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Section : A

Semester : 12 (Repeater)

Paper : Irrigation Engineering

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Q1:-

Part (a)

Define "Delta" and "Duty" and derive Their relationship in MKS and FPS systems.

Ans:- Delta:-

Any Point or crop needs water for it growth and development. The water (required if measured in terms of depth "whether inches or millimeters. for entire growth period of a crop in its field is. called Delta of a crop.

→ Denoted by "Δ"

Duty:-

Duty is The irrigating capacity of a unit water or it represents a relationship b/w The amount (volume) of water required for a crop during its growth period and The area of a crop which is irrigated.

Relationship b/w Duty and Delta :-

In F.P.S system :-

Let;

Duty = (Acres / cusecs)

Delta = A feet Base Period = B days

By Definition:

one cusec of water flowing continously for "B" days gives a depth of water "A" over on area of "D" acres.

Now;

volume of water in 1 ft^3 sec in

1 day = 1 x 24 x 60 x 60

= 86400 ft^3

volume of water in 1 ft^3 sec in

B days = 1 x 24 x 60 x 60

= 86400 B ft^3 —> (1)

=> As we know That.

1 Acre = 43560 ft^3

and

1 ft^2 = 143560 Acre, Then eq (1) becomes.

$\Rightarrow$ volume of water in $1 ft^3$ sec in "B" days = $86400\ B\ ft^3$

$= 86400\ B \times 143560$ Acre-ft volume.

Similarly,

volume of water in $1 ft^3$ sec in "B" days = $1.983\ B$ Acre ft.

So;

$\Rightarrow$ Depth of water required by crop A

= volume Area = $1.983\ B$ Acre-ft. D

Acre A = $1.983\ B.D$ ft.

In M.K.S system:-

let;

Duty = D (hectares / cumecs)

Delta = A (meter) Base Period = B days

By Definition,

one cumec of water flowing continously for "B" days gives a depth of water "A" over on area of "D" hectares.

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So;

$\Rightarrow$ volume of water in $1m^3$ sec in

1 day = $1 \times 24 \times 60 \times 60 = 86400\ B\ m^3 \rightarrow ①$

As we know That,

1 Hectare = $10000\ m^2$ and $1\ m^2 = 1104$ Hectare

Then eq ① becomes;

→ volume of water in $1m^3$ sec in B days.

$= 86400\ B \times 1104$ Hectares - meter

→ volume of water in $1m^3$ sec in B days.

$= 8.64 \times B$. Hectares . meters

$= 8.64 \times B$. H.m

→ Depth of water required by crop

= volume / Area A

$= 8.64 \times B.A / A.D.m$

$A = 8.64\ B/Dm$

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Q1:-

Part (b)

Sol:- water Requirement of water = 9cm

Days interval = 35 days

Base Period = 140 days

Delta of wheat (Δ) = ?

$\Rightarrow$ 35 days = 9cm

140 days = Δ

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

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

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Q 1 :-

Part (C): Indus water Treaty :-

The Indus water Treaty was an aggrement (treaty) of water-sharing b/w The two Asian Country India and Pakistan. This treaty was signed on september 19, 1960 b/w The Prime minister of india Jawaharlal Nehru and President of Pakistan Ayub Khan.

-> According to This, Eastern Rivers (Ravi, Beas, sutlej) are to be governed by india on average annual flow of 34 MAF.

-> western Rivers (Indus, Chenab, Jhelum) are to be taken by Pakistan.

-> since Indus River from india, only 20% is allowed to The country for Irrigation Power generation and other purposes.

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Q1:-

Part (D):

Ans: Significence of Duty of a Crop:-

with the help of it, we can design a canal irigation system that Provides us a better effeciency.

By Knowing the total area of crop to be mature, the overall duty of all the crops required to be Irrigated can be worked out.

Q2:-

Part (A): Factor Affecting comsumptive use:-

1. Humidity:- It also has a significant effect on the Growth of a Plant. High humidity slow down and low humidity on certain days accelerates be evaportranspiration Process.

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2. Temperature:- Temperature has a great effect on the consumptive use of water by crops. Temperature in normal range is effective for the growth of a crop.

3. Soil Fatility:- The Fatility of soil has an inverse relation with the amount of water consumed per unit of crop yield increasing Fertility results in the utilizatio of small amount of water to the crop. The yield may be expected to increase in small use of water.

4. velocity of wind:- velocity of wind also has significient effect in terms of moving or calm air conditions. In the conditions of moving air, evapotranspiration accelerates more rapidly Then calm air condition. The consumptiv use and in turns growth period of a crop.

5. Sun Light :- Sun light which is major source of energy also contributes in the evapotranspiration of a crop. If the intensity of the sunlight is high and it remains, throughout the day, It will helps in continuing the Pocess of evapotranspiration that of the case of weather is cloudy or overcast.

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Q 2:-

Part (b)

Given:

useful Rainfall (cm) = 10

water application Efficiency (na) = 80% = 0.8

Commulative consumptive use (Cu) = 40 cm

Required:-

Field irrigation Requirement (FIR) = ?

Consumptive Irrigation Requirement (CIR) = ?

