Mid Term Paper

Online

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Section "A"

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Q#01 (a) Define "Delta" and Duty and derive Their relationship in MKS and FPS System

Ans **Delta:-**

it is define The certain amount of water required for crop at fixed interval Through out its base period

⇒ The total depth of water required for The crop during The base period is called Delta of The crop

Depth of each watering: 5cm – 10cm

Duty:-

The duty of water is The relationship between The volume of water and The area of crop it matures (OR)

⇒ Duty is defined as The area irregated by a Unit discharge of water flowing continuously for The duration of The base period of The crop

Relation between Delta and Duty and MKS :-

As we know That

D = duty in hectares/cumec

Δ = total depth of water supplied in metres

B = Base Period in day.

i) we take a field of area D hectares water supplied to the field corresponding to the water depth Δ meter will be = Δ x D hec-ares - metres = $D \times \Delta \times 10^4$ cubic metres → (1)

ii) Again for the same field of D hectares one cumec of water is required to flow during entire base period Hence water Supplied to the field = (1) x (B x 24 x 60 x 60) → (2)

equation (1) and (2) we get

$$D \times \Delta \times 10^4 = B \times 24 \times 60 \times 60$$

$$\Delta = \frac{B \times 24 \times 60 \times 60}{D \times 10^4} = 8.64\ B/D\ m$$

$\Delta = 8.64\ B/D$ meter

1 hectare = 104 sq meter

cumec day = 8.64 hectare-metres

IN FPS SYSTEM:-

Let

Duty = D (Acres/cusecs)

Delta = A feet Base period = B day

By definition

One cusec of water flowing continuously for B days gives a depth of water "A" over in area of "D" Acres

Volume of water 1 ft^3 sec in one day = $1 \times 24 \times 60 \times 60 = 86400^3$

volume of water 1 ft^3 sec in B days = $1 \times 24 \times 60 \times 60 = 86400\ ft^3 ft$ →①

As 1 acre = 43560 ft^2 1ft = 143560 acre

Then eq ① become

Volume of water 1 ft^3 sec in B days = 86400 B ft^3 = 86400B x 143-560 acre-ft

Volume of water 1 ft^3 sec in B days = 1.983xB acre-ft →(ii)

Depth of water required by a crop "A" = volume Area A = 1.983 B Acre-ft D Acre A = 1.983 x B/D ft

(b) if ~~Heat~~ wheat requires about 9 cm of water after every 35 day and the base period or crop period of wheat is 140 days. Find out the delta for wheat?

Give Data

water require of wheat = 9cm

Day interval = 35 days

Bas period = 140 day

Requirment:-

Delta for wheat ?

Solution:-

35 days = 9cm

140 days = Δ

By cross multiplycation

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

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

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

Q#01 (C) Explain Indus Water Treaty:-

The indus water treaty is a water distribution between india and pakistan brokered by World bank to use the water available in the indus system of rivers located in india The indus water treaty was signed in Karachi on september 19, 1960 by the first prime minister of india pandit jawah-arlal Nehru and then president of pakistan Ayub Khan According to this agrement control over the Water flowing in three "eastern river" of India. The Beas the ravi and the Sutlej with the mean annual flow of 33 million acre-feet (MAF) was given to india. while control over the water flowing in three 'western rivers" of india the indus the chenab and the

Jhelum with the mean annual flow of 80 MAF was given to pakistan

Some Features of the indus Water Treaty:-

⇒ The treaty administer how river indus and its tributaries that flow in both the contries will utilized

⇒ Since indus flow from india the ~~cont~~ country is allowed to used 20% of its water for irregation power generation and transport purpose

⇒ The Treaty also provides arbitration Mechanism to solve disputes amicably.

Q#01 (D) Write the significance of Duty of a crop?

Following are the some significance of Duty of a crop

=> it helps in designing efficient canal irregation system. Knowing the total available water at the head of the main canal and the overall duty for all the crops required to be irregated in different season of the year the area can be irregated can be worked out

=> inversely if we know the crop area required to be irregated and their duties we can work out the discharge required for designing the canal

=>

Q#02 Part(a) Explain the factor affecting consumptive use

Consumptive Use:-

its is the quantity of water used by the vegetation growth of a given area it is the amount of water required by a crop for its vegetated growth to evapotranspiration and building of plant tissue plus evaporation from soil and intercepted precipitation.

Factor Affecting consumptive Use:-

1) Humidity:-

Evaporation and Transpiration are accelarated on day of low humidity and slow during period of high humidity During period of low relative humidity, grater rate of use of water by vegetation may be expected.

