Ch-5 Cloud and Rain Pg:-53

Q/1 What is cloud? What are the types? Explain.

Ans Clouds which are condensed water vapour, are one of the most visible marks of the weather. They form in distinctive patterns and often give a quick clue to what weather might happen in the near future. Meteorological clouds are very significant because all forms of precipitation occur from them. It may be mentioned that not all clouds yield precipitation but no precipitation is possible without cloud.

Class of Clouds can be classified in two ways —

a) According to height :— There are two types three types of clouds :- i) High clouds ii) Medium clouds iii) Low clouds.

Cirrus, Cirro-Cumulus, Cirro-Stratus → High clouds

Alto cumulus, Alto stratus → Medium clouds

Strato cumulus, Stratus, Nimbo stratus → Low clouds

b) According to shape and formation :- Then they are of four types

i) Cirrus :- Looks like feather or fine scales.

ii) Stratus :- They have a layered structure.

iii) Cumulus :- They look like a mound of fully cotton

iv) Nimbus :- They are rain clouds, giving plenty of rainfall.

Q3) What is the relation between RH & Rainfall?

Ans Relative humidity determines the rate of amount of evaporation. So it is an important climatic factor. As the relative humidity increases, the air becomes saturated. The relative humidity of the saturated air is 100%. At this stage, air cannot hold any additional amount of moisture. Water vapour is condensed into water. The possibility of rain depends upon also a high relative humidity.

Q4) How clouds are formed?

Cloud is the most common form of 'Condensation'. When moist air rises it cools down. The water vapour present in the air also cools and changed into minute droplets of water or crystals. These droplets of water or ice crystals stick to dust and salt particles, floating in the atmosphere. These small water droplets or ice crystals form a cloud. So nothing but a collection of countless droplets of water or the tiniest crystals of ice suspended in the atmosphere. These droplets or crystals are so small that they are blown about and carried with the slightest movement of air.

Q4b Explain any five importance of RH?

Ans The importance of RH are:-

i) It is possible to find out the possibility of rainfall with the help of relative humidity (RH).

ii) Relative Humidity (RH) is essential to agricultural operations.

iii) Many chemicals and medicines deteriorates in high relative humidity.

iv) It is necessary to take into account the relative humidity before construction constructing building.

v) Radio, Television etc and other scientific instruments are affected by relative humidity (RH).

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Q. Name the different forms of Precipitation?

Ans The different forms of Precipitation are-

(i) Rainfall (ii) Snowfall (iii) Hail (iv) Dew
(v) Frost (vi) Sleet (vii) Drizzle (viii) Glaze

Q. How is rainfall caused?

Ans Humidity is the basis of rain. The general cause of rainfall is the cooling of ~~and soli~~ saturated air. The mechanism of rainfall passes through a number of stages (i) air should have plenty of water vapours (ii) that air should be saturated with moisture. (iii) The air should get cooled or get the chance to come in contant with the cold air for condensation (iv) Condensation of water vapour make droplets. Thus the release of moisture in the form of drops of water called rainfall.

Q.7/ Difference between

a/

Evaporation	Condensation
i/ Evaporation is a process by which water changes into vapour.	i/ Condensation is a process by which water vapour present in the air changes into minute droplets of water
ii/ It takes place more when the weather is hot dry & windy	ii/ It takes place when the temperature of the saturated air goes down below the dew point.
iii/ It also takes place more quickly in the lower latitudes	iii/ It also takes place more quickly at the lower latitudes
iv/ As a result of evaporation the amount of water on the surface of the earth goes on decreasing & decreasing.	iv/ As a result of condensation the amount of water goes on increasing and increasing

b/ RH (Relative Humidity)

i/ It is a ratio between the actual amount of water vapour present in an air at a particular temperature and the maximum amount of water vapour that the air can hold at that temperature.

ii/ It is a ratio between the absolute humidity and vapour capacity of the air.

iii/ It is maximum in equatorial region, but is lowest in hot deserts.

iv/ It is expressed as percentage

@ AH (Absolute Humidity)

i/ The total amount of vapours present in a particular temperature is absolute humidity.

ii/ It is defined as weight of vapour per unit volume of the air.

iii/ It is maximum over ocean & lowest in high pressure

iv/ It is expressed as gm per cubic metre of air.

