# MID Term paper ONLINE

Name Shahkar

ID # 7808

Section 'A'

Semester 6th

Date

Subject Irrigation Engineering.

Instructor Dr. Jahangir Durrani.

Civil Engineering department.

Q1 a)

Define "Delta" and "Duty" and derive their relation ship in MKS and FPS systems.

Ans **Delta:** Any plant or crop needs water for the growth and development. and its base period Depth of each watering
50m — 10cm
Denoted by 'Δ'

Definition: It is the total depth of the water required by a crop during the whole period while the crop is in the field.
for example, watering depth
(4") or (10cm) or (100mm)

Duty: The Duty represent the irrigating capacity of a unit. It is the relation-ship b/w the area of the crop irigated and the quantity

of irrigation water required during the whole period of the growth of that crop.

Example: It represent a relation ship b/w the amount (volume) of water required for a crop during it growth period and the area of a crop which is irrigated.

Relation between Duty and Delta

In MKS system:

⇒ 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 volume of the water applied to this crop during B days = $V = (24 \times 60 \times 60 \times B)\ m^3$

$V = 86400 m^3$

This quantity of water (v) matures 'D' of Land or $10^4$ $Dm^2$ of area

$$So = \frac{\text{volume}}{\text{area}} = \frac{86400}{10^4} = 8.64\ l/Dm$$

So this total the depth of the water is called Delta 'Δ'

therefore $\Delta = 8.64\ l/Dm = 864\ l/Dm$

where Δ is in cm
B is in days

In F.P.S system:

Duty = D( area
Delta = A feat base period
= D days
By definition

one cusec of water flowing continiously for B days gives a depth of

water 'A' over an area of 'D' acres

So Volume of water in 1 $ft^3$ in 1 days
$= 1 \times 24 \times 60 \times 60 = 86400\ ft^3$

Volume of water in 1 $ft^3$ sec in B days =
$= 1 \times 24 \times 60 \times 60 = 86400^{B}\ ft^3$

As we know that
1 acres = 43560 $ft^2$
and
1 $ft^2$ = 143560 Acre then
volume of water in 1 $ft^3$ sec in 'B' days
= 86400 B x 143560 acre-ft volume

So Volume of water in 1 $ft^3$ sec in B days
= 1.983 B acre ft

So
Depth of water required by
crop A = volume area = 1.983 B acre ft.
Acre A = 1.983 B · D ft

Question 1 (part b)

If what required about 9cm of water after every 35 days and the base period and crop period of wheat is 140 days

find out the delta 'Δ' for wheat?

Given data:

water requirement of wheat = 9 cm
Days interval = 35 days
Base period time = 140 days

Required :- Delta Δ = ?

Solution: As we know that

$$\text{Delta} = \Delta = \frac{\text{water required} \times \text{base period}}{\text{Days interval}}$$

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

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

Now total depth of water

required in 140 days = 36 cm

Question 1 (part c)

Explain Indus water treaty;

The indus water treaty was an aggrement (treaty) of water Shearing b/w the two ~~action~~ asian countries india and pakistan. The treaty was signed on september 19, 1960 between the prime minister of India Jawahar Lal Nehru and president of pakistan Ayub Khan.

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

since indus flow from india, the country is allowed to use 20 % of its water for irrigation power geveration and transport purpose.

Question 01 (Part-D)

Significance of Duty of a crop.

⇒ Inversly if we know the crop area required to be irrigated and thier duties, we can work out the discharged required for designing the canal.

⇒ It helps in the designing of efficient canal irrigation system.

⇒ By knowing the total area of crop to be mature, the total duty of all the corps required to be irrigated can be worked out.

Question No 2

Explain factor affecting consumptive use?

Ans: Factor affecting consumptive use:

1- Temperature: The total rate of consumptive use of water by corps in any particular locality is propabaly affected more by temperature, so which for long time periods is good measure of solar radiation then by any other factor.

2- Humidity: Evaporation and transpiration are accelerated on days of low humidity and slowed during periods of high humidity

High humidity slow down and Low humidity on certain days accelerate the evapotranspiration process.

3 Velocity of a wind:

It has significant effect in terms of moving or clam air conditions.

Hot dry wind and othere unusual wind condition, Hot, dry during the growthing period will effect the amount of water consumptively used. However, there is a limit in the amount of water that can be utilized.

