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QNO I (a): Define 'Delta' & Duty & devive their relation in MKS FPS system.

⇒ **Delta:**

It's define as " The depth of water in (cm) or (in) That is required for the crops Throughout the Base Period is know as delta of The crop.

⇒ Majorly, a crop needs specific volume of water in order to accommodate it's base Period.

→ **Duty:**

Duty of water is expressed as the number of hectare of land that can be Irrigated for the Dull growth of The given crop by supplying 1cumec water continuously during the entire base Period of That crop.

Relationship b/w Duty & Delta in MKS system:

⇒ Let there be a crop of base Period 'B' days. Let one cumec (m/sec) of water be applied to this crop for the Field for 'B' days.

NOW the volume of water applied to this crop during 'B' days.

Where:

$V = (24 \times 60 \times 60 \times B)\ m^3 = 86.400\ m^3$

By the definition of duty:

$1\ m^3$ of water supplied for 'B' days matures 'D' hectares of land. This quantity of water 'V' matures 'D' ha of land or $10^4\ Dm^2$ of area.

⇒ The Total depth of water applied on This land:

$$\frac{\text{Volume}}{\text{Area}} = \frac{86400\ B}{D(m)} = 864\ B/D\ cm.$$

Where Δ is in cm ha/cumec.

Relationship b/w Duty & Delta in FPS system:

Let:

Δ = Delta

D = Duty (acres/cusec

B = Days

One (Cusec) of water flowing continuously for 'B' days gives a depth of water 'A' over an 'D' acres.

3:

→ Volume of water (ft^3/sec) in One day = $1 \times 24 \times 60 \times 60 = 86400\ ft^3/sec$.

→ Volume of water (ft^3/sec) in B days = $1 \times 24 \times 60 \times 60 = 86400\ ft^3$ ——— (i)

∵ 1 Acre = $43560\ ft^2$

Putting in eq (i)

$= 86400\ B/43560$

Volume of water (ft^3/sec) in B days = 1.983 Acre ft (2)

⇒ Depth of water required for crops = $\frac{1.983}{D}$ ft

$$\boxed{\Delta = \frac{1.983\ B}{D}\ ft}$$ Answer:

Part 'B'

Given data:

water required for wheat = 9 cm

No # of days = 35 day

B = 140 days

required:

Δ = ?

By using ratio Method:

9 cm = 35 days

Δ = 140 days

now

$35\Delta = 9 \times 140$ days

$\Delta = \frac{9\text{cm} \times 140\ \text{days}}{35\ \text{days}}$

$$\boxed{\Delta = 36\ \text{cm}}$$

Answer.

Part c:

Explain Indus water treaty?

⇒ The Indus water treaty (IWT) is a water distribution treaty b/w India and Pakistan Singned on 19 sept, 1960

⇒ The treaty was signed by President Ayub Khan P.M J. Nehru. It was brokened by the World Bank. The Indus water treaty deals with rivers Indus and it's five tributaries which are classified into two categories.

Eastern Rivers	Western Rivers
1: Sutlej	1: Jehelum
2: Beas	2: Chenab
3: Ravi	3: Indus.

⇒ According to the treaty, all the water of eastern river shall be available for unricted use in India.

⇒ India should let unrestricted flow of water from western rivers to Pakistan.

⇒ The treaty allocated 80% of water from the Six river Indus water system to Pakistan.

⇒ The treaty says that India can use the water in western rivers in "non-consumptive" needs.

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⇒ A Permenant Indus Commission was set up as a bilateral commission to implement & manage the treaty.

Part D:

Write significance of duty of a crop:

Answer:

It helps in designing efficient canal Irrigation system so we know the Overall duty of all the crops requried to be irrigated in different seasons of the year and the total available water at the head of the main canal. The area which can be Irrigated & can be worked Out.

⇒ If we know the crop area requried to be Irrigated along with their duties so we can work Out the discharge required for designing the canal

discharge = $Q = A/D$

$A = QD$

P.T.O

Q No # 2 (a): Explain the Factors affecting Consumptive use:

Ans: Following are the Factors affective consumptive use.

i: Temperature
ii: Humidity in air
iii: velocity of wind
iv: Soil topography.
v: Sunlight etc.

i: Temperature:

Consumptive use of water is directly affected by the temperature. At high temperature the plant tends to show dormancy while at low temperature there is a devasted plant growth.

ii: Humidity in air:

Evaporation is inversely Proportional to humidity as at low humidity evaporation rate is more while at high humidity evaporation is slowed down.

iii: Velocity of wind:

Evaporation rate is more when there is more velocity as air is moving faster so there will be more evaporation if the velocity of wind is low than rate of evaporation is also low.

iv: **Soil topography:**

If a soil is made more fertile through the application of manure or by some other means. The yields may be expected to increase with an accompanying small increase in use of water. However an increase in fertile of the soil causes a decreases in the amount of water consumed per unit of crop yield.

vi **Sun light:**

At days in summer there is more sunlight then usual so high evaporation occurs when in winter there is low evaporation rate.