	Precipitation	Rainfall
1.	The particles of water or ice that form within clouds and fall towards the earth is precipitation.	The release of moisture in the form of drops of water is called rainfall.
2.	It is the collective name given to different forms of moisture after condensation	It is a type of precipitation when moisture falls on the earth in the form of droplets of water
3.	Precipitation has two forms (a) liquid & (b) solid	Rainfall has only liquid form
4.	Rainfall, snow, hail, drizzle, sleet, dew, frost & glaze are the common forms of precipitation.	Three major types of rainfall (a) Convectional rainfall (b) Relief rainfall (c) Frontal rainfall.

Windward slope	Leeward slope
i) Windward side is the side of the mountain which faces the moisture	i) The leeward side is the side of the mountain which is opposite to the windward side
ii) On the windward side, the air ascends becomes cool.	ii) On the leeward side the air descends and get warmed.
iii) When the moisture bearing winds climb the windward side of the mountain, they cool down and bring heavy rainfall	iii) When these air across over to the otherside they already lost much of their moisture. While descending they further become warm and dry so they give less rainfall on the leeward side.
iv) The western slope of the Western Ghats get more rain because they form the windward side.	iv) The eastern slopes of the western Ghats gets lesser rain because they form the leeward side.

Convectional Rainfall	Relief rainfall
This rainfall is caused by convection currents.	This rainfall is caused when a mountain forces the winds to rise
The rising air expands and is cooled to give rainfall	It occurs in mountainous region.
It gives heavy showers for a short period.	It gives heavy rainfall on windward slope is dry and is called Rain shadow.
The equatorial region gets heavy showers in the afternoon daily	South-west Monsoons give heavy rainfall on western Ghats, but Deccan Plateau lies in rainshadow

Q5/ Short Notes on :-

1/ Evaporation :- The process where by a liquid changes into gas is called evaporation. The water of the water bodies changed into water vapour by solar energy. It mixes with other gases of the atmosphere. At 10°C temperature one cubic metre air can hold 11.4 gm water vapour. Warm air can absorb more water vapour than cold air.

2/ Saturated air :- When a specific quantity of air mass at particular temperature holds the maximum amount of water vapor as it can possibly hold is called 'saturated air'. The amount of water vapour required to saturate the air depends on temperature and pressure.

3/ Dew point :- The temperature of air at which it becomes saturated with water vapour starts to condense to form water droplets is called 'dew point'. The upper level of saturation is known as dew point.

Condensation :- The physical process of transformation from the vapour to the liquid state is called 'condensation'. In the atmosphere condensation occur either when the temperature drops sufficiently for moisture to be cooled to its dew point, or when there is enough water vapour within an airmass for it to reach saturation point.

Fog :- Droplets of water suspended in the lower layers of the atmosphere resulting from the condensation of water vapour around nuclei of floating dust or smoke particles is called fog. Its visibility is less than 1km.

Mist :- A reduction of visibility within the lower layers atmosphere to 1-2 km caused by condensation producing water droplets within the lower layers of the atmosphere is called mist. It is intermediate between fog & haze.

7) Haze :- An obscurity of the lower atmosphere that's visibility to under 2 km but over 1 km is Haze. It is normally formed by water particles have condensed around nuclei to the atmosphere may also be a result of particle of smoke, dust salt in the air.

8) Smog :- A form of fog that occurs in areas where air contains a large amount of smoke is called Smog (Smoke + fog).

9) Humidity :- Humidity means the amount of water vapour present in an air. Water vapour is always present in an air. About 2% of the atmosphere consists of water vapour. Most of the water vapour of the atmosphere ~~is absolute humidity. It is defined as the weight~~ comes from the oceans, lakes, rivers through (evaporation

Absolute Humidity:- Total amount of water vapour present in air at a particular temperatures is absolute humidity. It is defined as the weight of water vapour per unit volume of air. It is expressed as grams per cubic metre of air.

Relative Humidity:- Relative humidity is expressed as percentage. It is ratio between the actual amount of the water vapour present in an air at a temperature and the maximum amount of water ~~va~~ vapour which the same volume of air can hold at a given temperature.

Specific Humidity:- The humidity of the atmosphere expressed as the ratio of the weight of water vapour to the total weight of a given volume of air is called specific humidity. This varies from about 0.2 gm/kg in very dry cold arctic ~~air~~ air to over 18.0 gm/kg in hold humid tropical air.

13) Precipitation :- The particles of water or ice that form within clouds and fall towards the earth surface is Precipitation. According to the ~~stratus~~ famous climatologist H.J Critchfield, "Precipitation is defined as water in liquid or solid forms falls to the earth." Precipitation includes all forms in which the moisture falls on the earth's surface. It is the process by which condensed water from the clouds falls on the earth's surface. It can be solid or liquid. Precipitation is a complex process when millions of drops of water combine together and fall on the earth.

