Name : Muhammad Imran

ID : 7847

Section : B

Semister : 6th

Subject ; CE 324 Irrigation Engineering

Question No # 01 :-

(a): Define "Delta" and Duty and derive their relationship in MKS and FPS systems.

Answer :-

DELTA :-

- A crop needs a certain amount of water at fixed interval through out its base period.
  Depth of each watering: 5cm (2") – 10cm (4").

- The depth of water in cm or inches required for the crop through out the base period is called Delta of the Hop.

- Ex. Rice : 10 cm of water at interval of 10 day. Base Period is 120 days.

Duty :-

The term duty means the area of land that can be irrigated with unit volume irrigation water. Duty represents the irrigation capacity of a unit. It is the relation between the area of crop irrigated and quantity of irrigation water required during the entire period of the growth of that crop.

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

$= 86400 m^3$

By definition of duty, $1 m^3$ of water supplied for B days matures D hatares of land. This quantity of water (V) matures D ha of land or 10^4 Dm^2 of area.

Total depth of water applied on this land.

$=$ volume/area $= 86400 B/10^4 D = 8.64 B/D m$.

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

Therefore $Δ = 8.64 B/D m = 864 B/D cm$

where Δ is in cm, B is in days. D is duty in ha/cumec.

In FPS units $Δ = 1.98 B/D ft$.

where Δ is in ft, B in days and D in Acres/cusec.

b) If wheat required about 9 cm of water after every 35 days and the base period or wheat is 140 days. Find out the delta for wheat?

Given data:

Depth of water = 9 cm

Base Period = 140 days.

Required:

Delta for wheat, $\Delta = ?$

Solution:

As

No of watering required = $140/35 = 4$

Total depth of water required = No of watering $\times$ Depth of water

$= 4 \times 9 = 36$ cm

Δ for wheat = 36 cm

Result:

Δ for wheat = 36 cm

Q No 1 (c)

Explain Indus water Treaty:

Answer:

Introduction:

It was in year in 1960 by former Prime Minister Jawaharlal Nehru and President of Pakistan. Ayub khan.

Purpose of Indus water Treaty:

The Purpose of Indus water treaty is an aggrement that was made to chack. out the control over the 6 rivers that run across India and Pakistan into the Indus Basin.

River given to Pakistan:

control of water flowing in three wastern river of India Indus, chenab and Jehlum with mean annual flow of 80MAF were given to Pakistan.

River given to India:

Eastern river of India. Beas, River and sutlej with mean annual flow of 33 MAF was given to india.

Q No # 01 (D)

Write significance of Duty of a crop?

Answer :-

Significance of Duty of Crop :

• It helps in designing efficient canal irrigation system. knowing the total available water at the head of the main canal and the overall duty for all the crops required to be irrigated in different season of the 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.

Question No # 02:

a) Explain the factor affecting consumption use

Answer:-

The following are the factor affecting consumption use.

Temperature:-

The rate of consumptive use of water by crops in any particular locality is probably affected more by temperature, which for long time period is good measure of solar radiation, then by any other factor. Abnormally low temperature retard Plant growth and and unusually high temperature may Produce dormacy.

Humidity:

Evaporation and transpiration are accelerated on days of low humidity and slowed during periods of high humidity. During period of low relative humidity, greater rate of use of water by vegetation may be expected.

Wind Movement

Evaporation of water from land and plant surfaces takes place more rapidly when there is moving air then under calm air condition. Hot, dry winds and other unusual wind conditions during the growing period will affect the amount of water consumptively used. However there is a limit in the amount of water that can be utilized. As soon as the land surface is dry, evaporation partically stops and transpiration is limited by the ability of the plants to extract and convey the the soil moisture through the plants.

Lattitude and sunlight :-

Although latitude may hardly be called a climatic factor, it does have considerable influence on the rate of consumptive use of water by various plants. Because of the earth movement and axial inclination, the hours of day light during the summer are much greater in the northern latitudes than al the Equator. Since the sun is the source of all energy used in crop growth and evaporation of water, this longer day may allow plant transpiration to continue for a longer period each day and to produce an effect similar to that of lengthening the growing season.

b)

wheat is to be grown at a certain place, the useful rainfall for the whole season is cumulative consumptive use is 40 cm. Determine consumptive irrigation requirement (CIR) and field irrigation Requirement (FIR) if water efficiency is 80%.

Given Data :-

Useful Rainfall (cm) = 10 cm

water application efficiency $(n_a) = 80\%. = 0.8$

commulative consumptive use $(cu) = 40$ cm

Required Data :-

Field irrigation Requirement (FIR) = ?

