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SECTION ⇒ "B"

SMESTER ⇒ 6th

SUBJECT ⇒ Irrigation Engineering.

Q NO. 1

PART-A

* DEFINE "Delta" and duty and derive their Relationship in MKS and FPS System.

ANSWER:-

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

Generally a crop needs a certain volume of water at fixed intervals throughout it's Base period.

⇒ DUTY OF WATER

The duty of water is the relationship b/w the volume of water and the area of crop it matures.

• 1 cusec. M. Per. Sec or 1 Ft^3/sec for B days matures Dhectares or area of Land than the duty of water for that particular crop is Dhectares Icumecs or Oaires/cusec

→ Relationship B/ON Delta & Duty in FPS System.

Let

D = Duty (acres/cusec)
Δ = Peel Base period = B days by def.

One cusec of water flowing continuously. For "B" days give a depth of water over "A" and "D" Acre

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 =
$1 \times 24 \times 60 \times 60 = 86400$ BFt^3
$= 86400$ BFt^2 ——→ (1)

1 Area = 43560 ft^2
1 Ft^2 = 143560 Aire
putting in eq it Become,

$= 86400\ B \times 43560$ Acre ft

Volume of water $= 1.983\ B$ Acre ft — (ii)
(ft^3/sec) in
B days

Depth of water required by crop

$= 1983 \times B\ ft.$

⇒ Relationship in Mks Systems:

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

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

$= 86400\ m^3$

By definition of duty, $1\ m^3$ of water supplied for B-days matures D hectares of land. This quantity of water (i) matures D hectares of land 10^4 Dm of area.

Total depth of water applied on this land.

$= \frac{\text{Volume}}{\text{Area}} = \frac{86400\ B}{10^4\ D} = \frac{8.64\ B}{D}\ m$

By Def. this total depth of water is called Delta Δ.

Therefore $\Delta = 8.64\ B/Dm = 864\ B/Dcm$.

Where Δ is cm, B is in days.
D is duty in hactor/unce.

QNO.1.

PART :- B

* If Wheat required about 9cm of water after every 35 days and the base period or crop period of Wheat is 140 days. find out the delta for Wheat

Solution :-

B = 140 day
Δ = ?
Water req. for Wheat = 9cm
No. of days = 35 days.
By Ratio method

9cm = 35 days
Δ = 140 days

$35\Delta = 140 \times 9$

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

Δ = 36 cm.

PART :- C

* Explain Indus water treaty?

ANSWER :-

The Indus water treaty (IWT) is the water distribution treaty Blw india and pakistan Sign. On 19, Sep - 1960. The treaty was Sign by the president "AYUB KHAN" and pm Nehru. it was brokered By the world Bank.

The Indus water treaty deals withe the river indus and it's five tributaries which are classified Below.

→ EASTERN RIVERS

- → Sutlej
- → Beas
- → Ravi

WESTERN RIVERS :-

- → Jehlum
- → Chenab
- → Indus

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

India should we unrestricted flow of water from western rivers to pakistan.

The treaty says that india can use the water in western rivers in non-consymptive needs.

The treaty allocates 80% of water from the Six rivers Indus water System to pakistan.

A permanent Indus commission was set up as a bilitral commission to implement and manage the treaty.

Q No. 1.

PART : D

* Write Significance of duty of a crop.

Ans:- It helps in designing efficient canal Irrigation System knowing the total available water at the head of the main canal and the overall duty of all the crops required to be irrigated in different seasons of the day year the area which can be irrigated can be worked out.

Inversely 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 NO. 2

PART. A

★ Explain the factor affecting Consumptive Use.

ANS:- **FACTORS EFFECTING Consumptive Use:-**

- Temperature
- Humidity in Air
- velocity of wind.
- Soil topography.
- Sunlight etc.

⇒ **TEMPERATURE:-**

Consumptive Use of water is directly effected by the temperature. At high tempt. the plant tends to show dormoney while at low tempt. there is a devastated plant growth.

⇒ **HUMIDITY:-**

Evalaration is inversely proportional to humidity as at low humidity evolaration rate is more write at high humidity evaporation is solved down.

⇒ **Velocity:-**

Evalution rate is more when there is more velocity as air is moving faster there will be more evaporation, If the velocity of wind is low

Then rate of evaporation is also low.

⇒ **SOIL TOPOGRAPHY**

If the soil is made more fertile through the application of manure or by some other mean. The yield may be expected to increase with an accompanying small increase in use of water. However an increase in fertility of the soil cause a decrease in the amount of water consume per unit of crop yield.

⇒ **SUNLIGHT**

At days in Summer there is more Sunlight Then usual so high evaporation occurs when on water there is low evaporation rate.

Q NO. 2. PART. B

* Wheat is to be grown at a certain place the useful rainfall for the whole season is 10 cm & and it cumulative consuptive use is 40 cm. Determin cumpative irrigation Requirement (CIR) and field irrigation Req. (FIR) the water application efficiency is 80%.

