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Date : 13-04-2020

Mid Term Examination

Question No # 01:-

- a) Define "Delta" and "Duty" and derive their relationship in MKS and FPS system.

Answer:-

DELTA:-

- A crop needs a certain amount of water at fixed interval throughout 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 crop.
- Ex. Rice 10 cm of water at interval of 10 day. Base period is 120 days.

(2)

DUTY:-

The term duty mean 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 that crop.

(3)

Derive their relationship in MKS & FPs

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 hectares of land. This quantity of water (V) matures D ha of land or $10^4 D m^2$ of area.

Total depth of water applied on this land.

$$= \text{Volume} / \text{area} = 86400 B / 10^4 D = 8.64 B/D \text{ m.}$$

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

$$\text{Therefore } \Delta = 8.64 B/D \text{ m} = 864 B/D \text{ cm}$$

where Δ is in cm, B is in days.

D is duty in ha/cumec.

$$\text{In FPs units } \Delta = 1.98 B/D \text{ ft.}$$

Where Δ is in ft. B in days and D in Acres/cumec.

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

Given Data:-

Depth of water = 9cm

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
x Depth of water
= $4 \times 9 = 36\text{cm}$.

Δ for wheat = 36cm

Result:-

Δ for wheat = 36cm

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 agreement that was made to check out the control over the 6 rivers that run across India and Pakistan into the Indus Basin.

River given to Pakistan:-

Central of water flowing in three western river of India Indus, Chenab and Jhelum 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 33MAF was given to India.

(6)

Question No 1 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 seasons of the year area which can be irrigated can be worked out.
- Inversely if we know the crop area required to be irrigated 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 consumption 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, than by any other factor. Abnormally low temperature retard plant growth and an unusually high temperature may produce dormancy.

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 than 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 partially stops and transpiration is limited by the ability of the plants to extract and convey the soil moisture through the plants.

Latitude 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 at 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 40cm. Determine consumptive irrigation requirement (CIR) and field irrigation requirement (FIR) if water efficiency is 80%.

Given Data:-

Useful Rainfall (cm) = 10cm

Water application efficiency (η_a) = 80% = 0.8

Cumulative consumptive use (CU) = 40cm

Required Data:-

Field irrigation Requirement (FIR) = ?

Consumptive Irrigation Requirement (CIR) = ?

Solution:-

Consumptive Irrigation Requirement CIR =

$$= CU - R_e$$

$$CIR = 40 - 10$$

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

(10) (u)

Field Irrigation Requirement (FIR):-

$$= \frac{CIR}{\eta_a}$$

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

CIR = NIR
b.c neglect teaching
requirement.

Result:-

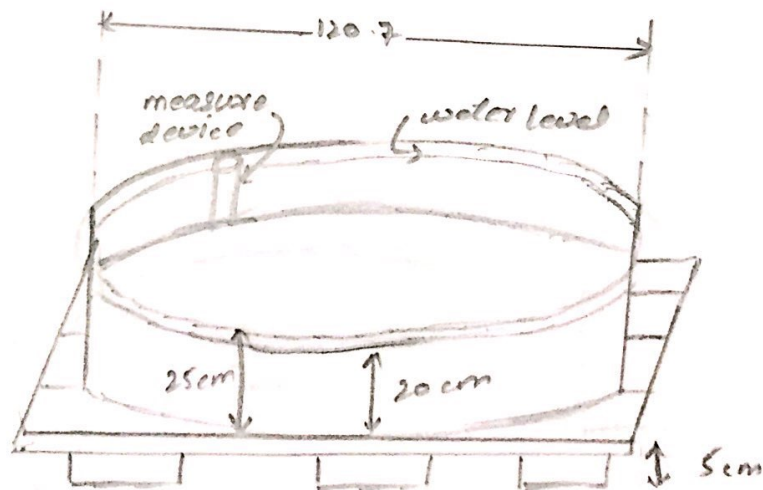
$$CIR = 30 \text{ cm}$$

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

(C) Explain class A pan Evaporation (EP) measurement with help 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 100cm in diameter, 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 pan.



(d)

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

Answer:-

- 1) RABI - 1st October to 31st March - winter.
 - 2) KHARIF - 1st April to 31st 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 capacity.

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 PWP is that water content at which a plant can no longer extract sufficient water for its growth and withers up.

Water Available to plant = field capacity - P.W.P water

(c) Available and Readily available Moisture Content

Available Moisture Content:-

The difference 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.