Consumptive Irrigation Requirement (CIR) = ?

Solution :-

Consumptive Irrigation Requirement CIR =

$$= cu - Re$$

$$CIR = 40 - 10$$

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

Field Irrigation Requirement (FIR)

$$= \frac{CIR}{n_a}$$

$$CIR = NIR$$
i.e neglect leaching requirement.

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

Result.
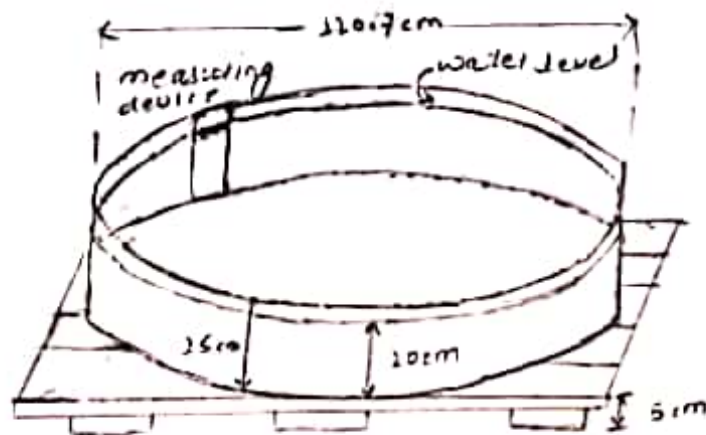
$$CIR = 30 \text{ cm}$$

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

Q#02

c) Explain class A Pan Evaporation (EP) measureme with help of of a diagram.

Answer :-

Ep can be experimentally determined by directly measuring the quantity of water evaporated from this standard class a pan. This pan is 2.0 m in diameter, 25cm 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 than 7.5 cm below the top of Pan.

Q#02

d)

Explain Crop seasons (Rabi and kharif) and Kharif Rabi Ratio?

Answer :-

1. RABI — 1ˢᵗ October to 31ˢᵗ march — winter.

2. KHARIF — 1ˢᵗ April to 30st september — summer.

Kharif crops : Rice Bajra Jawar Maize cotton

Rabi crops : wheat, Barley, Gram, Mustard

Potatoes. KHARIF RABI RATIO

KHARIF RABI RATIO :-

The area to be irrigated for rabi crops generally more than that for kharif crops. This ratio of Proposed areas, 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.

Question No #03

Define and Explain 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 soil. This water which can not be easily drained under the action of gravity and is called Field Capacit

Period of drainage = 2-5 days

FC is measured after 2 or 5 days

Field capacity (F.C).

1. capillary water.
2. Hygroscopic water.

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 to Plant = Field capacity - P.W.P water

c) Available and Readily available Moisture content.
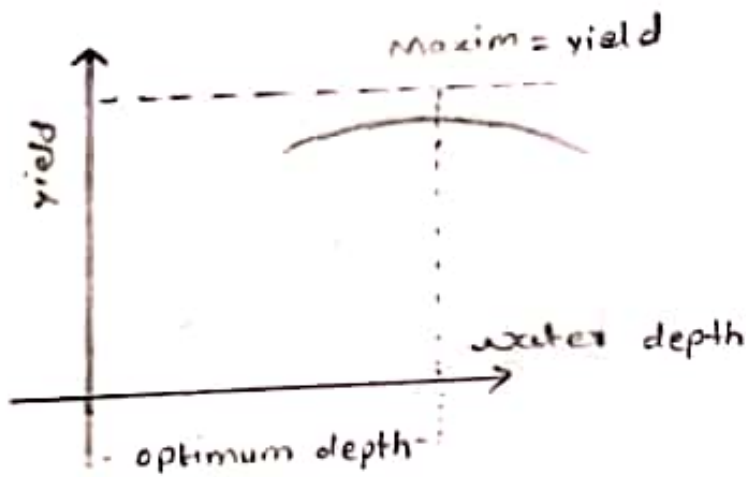
Available Moisture content :

The different in moisture content of the soil between field capacity (F.C) and Permanent wilting is termed as the available moisture. Available moisture can be expressed as Percentage moisture.

Readily Available Moisture :-

It is the Portion of available moisture which is most easily extracted by Plants and is approximately 75 to 80% available moisture.

d) Optimum utillization of water:

• If a crop is sown and produced under absolutely identical conditions using different amounts of water depths. the yield is found to vary. The yield increases with water, reaches a certain maximum value & then falls down as shown in following fig.

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

Irrigation Efficiencies :- Efficiency is the ratio of water output of water to the water input and is usually expressed as Percentage