NASRULLAH

7870

SEC "B"

6th Smester

IRRIGATION ENGG

Q#01 (a)

Define "Delta" and Duty and derive their relationship in MKS and FPS systems?

Defination :-

The Depth of water in cm or inches required for the crops through out be base period is known as delta of the crop.

Generally a crop needs a certain volume of water at fixed intervals through out its base period.

Duty of Water :-

The duty of water is the relationship between the volume of water & the area of crop it matures.

1 cubic m per second or 1 ft³/sec of water for B days matures D hectres or areas of land then the duty of water for that particular crop is D hectere/cu mess or D acres/cusec.

Relationship between Duty & Delta in FPS System :-

Let D = Duty (acres/cusec)

Δ = Δ feet base period = B days by def one cusec of water flowing continously for "B" days gives a depth of water "Δ" over an "D" acres

volume of water (ft^3/sec) in one day =

$1 \times 24 \times 60 \times 60 = 86400\ ft^3/sec$

vol of water (ft^3/sec) in B day = $1 \times 24 \times 60 \times 60$

$= 86400 B\ ft^3$

$= 86400 B ft^3 \rightarrow (i)$

$1 ACre = 43560 ft^2$

$1 ft^3 = \frac{1}{43560} ACre$

putting eq (i) it becomes

$= 86400 B \times \frac{1}{43560} ACre\ ft$

Volume of water (ft^3sec) in B day $= 1.983 B\ ACre\ ft$ — (ii)

Depth of water required by crops

$= \frac{1.983 \times B ft}{D}$

Relation between Duty and Delta & MKS:

- Let there be a crop of base period B days. Let one cumec (m^3/sec) of water be applied to this crop on the field for B days.
- Now the volume of water applied to this crop during B days = V

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

$$= 86.400 B\, m^3$$

- By defination of duty, $1 m^3$ of water supplied for B days matures D hectares of land 10^4 D m^2 of Area
- total depth of water applied on this $= \frac{\text{Volume}}{\text{Area}} = \frac{86400B}{10^4 D} = \frac{8.64B}{D}$ m

is called Delta Δ.

Therefore $\Delta = 8.64\ B/D_m = 864\ B/D_{cm}$

where Δ in cm ; B is in days.

D is duty in hactor/cumec.

(B) If wheat requires about 9cm of water every 35 days and the base period or crop period of wheat is 140 days Find out the Delta for wheat?

Sol:- B = 140 days

Δ = ?

water required for wheat = 9cm

No of days = 35 days

By ratio method

9cm : 35 day

Δ : 140 days

$35\Delta = 140 \times 9$

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

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

(() Explain Indus water treaty?

The Indus water treaty (IWT) is a water Distribution treaty between India and pakistan signed on Sept 19, 1960 the treaty was signed by president Ayub khan and PM. J. Nehro. It was brokered by the world bank.

The Indus water treaty deals with rivers Indus and its five tributaries which are classfied into two catogories

Eastern Rivers	Western Rivers
1) Sutlej	1) Jhelum
2) Beas	2) Chenab
3) Ravi	3) Indus

• According to the treaty, all the water of eastern rivers shall be available for unrestricted use in India.

- India should let unrestricted flow of water from western rivers to pakistan.
- the treaty says that India can use the water in western rivers in non-consumptive" needs
- the treaty allocates 80% of water from the six-river indus water system to pakistan.
- A permenant indus commision was set up as a bilateral commission to implement and manage the treaty.

(D) Write Significance of Duty of a crop?

Importance of DUTY:

- It helps in Designing efficient canal irrigation System. Knowing the total availble water at the head of the main canal and the Overall duty of all the crops required to be irrigated can be worked out.
- Inversly if we know the crop area required to be irrigated and their duties, we can work out the discharge required for designing the canal.

Q NO2

Explain the factor affecting consumptive use.

Factors effecting consumptive use

- Temperature
- Humidity in air
- velocity of wind
- Soil topography
- Sunlight etc

1) Tempearatures:-

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

2) Humidity:-

Evaporation is Inversely proportional to humidity as at low humidity evaporation rate is more while at high humidy

evaporation is slowed down.

3) Velocity:-

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 then rate of evaporation is also low.

4) Soil topography:-

It is a soil mode more fertile through the application of mature or by some other means. The yields may be expected to increase with an accompying small increase in use of water. However an increase in fertility of the soil causes a decrease in the amount of water consumed

Per unit of crop yield

5) Sun light :-

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

QNO2 (B)

Wheat is to be grown at a certain place the useful rainfall for the whole season is 10cm, and its commulative consumptive use is 110cm.

Determine consumptive irrigation requirment (CIR) and field irrigation Requirment (FIR) if the water application efficency is 80%.

Sol

Given

Usefull Rainfall (cm) = 10

water application Efficiency (n_a) = 80% = 0.8

Comulative consumptive Use (Cu) = 40cm

ReQ

Field Irrigation Requirment (FIR)?

Consumptive Irrigation Requirment (CIR)?