By formula;

→ Consumptive irrigation Requirement

$$(CIR) = Cu - Re$$

$$= 40 - 10$$

$$\boxed{(CIR) = 30 \text{ cm}}$$

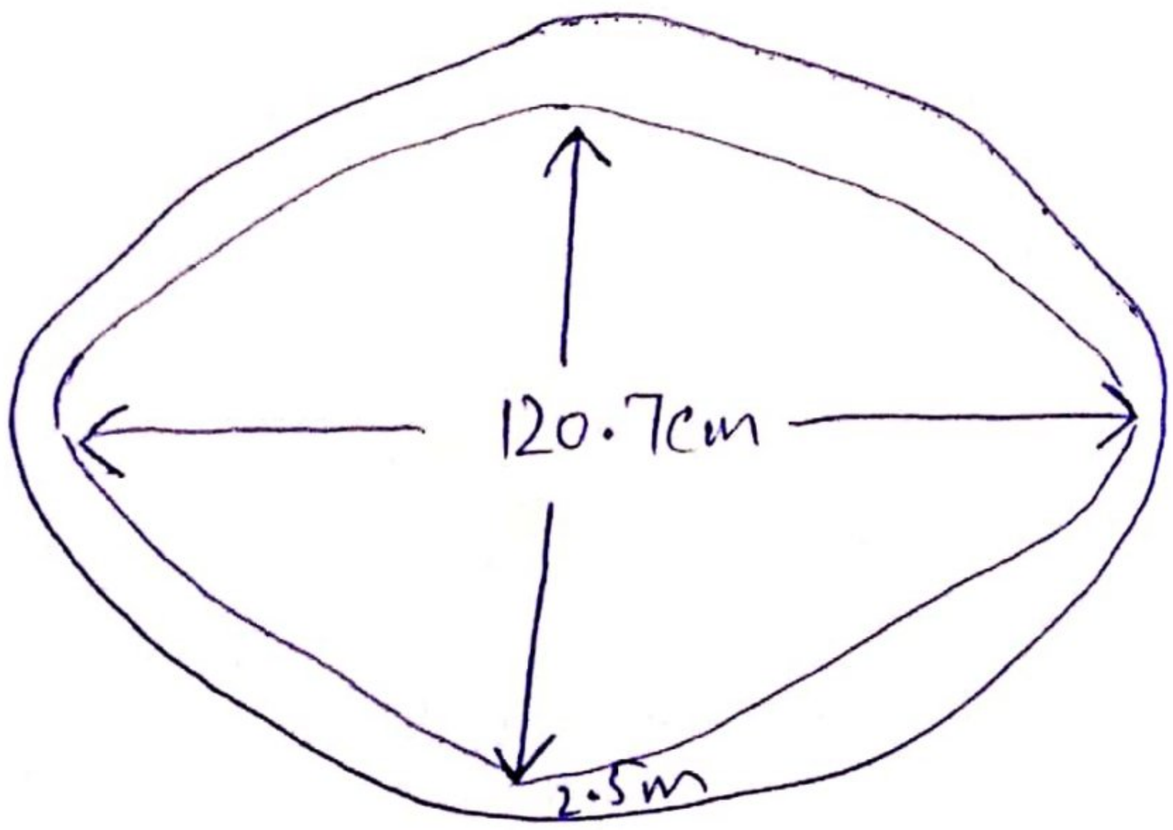
→ Field Irrigation Required $(FIR) = \frac{CIR}{na}$

$$= \frac{30}{0.8} = \boxed{37.5 \text{ cm}}$$

Q2:-

Part (C) Explain class A Evaporation measurment with the help of a diagram.

The class A Evaporation Pan may be a standard device for manual measurement of evaporation (Austrilian Bureau of meterology class A type) The Pan represents an open body of water its crammed with water & exposed on a flat platuea. The evaporation rate is calculated by the change in level of the free water surface (daily manual reading) & Therefore the recorded rainfall in (mm).



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Q2:-

Part D: Crops Seasons:-

In Pakistan There are two crop seasons "Kharif" & "Rabi".

Kharif:- crop which is sowing in begining in April & harvest blw october & December Examples are Rice, maize cotton e.t.c.

Rabi:- Crops That are sown in winter & harvest within Springs. Example are wheat Gram, onion e.t.c.

Kharif Rabi Ratio:- The area to be irrigated for Rabi crop is usually quite That for The Kharif crop. The ratio of Proposed Area to be irrigated in Kharif Rabi ratio. This ratio is generally 1:2 i.e; Kharif area is one half of The Rabi area.

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Q3:-

Part (a): Field capacity:-

Field capacity is greatest amount of water The soil can hold under The drainage. For most soil it is obtained After two days of drainage after The soil was saturated by heavy rain or Irrigation.

it is basically The optimum amount of water needed for agriculture.

(b) Permanent wilting Point:-

That water content at which Plants can no longer extract sufficient amount of water from The soil for his growth.

A Plant is said to be Permanently wilted when it will not recover after been placing in a saturated atmosphere.

"Two stages of wilting Point"

(1) Temporary wilting Point.

(2) Permanent wilting Point.

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(C) Available moisture content :-

The difference in moisture contents of soil b/w the field capacity & Permanent wilting point is called Available moisture content. It is approx; 75% of available moisture.

(D) Optimum utilization of water :-

If crop is sown & produced under absolutely identical condition using different amount of water depths. The yield is found to be very the yield increase with water reaches to a certain maximum value & than fall down so, the quantity of water at which the yield is maximum is term as optimum water depth.

Therefore optimum utilization of water generally mean getting maximum yield with any amount of water.

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