14) Snowfall :- A form of precipitation consisting of crystals of ice is called 'snow'. It is produced when condensation takes place at a temperature below freezing point so that the minute crystals of ice form directly from the water vapor. These small crystals then unite to form flakes of ice called snow. The coming down of snow flakes towards the earth's surface is known as 'snowfall'. It is common in higher and high mountain regions.

15) Hail :- Precipitation in the form of pellets of ice that develop in and fall from a cumulonimbus cloud either at a cold front or where intense heating of the surface causes rapidly ascending convection current is called hail. When they become so big and heavy that

the air can no longer hold them. Therefore they fall back to the earth's surface as hailstones. Hailstones cause damage to crops and buildings.

16) Dew :- When the temperature for the air is higher than the dew point and a cool object having a lower temperature comes in contact with such air this causes condensation in the air the drops of water thus formed rest on the ~~cloud~~ cold objects like glass, leaves, rocks etc. These drops of water on the cold objects are called dew. The conditions favouring few formations are moist air, light winds and clear night skies to ensure maximum cooling radiation.

17) Frost :- A weather condition that occurs when the air temperature is at or between the freezing point the water vapour will condense to form an icy deposit. It is called frost

18) Sleet :- In UK sleet is described as a form of precipitation consisting of either partly melted snow flakes or rain & snow falling together. In the USA, Sleet is described as a form of precipitation consisting of frozen

raindrops that have subsequently partially refrozen. So sleet is considered as a mixture of rain and snow.

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19) Drizzle :- Light rainfall consisting of particles of size less than 0.5mm in diameter and are closely together is called ~~Dizzle~~ 'Drizzle'. Normally drizzle is produced by stratus and stratus cumulus clouds.

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20) Glaze :- A covering of smooth clear ice ~~at the~~ that coats objects and surface is called glaze. It occurs when supercooled water droplets freeze on contact with a surface and when a fall in temperature causes wet surface to freeze.

Explain the types of rainfall with proper diagram?

Convectional Rainfall

Convectional rainfall is formed when the air is cooled by the rise of the convectional current. It happens when the land is intensely heated, the hot and moist air rises up vertically as convection current. As it rises up it expands and cool due to the release of pressure. Hence, Condensation takes place resulting in cumulus or cumulonimbus clouds. Consequently it results in torrential rainfall. The equatorial region of low latitude experiences convectional rainfall. In this region, convectional rainfall system is best developed because daily heating of ground surface up to noon causes convection currents. Consequently the sky becomes overcast by 2-3 pm + daily causing pitch darkness and heavy rains and sky becomes clear 4 PM. So it is called 4 O'clock rain. Thus the convectional rainfall in the equatorial region is a daily regular feature.

Orographic or Relief rainfall

Orographic rainfall occurs when moist air is cooled due to ascend along a mountain slope or a plateau barrier.

Orographic or Relief Rainfall

The moist wind coming from the sea rises up along the slope of the land and comes in contact with cool upper atmosphere. As a result the moist air condenses and rainfall occurs. Since this type of rainfall is caused by the relief of the land, it is known as 'relief rainfall'. The 'windward slopes' get maximum rainfall.

On the 'leeward slope' as the air descends, its temperature increases and it offers little rainfall. Hence the leewards side is known as 'Rainshadow region'. In summer, S.W. Monsoons give heavy rainfall on the western parts of the western Ghats but Deccan plateau is practically dry as it lies in the rain shadow region of the Western Ghats.