→ $CIR = Cu - Re$

$= 40 - 10 = 30cm$

→ $FIR = \frac{CIR}{n_a} = \frac{30}{0.8} = 37.5cm$

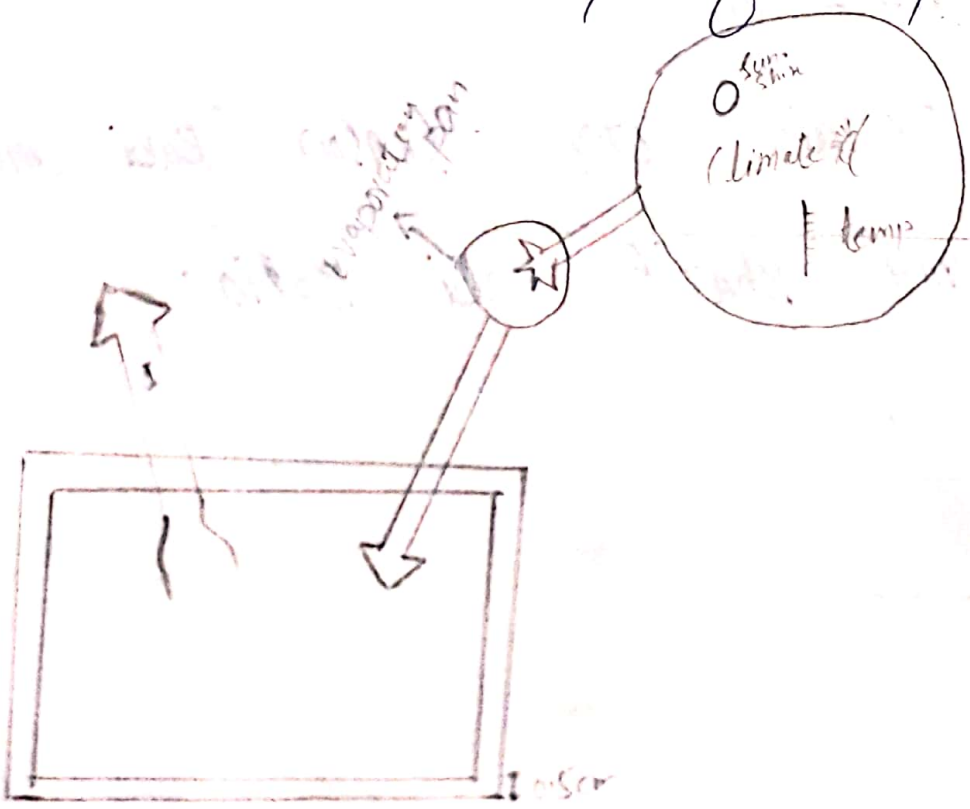
QNo2(C)

Explain Class A pan Evaporation (EP) Measurment with the help of a diagram?

class a pan Evaporation (Ep) Measurment

Ep can be experimently Determind

by directly measuring the quantity of water evaporated from this standered Class a pan. This pan is 1.0m in dia 25cm deep, and bottom is raised 15cm above the ground surface the depth of water is to be kept in a fixed range such that the water surface is at least 5cm and never more than 7.5cm below the top of the pan.



The pan evaporation Ep can also determind by using the christiansen formula which state

$Ep = 0.459R \cdot ct \cdot cw \cdot ch \cdot cs \cdot cc$

K = extra terrestimal radiation in the same units as Ep in cm or mm

ct = coefficent for tempeabature

cw = coefficient for wind velocity.

QNO 2 (D)

Explain crop season (Rabi and kharif) and kharif Rabi Ratio.

Ans

1) Rabi :-

1th octobes to 31st march - winter

Rabi crops :- Rabi crops are wheat, Barly Gram mustard potatoes

2) Kharif :- 1st April to Sept in Summer "Kharif crops"

Kharif crops are Rice Bajro Jawar Maize Cotton

Rabi & Kharif Ratio :-

The area is irrigated for Rabi crops generally more that for Kharif crops The ratio of proposed areas is to be irrigated in Kharif season to that in Rabi season is called as Rabi & Kharif ratio. The ratio is [1 : 2] That is Kharif area is one half of that Rabi ratio

Q NO:3 Define and explain the following terms:-

(A) Field capacity :-

When all gravity water has drained down to water table a certain amount of water which cannot be easily drawn under the action of gravity.

Part (b)

Permanent wilting point:

It is Defined as the minimum amount of water in the soil that the plant requires not to will. If the soil water content Decrease to this or any lower point a plant wilts and no longer recover its turgidity which placed in a Saturated atomsphere for 12 hrs.

Part (c)

Avcilble and readily availble moisture content

a) Availble moisture content:

The Difference in moisture content of the soil between field capacity and permanent wilting is termed the availble moisture. Availble moisture can be expressed as percentage moisture pw, as percentage pv or as Method.

b) Readily available Moisture content

Water that a plant can easily extracted from the soil Row is the soil Moisture held between field capacity and a normalled depil point for unrestricted growth. In this range of soil moisture plant are neither waterlogged or water stressed.

QNo(3)

part (D)

optimum utilization of water:

The yield increase with water can reached a certain maximum value and than falls down. the gravity of water at which depth the yield is maximum is called the optimum water depth. Therfor the optimum utilization of water means getting maximum yield with any amount of water