation is the process by which water vapour is converted into water. Condensation can only occur when the air becomes saturated.

(i) Precipitation :- The process through which water from the atmosphere falls down on the earth is called precipitation.

(j) Rain :- Precipitation that reaches the ground in the form liquid is called rain. Rain drops are 0.5 mm to 6.35 mm in diameter.

(k) Cloud :- Clouds are formed when condensation occurs at altitudes far above the ground. Clouds consist of million of tiny water droplets and ice particles. Clouds are formed owing to the ascent of warm moist air. The cloud droplets are so tiny that they remain in suspension and do not drop on the ground. Clouds move about in response to winds and air currents and take on different shapes and sizes. The measurable proportion of cloud in the sky is called 'cloud cover' or 'cloudiness'.

(d) Inversion of Temperature :- Under normal condition, temperature decreases at the rate of 6.5°C per 1000 metre. But sometimes, the conditions show the reverse of the normal situation. So that temperature increase with height, locality and temporarily. This condition in which the cooler air is nearer on the earth's surface and the warmer air above on it is called inversion of temperature. It generally occurs in mountain valleys, especially in winter on calm clear nights.

8. Explain the role of humidity in the atmosphere.

Ans: (1) The atmosphere humidity is of vital climatic importance because different forms of precipitation, storms and turbulence etc. depend on humidity. (2) Human comfort depends considerably on the humidity of the atmosphere especially in hot countries. High

relative humidity means discomfort and low humidity causes skin to become rough and cracked. (3) Relative humidity determines the rate and amount of evaporation. So it is an important climatic factor. (4) Water vapour absorbs terrestrial radiation and thus helps in heating the earth's surface and the lower atmosphere. (5) Through the condensation of water vapour, huge amount of energy is released into the atmosphere in the form of latent heat of condensation, driving force for most of the storms.

9. Explain the importance of air pressure.

A: Air pressure is important for the following reasons:

(1) It creates winds
(2) It influences weather
(3) Changes in air pressure give important clues

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in forecasting weather.

10. Name the factors which effects the atmosphere pressure. Explain any three of them.

A:- The atmospheric pressure varies from place to place, region and from time to time due to the following factors:-

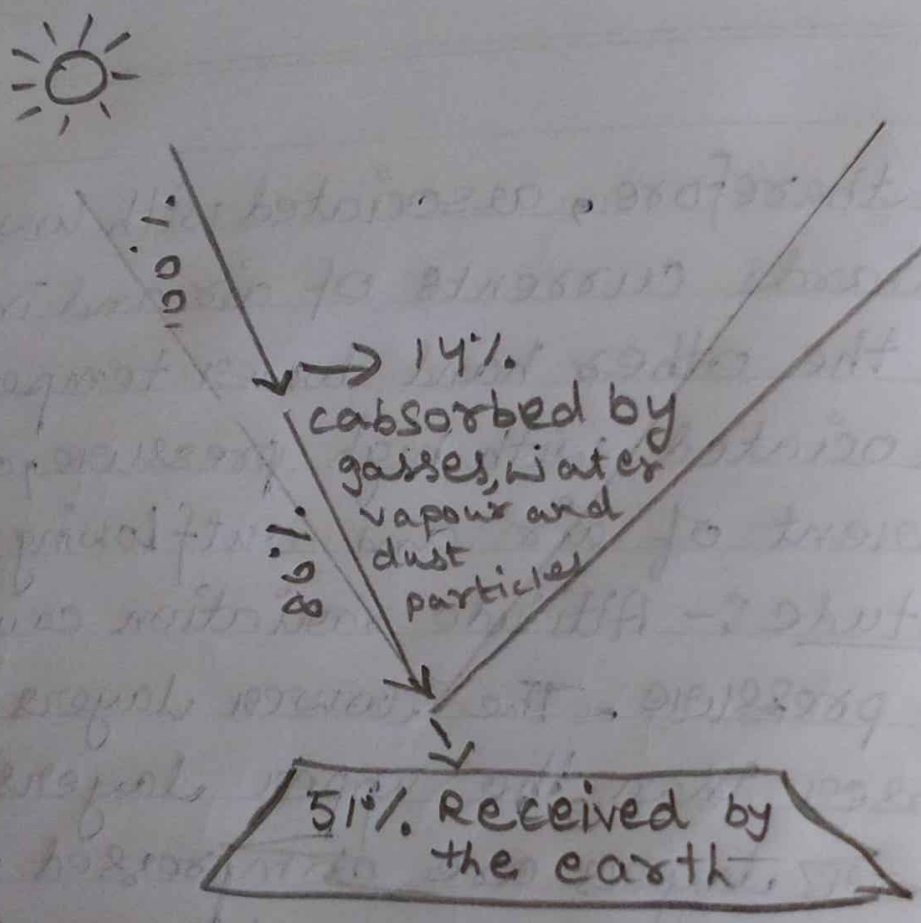
(i) Temperature
(ii) Altitude
(iii) Water Vapour
(iv) Rotation of the earth
(v) Distribution of land and water

(i) Temperature:- Air pressure has an inverse relation with temperature. The higher the temperature, the lower is the pressure. As air is heated, it expands and rises upwards. It becomes less dense and exerts less pressure. Conversely, cold air contracts; it becomes heavier and descends. This descending cold air exerts high pressure. Higher temperature

is, therefore, associated with low pressure, an upwards currents of air and inflowing winds. On the other hand lower temperature is associated with high pressure, a downward current of air and outflowing winds.

(ii) Altitude :- Altitude variation causes variations in air pressure. The lower layers of air are denser than the upper layers. Moreover, the lower layers are compressed under the ~~height~~ weight of the upper layers of air and that is why the lower layer exerts high pressure. As we go higher up, the atmospheric pressure decreases. Air pressure decreases at the rate of 10 mm per 110 metres rise in altitude.

(iii) Water vapour :- Air containing water vapour is lighter than dry air. The more the water vapour the lighter the air is. The humid air contains comparatively less nitrogen and oxygen but the dry air contains more of those. This makes the humid air lighter than the dry air.



Effective Solar Radiation

For this reason land winds are heavier than sea winds which are laden with water vapour.

11. What is Effective solar Radiation. Explain with diagram.

A:- The radiant energy received by the earth is called the 'incoming solar radiation or insolation. The incoming solar energy intercepted by the earth is defined is insolation. According to H.C. Critchfield, "Radiant energy from the sun that strikes the earth is called isolation." If we considered 100% of insolation entering the earth's atmosphere, nearly 35% of the total insolation scattered and reflected by clouds (26%), particles molecules (7%) and surface of the earth (2%) (26% + 7% + 2% = 35%). This loss of insolation is called Albedo (35%). The 35% insolation is therefore, not used for heating the atmosphere. Remaining (100 - 35)% = 65% of the incoming

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solar radiation takes part in warming up the atmosphere directly and indirectly and is called an Effective Solar Radiation. The atmosphere directly absorbs only 14% of the incoming insolation. The rest (65-14)% or 51% of incoming solar radiation is transmitted to the surface of the earth. This incoming solar radiation (insolation) first heats the solid and liquid surfaces and then the earth radiates back to the air in contract with it and atmosphere is gradually heated. These are called indirectly Effective Solar Radiation.