Name, Bilal Hussain

ID. 7493

Subject, Engg Hydrology & water M.

Submitted To. Engr. Fawad Ahmad.

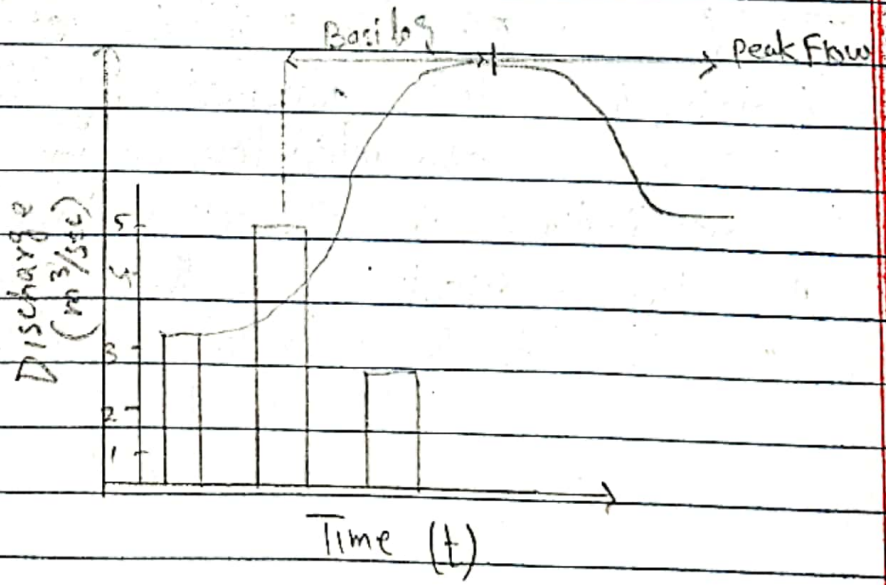
Answer # 1 Part (a)

Ans **Hydrograph :-**

The graphical Presentation of a relation between any hydrological Quantity i.e. stage, velocity, discharge etc and the time is known as a hydrograph.

Basin lag or time lag :-

It is defined as the time difference the Peak discharge and the Peak of the rain event"



Checked By:..... Parents:..... Excellent ☐ Good ☐ BRRR PAPER PRODUCTS

Rising limb :-

That Portion of hydrograph where it begins to rise and then reaches the Peak.

Recession Curve :-

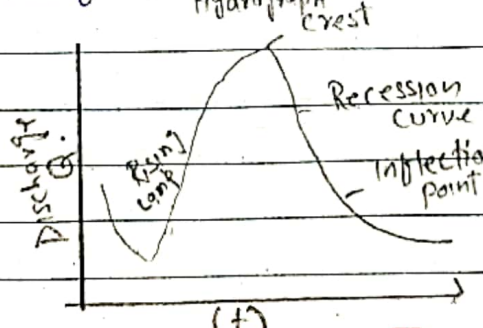
The Portion of hydrograph between the Peak flow and to that Point where the flow return to relatively steady state.

Inflection Point :-

The Point on the recession curve of hydrograph where the slope of hydrograph begins to decline or changes.

Crest :-

This segment of hydrograph is governed by the Stram characteristics and stream distribution in the area, furthermore it also depends upon the geological structure of the area



Answer #1 Part "B"

Ans Current meter is an accurate and one of the most widely used instrument to find the velocity of water in open channels. The type of current meter used by us geological survey is Price meter. It Consist of six Conical cups rotating about a vertical axis the meter reader of current meter is either on boat or on a bridge. The velocity of water is given by equation.

$$V = a + b N$$

where N is the number of revolutions Per Second of cups and "a" and "b" are the Coefficient of a given current meter.

Answer #2 Part (a)

Given :-

Rain Gauge Station	A	B	C	D	E	F
Polygon area (km^2)	12	71	42	57	13	34
Precipitation (cm)	23.64	31.18	18.52	21.87	23.35	29.1

Required :-

Average Precipitation in mm by thiesen Polygon method.

