HYDROLOGY

- Hydrology is the science of water which deals with occurance circulation, and distribution of water on earth surface and its atmosphere.

Hydrological cycle:-

- It is the cyclic movement of water in which water moves from one phase to other having different residence time in its each phase.

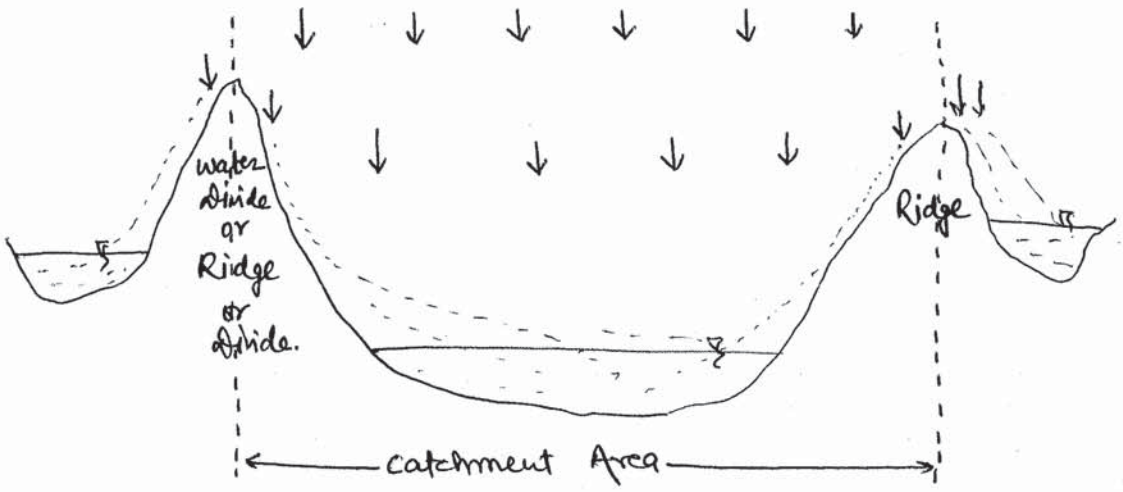
⇒ Residence Time:-

- This is the avg time taken by the water particle in crossing one particular phase of the hydrologic cycle.

$$t_r = \frac{V_{total}}{Q_{avg}}$$

Note:- Over the ocean surface, evaporation is greater than precipitation (approximately 9:1) whereas on the land mass precipitation is greater than evaporation.

⇒ Catchment Area:-



- Area draining into a river or stream is called as catchment area of that particular river or stream at a given location.

- In American english, this is also called as a water shade.

⇒ Ridge :-

- It is the line which demarkate or differentiate one catchment area from its neighbouring catchmat area. This is also called as water divide or divide.

- In British English, this is also called as the water shade

⇒ Water Budget Equation :-

This equation is based on the law of conservation of mass and it's states that difference of inflow and outflow is equal to change in storage.

$$\text{Mass Inflow} \underset{\text{difference}}{\sim} \text{Mass outflow} = \Delta \text{ storage}$$

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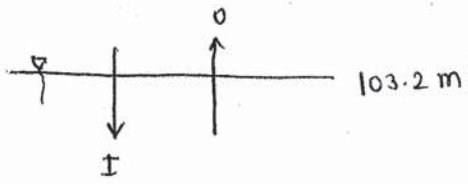


$I = 6 m^3/s + 145 mm$

$= \frac{6 \times 30 \times 24 \times 60 \times 60}{5000 \times 10^4} + 0.145$

$I = 0.456 m.$

$O = 6.5 m^3/s + 6.1 cm$

$= \frac{6.5 \times 30 \times 60 \times 60 \times 24}{5000 \times 10^4} + 0.061$

$O = 0.397 m.$

Current surface elevation (At the end of month) = 103.2m + 0.456m − 0.397m

103.259m ans

⇒ World Water Balance :-

Total water quantity ~ 1386 M km^3 ~ 1400 M km^3

- 96.5% - ocean
- 1% Land is saline } 97.5%

Fresh water = 2.5% → 35 M km^3

- 10.6 M km^3 Liquid
- 24.4 M km^3 Frozen

Note: 1) Sun is the source of energy which drives the hydrological cycle.

2) About 3/4th of earth surface (Approx. 71%) is covered with water.

PRECIPITATION

This denotes the different process and ways in which water reaches the earth surface from the atmosphere. Following are the different types of precipitation.

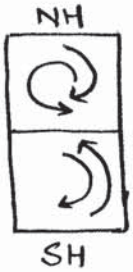
(i) Rainfall :-

This is the most dominant form of precipitation in India and it denotes water droplet which size varying from 0.5mm - 6mm. On the bais of intensity rainfall is classified as follows:-

R.I (mm/hr)	
0 - 2.5	→ Light
2.5 - 7.5	→ Moderate / Medium
> 7.5	→ Heavy

In India, rainfall data is collected everyday at 8:30 AM and if rainfall on a particular day is more than 2.5 mm then that particular day is called as a rainy day.

Note:



Cyclone
Anticyclone
} wind direction

- **Cloud seeding :-**

→ It is a process in which artificial condensation nuclei is introduced in the atmosphere so as to bring about rain.

→ The compound that is most commonly used is silver iodide (AgI). Potassium Iodide & sodium chloride can also be used.

→ This type of rainfall is called as artifical rain.

→ It has been observed that normal rainfall of places subjected to cloud seeding is getting adversely affected and hence at present this technique is not being used very frequently.

Note - orographic type of rainfall is the most dominant form of rainfall in India.

(ii) **Drizzle :-**

- These are fine droplets of water whose size is less than 0.5mm and intensity is less than 1mm/hr.

(iii) **Snow or Snowfall :-**

There are ice crystals having a density of around 0.1g/cc

(iv) **Glaze :-**

When droplets of water comes in contact with cold ground surface (at ~~sam~~ sub freezing temp). then the droplet of water is converted into ice which is called as glaze.

(v) **Sleet :-**

These are frozen rain drops which are transparent in nature.

(vi) **Hail :-**

These are lumps of ice whose size is more than 8mm.

As per international convention lump of ice greater than 5mm is called as hail whereas lumps smaller than 5mm is called as Graupel.

AVERAGE ANNUAL RAINFALL:-

The amount of rain collected by a rain gauge in last 24hrs is called daily rainfall and the amount collected in one year is called as annual rainfall.

Average value of this annual rainfall for a period of last 35 years (or any other suitable time interval) is called as average annual Rainfall.

India's avg annual rainfall is approximately 120 cm.

INDEX OF WETNESS:-

- This index is used to find variation or deviation in rainfall and is given as follows.

$$\text{Index of wetness} = \frac{\text{Rainfall in a year}}{\text{Avg. annual Rainfall}} \times 100$$

eg:- Suppose in a particular year India recieves 90 cm of rainfall then Index of wetnes will be

$$IOW = \frac{90}{120} \times 100 = 75\%$$

$$\text{Rainfall Deficiency} = 25\%$$

- Based on rainfall deficiency, region is classified as follows:-

Rainfall deficiency	Region
30 - 45	Large Deficient Region
45 - 60	serious
> 60	Disastrous.