4- Sun light, Sun is the source which of the total of all energy which is used in crop to growth and help in evaporation of water, this thin layer day may allow plants transpiration to continiouse, for a longer period each day and to Produced an effect similar to that of lengthening the growing season.

5 Soil Fertility:

The fertility of a soil has an inverse relation with the amount of water consumed per unit of crop yield.

an increase of in fertility of the soil cause a decrease in the amount of water consumed per unit of crop yield.

Question NO2 (part B)

wheat is to be grown at a certain place, the usefall rainfall for the whole season is 10 cm and its cumulative consumptive use in 40 cm, Determine consumptive irrigation requirement (CIR) and field irrigation requirement (FIR) if the water application efficieny is 80%.

Given data:

Usefull rainfull = 10 cm

water application efficiency $\eta_a = 80\% = 0.8$

commulative consumptive use $Cu = 40$ cm

Required:-

Field irrigation requirement = ?

FIR =

consumptive irrigation requirement = ?

CIR =

Solution:

By the formula we have

we know that

$$CIR = Cu - Re = 40 - 10$$

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

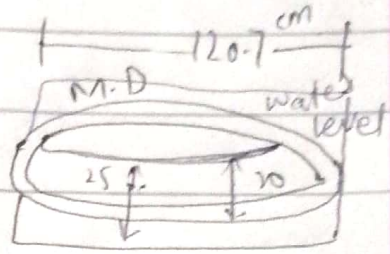
we also know that

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

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

Question No 2 (Part C)

Explain class A pan evaporation (EP) measument.




Pan evaporation can be experimentally determined by directly measuring the quantity of water evaporated from this standard class A pan. diameter is 1m of a pan, deepness is 25 cm and bottom is raised 15 cm above the ground surface level.

The depth of water is to be kept in a fixed rang such that the water surface is at least 5 cm and never more than 7.5 cm below the top of Pan.

Question 02 (Part D)
Explain crop season

(Rabi crops):- The Rabi crops are sown during the winter season. usually from 1st october to 31st March

=> Rabi crops are sown after the end of the Monson i.e during the winter season.

corps that comes under this catagory are Rice, Bajra, etc

Kharif corps: Kharif corps can be described as the corps which are sown with the begining of raining season.

corps comes under this catagory are Rice, Bajra, jawar, Maize, cotton.
Harvesting months are usually september, october.

Kharif rabi ratio:

The ratio of proposed area to be irrigated by Kharif season to that in Rabi season is called Kharif Rabi ratio.

The ratio is generally 1:2

Question No 3 (Part A)
Define and explain the following terms.

1- Field capacity:
When the total all gravity water has drained down the water table, a certain amount of water is retained by surface that soil. this water which cannot be easily drained under the action of gravity is called Field capacity.
Period of drainage = 2 to 5 days

2- Hygroscopic water: By the capillary action water is attached to soil by the help

of chemical bonding action can be easily extracted to the plants.

ii) Capillary water: water attached to soil by surface tension which can easily be extracted by plants by cappillary action.

B. Permanent Welting point:-

It is the water content at which a plant can no longer external extract sufficient water for its growth and wilts up.

water available to plant = field capacity - P.Wp water.

C. Available Moisture content;

It is the difference b/w the amount of water in the soil at field capacity and the amount at the permanent wilting point refered to as the available water or moisture

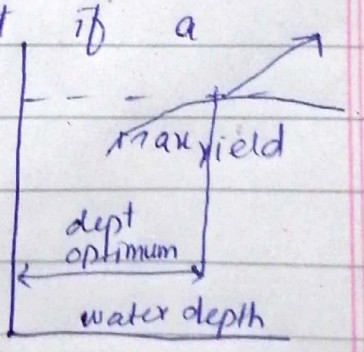
water available = F.C - PWP.

Readily Available Moisture content.
The amount of available water that a crop can use without effecting its consumptive use or growth is called available Moisture content.

OR

It is the portion of available moisture which is mostly easily extracted by plants and is approximately 75% to 80% available moisture.

d) Optimum utilization of water,
This graph shows that if a crop is sown and being produced yield under absolutely identical condition using different amount of water.




The quantity of the water at which the yield is maximum called optimum water depth.