Solution :-

Rain gauge Station	Polygon Area (km^2) "A"	Precipitation P (mm)	AxP ($km^2 \cdot mm$)
A	12	236.4	2836.8
B	71	311.8	22137.8
C	42	185.2	7778.4
D	57	218.7	12465.9
E	13	223.5	2905.5
F	34	291.8	9921.2
Sum	229		58046

$$P_{AV} = \frac{\Sigma (AxP)}{\Sigma A}$$

$$= \frac{58046 \ \text{kg/m}^2 \cdot \text{mm}}{229 \ \text{kN/m}^2}$$

$$\boxed{P_{av} = 253.47 \text{ mm}}$$

Answer # 2 Part "B"

Ans **Water losses in nature :-**

* **Vaporization :-**

It is a physical process in which liquid changes to gaseous state without boiling. From free surface of water bodies and wet soil mases are return to atmosphere due to high temperature effect.

* **Evaporation :-**

Water losses due to vaporization is called evaporation. It is measured in depth unit.

* **Transpiration :-**

The process by which water is returned to the atmosphere by evaporation from the surface of the leaves after movement from the soil through the root and stem system of the plant is called transpiration.

★ Evapotranspiration :-

It is combined evaporation and transpiration. The total water loss of soil or fresh water surface and from trees and plants is termed as evapotranspiration.

Answer #03 Part "A"

Ans Probably the first hydrological phenomenon to have been recorded by man was preuptation. Measurment of Precipitation is required by various fields.

(1) **By Agriculture :-**
what to plant in certain areas, where and when to plant, when to harvest.

(2) **By Horticulture :-**
when and how to irrigate.

(3) **Engineers :-**
To design structure for run off control, storm water drain bridges etc.

(4) **Scientist :-**
Hydrological modeling of catchments.

Methods for measuring Precipitation.

1) Arithematic Average Method.
2) Thiessen Polygon Method.
3) Isohytel Method.

=========

Answer # 3 Part "B"

Ans Time of concentration is the time required for water to flow from the most hydraulically distant Point of the catchment area to outlet or detention storage. Storage detention impact the time of Concentration in such a way. If storage detention is far away from distant Point so as a result time of concentration increases and detention storage will take more time to get filled.

Answer #04 part (a)

(I.D = 7493)

Given Data :-

Well with a radius of $r_1 = 0.5\,m$

$K = 0.0007493\ m/sec$

water table height from an impermeable strata at the bottom of aquifer, $H_2 = 74\,m$

$h_1 = 36\,m$

$r_2 = 749\,m$

Required Data :-

Steady well discharge, $Q = ?$

Solution :-

$h_2 = 74\,m$

$$Q = \frac{\pi K [h_2^2 - h_1^2]}{\ln\left(\frac{r_2}{r_1}\right)}$$

$$Q = \frac{(3.14)(0.0007493)(74^2 - 36^2)}{\ln\left(\frac{749}{0.5}\right)}$$

$$\boxed{Q = 1.3\ m^3/sec}$$ — Ans

Answer #4 Part (B)

Given Data :-

Air Pressure, $P = 116 \times 10^3 \ N/m^2$

$e_o = 5690 \ N/m^2$

$e_a = 2540 \ N/m^2$

$Z = 3.44 \ m$

$v = 2.88 \ m/sec$

$\rho_w = 1000 \ kg/m^3$

$\rho_a = 1.34 \ kg/m^3$

$k = 0.40 \ m$

$Z_o = 0.46 mm = 0.00046 m$

Required Data :-

Evaporation in mm/day.

Solution :-

As we know that

$$C = \frac{0.622 k^2 \rho_a v}{P \rho_w \left[\ln\left(\frac{z}{z_o}\right)^2\right]}$$

$$C = \frac{(0.622)(0.40)^2 (1.34)(2.88}{(116\times10^3)(1000)\left[\ln\left(\frac{3.44}{0.00046}\right)^{2^{-1}}\right]}$$

$$\boxed{C = 4.16\times10^{-11}}$$

Now

$$E = C\,(e_o - e_a)$$

$$E = (4.16\times10^{-11})(5690 - 2540)$$

$$E = 1.31\times10^{-7} \text{ m/sec}$$

$$E = (1.31\times10^{-7})(1000)(1\times60\times60\times24)$$

$$\boxed{E = 11.31 \text{ mm/day}}$$