⇒ **SOL'N**

GIVEN:

useful Rainfall = 10 cm.

Water application efficiency (η_0) = 80% = 0.8.
Consumptive use C_u = 40 cm.

⇒ **REQUIRED:-**

Field Irrigation Requirement = (FIR) = ?
Consumptive Irrigation Requirement = (CIR) = ?

→ $CIR = C_u - R_e$

$= 40 - 10 \Rightarrow 30$ cm.

$\Rightarrow FIR = \frac{CIR}{\eta_0} = \frac{30}{0.8} \neq 37.5$ cm.

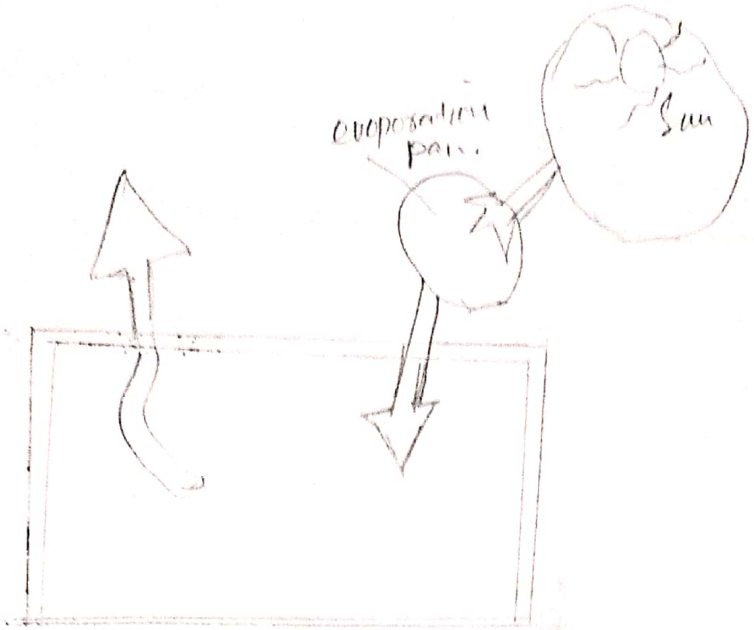
Q NO. 2

PART-C

⇒ EXPLAIN Class a pan evaporation (PE) measurement with the help of diagram.

ANS ⇒ CLASS A PAN EVAPORATION Measurment:-

EP can be experimently determined by directly measuring the quantity of water evaporated from this standard class a pan. This pan is 10 m in daimeter, 25 cm depth and bottom is raised 15 cm above the ground surface. The depth of water is kept to be in a fixed range such that the water surface is at least 5 cm and never more than 7.5 cm. Below the top of Pan.



The pan evaporation "EP" can also determine by using the Christhonsen with States.

$EP = 0.459\ R.c_t.c_w.c_h^2.c_s.c_c.$

R = Extra Terrestrial radiation in the same Unit. As Ep is cm or mm.

c_t = coefficient for temperature.

c_w = coffincied for wind velocity.

Q No. 2.

PART D:-

⇒ Explain crop Seasons (Rabi and Kharif) and kharif Rabi Ratio.

Ans:- **RABI :-**

1st Oct — 31st March — Winter.

⇒ "RABI CROPS" :-

Rabi crops are wheat, Barley Gram Mustured potato.

2ND

⇒ KHARIF :-

1st April to 30th Sep. Summer.

⇒ "KHARIF CROPS"

Kharif crops are Rice, Bajro, Jowar 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 ration is [1:2] that is Kharif area is one half of that Rabi area.

Q No. 3

⇒ DEFINE AN EXPLAIN THE FOLLOWING TERMS.

Ans/ PART-A

⇒ Field capacity:-

When all gravity water has drained down to water table a certain amount of water is retained by surface soil the water which cannot be easily drained under the action of gravity.

⇒ PART ⇒ B

PERMANENT WILTING POINT:-

It is defined as the minimum amound of water in this soil that the plant requires not to will if the soil water content decrease to this or any lower point a plants wilts and no longer recovery its turgidity which is placed in a saturated atmosphere for 12 hours

⇒ PART = C :-

① Available moisture Content:-

The difference in moisture content of the soil b/w field capacity and permanent wilting is termed the available

(13)

moisture. Available must can be expressed as percentage moisture P_W, as percentage P_r or as depth d.

(11) **Readily Available moistm Content:-**

q_1 is the water that a plant can easily extracted from this soil Raw is the soil moisture held b/w field capacity and nominated refill point for Unrestricted growth in this Range of soil moisture plant are neither water logged or water Stressed.

PART-D

OPTIMUM Utilization of water:-

The field increase with water can reaches a certain maximum volume and then falls down the quantity of water at which the field is maximum is called the optimum water depth. Therefore the optimum Utilization of water means getting maximum field with any amount of water.

THE END