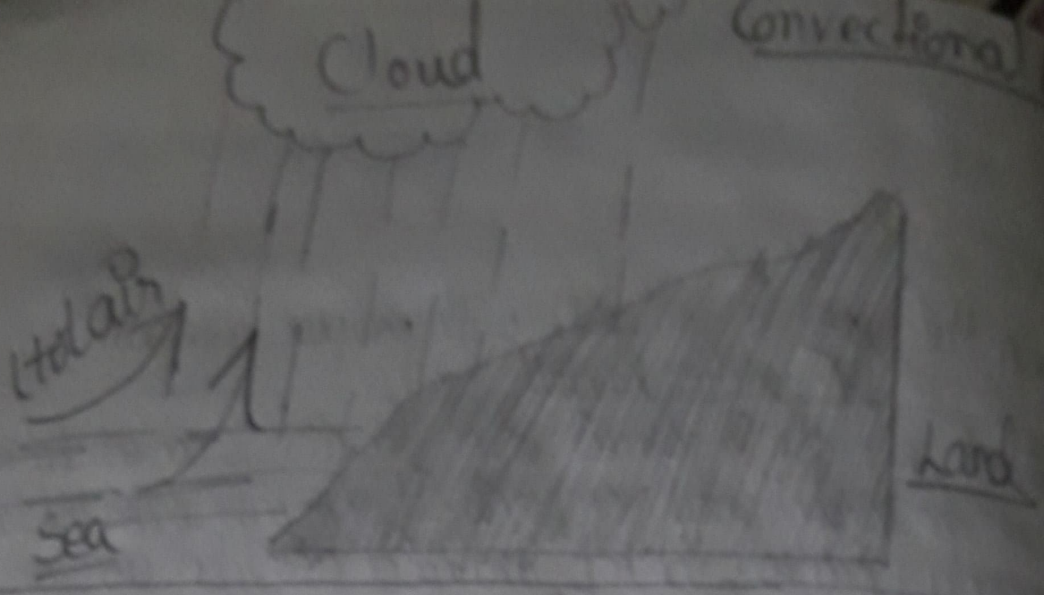
Cyclonic or Frontal Rain

When hot and cold air masses move towards each other parallel to the earth's surface along a front, the cold air being heavy flows near the earth's surface, while the hot air blows above it, rises and expands to cool and condense to form rainfall. This is called Cyclonic Rain because as this rain is associated with ~~Cyclone~~

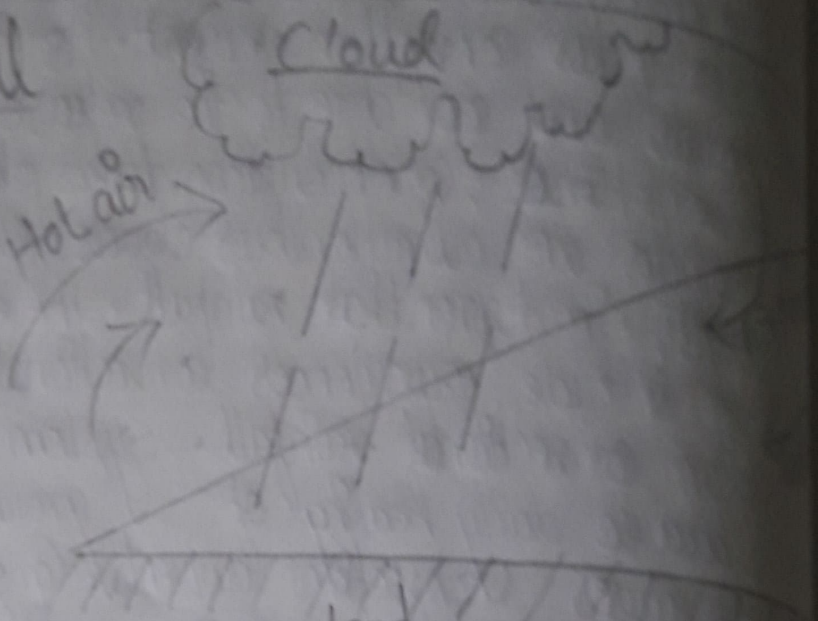
~~rain been because as the~~ rain cyclones. This rain is com
in North West Europe in winter from cyclones coming from
the Mediterranean sea.

D.10

Convectional



Cyclonic Rainfall



Relief Rainfall

Q10) Explain the characteristics of all types of rainfall?

Ans The characteristics of of Convectional rainfall are:-

i) It occurs daily in the afternoon in the equatorial region.

ii) It is of very short duration but occurs in the form of heavy showers.

iii) It occurs through thick dark and extensive cumulonimbus clouds.

iv) It is accompanied by cloud & thunder and lighting.

The characteristics of Relief rainfall are:-

i) The windward slope, also called as rain slope, receives maximum amount of rainfall where as leeward side of the mountain gets very low rainfall.

ii) There is maximum rainfall near the mountain slopes and it decreases away from the foot hills

Orographic

iii) Relief rainfall may occurs in any season. Unlike other types of rainfall it is more widespread and of long duration.

iv) The amount of rainfall increases with increasing height along the windward slope of the mountains.

The characteristics of frontal rainfall are:-

i) This rainfall is slow, continuous and extensive

ii) The mechanism of cyclonic rainfall is of two types :
(a) Temperate cyclone (b) Tropical cyclone.

iii) This rainfall associated with warm front is widespread and long duration.

iv) Sometimes this rainfall occurs in the form of snow and hailstorms

v) Most of the rains of temperate region are received through cyclones.

vi) If tropical cyclones are fully of moisture become saturated and yield heavy showers characterised by lightning and thunder.