2) Sun Light:-

The Sun is the source

of all energy use in crop growth and evaporation of water this longer day may allow plants transp Transpiration The continous for longer period each day and produced and effected similar to that of lengthering the growing season

3) Temperature :-

The rate of consumptive use of water by crop is any particular locality is probably affected more by tempreture which for long time period is good measure of solar radiation then by any other factor. Abnormally low temprature related plant growth and unusually ~~Hi~~ High Temprature may produce dormancy.

4) Velocity of wind :-

Evaporation of water from land and plant surface take place more

rapidly when their is moving air Then under calm air condition. Hot dry wind and other unusual wind condition during the growthing period will effected the amount of water.

5) Soil Fertility:-

if the soil is made more fertil through the application of ~~man~~ manure or by some other, the yield may be effected the increase with an accompanying small increase in use of wates.

Q#02 Part(b) Wheat is grown at a certain place, the useful rainfall for the whole season is 10 cm and its cumulative use is 40 cm. Determine the consumptive irrigation requirment (CIR) and field irrigation Requirment (FIR) if the water application efficiency is 80%.

Given Data:-

Usefull rainfall = 10 cm

water application Efficiency $\eta_a = 80\%$

$= 0.8$

Commulative consumptive use

$C_u = 40$ cm

Requirment:-

FIR = ?

CIR = ?

Solution:-

As we know that

$CIR = C_u - R_e = 40 - 10$

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

$FIR = \frac{CIR}{\eta_a} = \frac{30}{0.8}$

$\boxed{FIR = 37.5 \text{ cm}}$

Q#02 Part (c) Explain class A pan Evaporation (EP) measurment with the help of a diagram.

⇒ A class A ~~pan~~ Evaporation pan is a standard device for manual measurment of evaporation. The pan represent an open body of water

⇒ Ep can be experimentally determined by directly measuring the quantity of water evaporated from this standard class a pan this pan is 1.0 m in dia, 25 cm deep and bottom is raised 15 cm above the ground surface the depth of water is to be kept in a fixed range such that the water surface is at least 5 cm and never more then 7.5 cm below the top of the pan.

⇒ The pan evaporation can also determine by using the christiansen formulla which states

$Ep = 0.459\ R.Ct.Cw.Ch.Cs.Ce$

R = extra. Terrestrial radiation in the same unit as EP in cm or mm

Ct = coefficient for temperature

Cw = coefficient for wind velocity

Ch = coefficient for relative humidity

Cs = coefficient for percent of possible sun shine

Ce = coefficent for elevation

Q#02 Part(d) Explain crop seasons (Rabi and Kharif) and Kharif Rabi Ratio

Rabi crop season:-

Rabi crop, which are also known as winter crop are the crop that grown in the winter season (October or November) their seeds are sown at the beginning of the winter season and crop is harvest at the end of the winter season or in the spring season.
The rabi crops are cultivated in the dry season so timely irrigation is required to grow these crop. some of the main rabi crop of include wheat gram, oat barley, potato and seeds like mustard linseed etc.

Kharif crop season:-

Kharif crop which are also known as monsoon

croop are the crop which are grown during the monsoon or rainy season (June to Oct) Their seeds are Sown at the beganing of the moonsoon season and the crop are harvested at the end of the ~~moonso~~ monsoon season.
Kharif crop depend on the rainfall patterns. The timing and quantity of rainwater are two important factor That decide the out put of Kharif crop.

Kharif Rabi Ratio:-

The area to be irrigated for Rabi crops generally more then that for Kharif crop. This Ratio of purpose area to be irrigated in Kharif season to that in Rabi season is called Kharif Rabi Ratio
This Ratio is generally 1:2
i.e Kharif area is one half of Rabi area.

Q# 03 Define the following terms

(a) Field Capacity:-

When all gravity water has drained down to water table a certain amount of water is retained by surface oil This water which can not be easily drained under the action of gravity and is called F.C

Period of Drainage = 2-5 day

FC is measured after 2 or 5 days

(b) Permanent wilting point:-

A plant can extract water from soil till a permanent wilting is reached P.W.P is that water content at which a plant can no longer extract sufficient water for its growth and wilts up.

water available in plant

= Field capacity - P.W.P water

P.W.P water = $\frac{\text{water available in plant}}{\text{Field capacity}}$.

(c) Available and Readily available Moisture content

Available Moisture content:-

The range of available water that can be stored in soil and be available for growing crop is know is availabl moisture content.

Readily Available Moisture:-

it is the portion of available moisture which is mostly easily extracted by plant and is approximately 75% to 80% available moisture

(d) Optimum Utilization of water:-

it is the crop is shown and produced under absolutely identical condition using different amount of water depth. the yield is found to vary, the yield increase with water reach a certain Maximum value & then falls down.