Q2: Part (b)

Given data:

Useful Rain fall (cm) = 10

Water application efficiency (na) = 80% = 0.8

Cumulative consumptive use (cu) = 40cm

Required:

Field Irrigation Requirement (FIR) = ?

Consumptive Irrigation requirment (CIR) = ?

Solution:

We know that:

$\Rightarrow$ CIR = Cu − Re = 40 − 10 = 30 cm

$\Rightarrow$ $FIR = \frac{CIR}{na} = \frac{30}{0.8} = 37.5$ cm.

$\Rightarrow$ FIR = 37.5 cm

Answer:

Q2: Part (C):

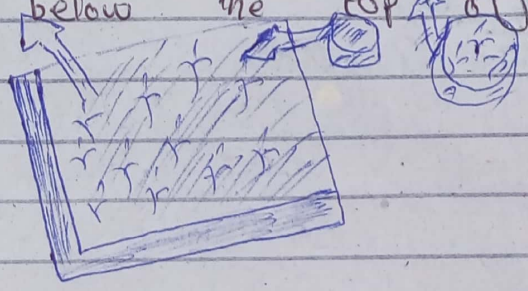
Explain class A Pan evaporation (EP) measurment with the help of a diagram:

⇒ Class A Pan Evaporation (EP):

⇒ Ep can be experimently determined directly measured the quantity of inlater evaported from this standared class A Pan. This Pan is 1.0m in dia, 25cm deep & bottom is raised 15cm above the ground surface.

⇒ The depth of water is to be kept in a fixed range such that the inlater surface is at least 5cm, & never more then 7.5 cm, below the top of Pan.

dra gram:



⇒ A Pan evaporation EP can also determined by using the christiansen formula which states.

⇒ EP = 0.459 R.ct.cw.ch.cs.ce

⇒ R = extra Terrestrical radiation is the same Unit as (EP) cm or mm.

⇒ ct. = coefficient for Temperature.

⇒ cw = coefficient for wind velocity.

Qno2 Part D :

Explain crop Season (Rabi & Khariff) & Khariff, Rabi ratio :

i: Rabi :

1st October to 31st March → Winter

⇒ "Rabi crops"

Rabi crops are Wheat, Barley, Grom, Mustard Potates.

ii : Khariff :

1st April to 30 Septeber in Summer.

⇒ Khariff crops :

Khariff crops are Rice, Bajra, Jawar & Maize, cotton.

⇒ Rabi & Khariff Ratio :

The area is Irrigated for Rabi crop generally more then that for Khariff crops generally more than that for Khariff crope. The ratio of Proposed area so is to irrigated in Khariff Season to that in Rabi season to That in Rabi season is called as Rabi and Khariff ratio. The ratio is [1 : 2] that is Khariff area is one half of that Rabi area.

Q No# 3: Define & Explain the following terms:

(a) i: **Field Capacity:**

When all gravity water has drained down to water tables, a certain amount of water is retained by surface soil. This water which can't be easily drained under the action of gravity & is called Field capacity (F.C).

ii) **Permanent Wilting Point (P.W.P):**

A plant can extract water from soil till a Permanent Wilting Point is reached (P.W.P) is that water content at which a plant can no longer extract sufficient water for it's growth and wilts up.

⇒ Water Available to Plant = Field capacity - Perm. P water.

iii) **Available & reality available moisture.**

⇒ **Available moisture Content:**

The difference in moisture content of the soil b/w Field capacity & Permanent Wilting is termed the available moisture. Available moisture can be expressed as Percentage moisture (Pw) as Percentage (Pv) or as depthed.

Optimum utilization of water:

⇒ **Readily available moisture content.**

It is the water that a plant can easily extract from the soil. RAW is the soil moisture held b/w field capacity and a nominated refill point for unrestricted growth. In this range of soil moisture point are neither waterlogged or water stressed.

d: **Optimum utilization of water:**

The yield increases with water can reached a certain maximum value & then falls down. The quantity of water at which the yield is maximum is called the optimum water depth. Therefore the optimum water depth. Therefore the optimum utilization of water means getting maximum yield with any amount of water.

The end!