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ID = 7795

Section = A

paper = irrigation Eng

Q NO 1:-

A) Define detta and duty and derive their relationship in MKS and FPS system.

ANS:-

**Delta:-**

⇒ A crop needs a certain amount of water at fixed interval throughout its base period is know as delta.

⇒ Depth of watering is 5cm – 10cm.

⇒ The total quantity of water is divided by total irrigated place is known as delta.

**Duty of water:-**

⇒ The duty of water is the relationship between the volume of water and the area of crop it matures.

⇒ It is the relation between the area of crop irrigated and quantity of irrigated water required during the entire period of the growth of that crop.

⇒ Duty represent the irrigating capacity of a unit.

## Relationship of delta and duty in MKS:-

Duty = D (hectares/comecs)

Delta = A meters base period = B days by define one comec of water flowing continously for "B" days given a depth of water "A" over an area of "D" hectares.

volume of water @ $1m^3$ sec in 'B' day = $1 \times 24 \times 60 \times 60$

$= 86400 B m^3$

$= 86400 m^2 m \rightarrow (i)$

As 1 Hactare = $10000 m^2$

$1 m^2 = 1 / 10000$ H

Then ~~1 Hactare~~ eq (i) becomes

volume of water @ $1m^3$ sec in 'B' days = $86400 B m^3$

$= 86400 B \times 1/10000$ H-M

volume of water @ $1m^3$ sec in B days = $8.64 \times$ BH·M (ii)

Depth of water required by crop A =

volume of area A = $8.64 \times B$ H·M D/A

$= 8.64 \times B D M$

one cusec of water flowing continously for B days given a depth of water 'A' over an area of 'D' acres.

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Volume of water @ 1 ft³ sec in one day

= 1 × 24 × 60 × 60 = 86400 ft³

Volume of water @ 1 ft³ sec in 'B' days

= 1 × 24 × 60 × 60

= 86400 B ft³ = 86400 ft³ → (1)

As 1 Acre = 43560 ft², 1 ft² = 143560 Acr

As 1 acre = 43560 ft²,

then eq (i) becomes

Volume of water @ 1 ft³ sec in B days

= 86400 ft³

= 86400 B × 143560 Acr. ft

Volume of water @ 1 ft³ sec in B days

= 1.983 × B Acrs-ft → ①

Depth of water required by crop A = volume

Area A = 1.983 B Acre-ft D Acre A = 1.983 × B D ft

$$\boxed{\text{Acre } A = 1.983 \times B \, D \text{ ft}}$$

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Q NO 1)

b)

Given:-

water requirement of wheat = 9cm

Days Interval = 35 days

Base period = 140 days

Req:-

Delta of wheat (D) = ?

Sol:- As 35 days = 9cm

140 days = D

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

$$D = 36cm$$

Q NO 1)

c) Indus water treaty:-

Sign with in the year 1960 by farmer P.M Nehru and therefore then the president of pakistan Ayub Khan. The (IWT) is an agreement that was made to sketch the control over the 6 rivers that meet india and then pakistan into the indus basin.

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The origin of the six rivers that make the indus basin happen in the tibet from where they flow across the himaliyan ranges and end with the arabian sea south of karachi. The treaty was devised because the indus basin was one among the network btw the two nations and since pakistan was unsurprisingly threatned with prospect are being fed by india.

## Q NO 1)

## D) significiance of duty of a crop:-

it helps is designing efficient canal irrigation system. knowing the entire available water at the top of most canal and therefore the overall duty for all the crops required to be irrigated in several season of the year. The world which may irrigated area often figured out.

Inversly if we all know the crop area required to be irrigated and their duties we will compute the discharge required for designing the canal.

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Q NO 2)

a) factors affecting consumptive use:-

Consumptive use varies with temperature, humidity, wind speed topography, sun light hours, method of irrigation, moisture availability.

Consumptive use varies with.

=> Evaporation which depends on humidity.
=> Mean monthly temperature.
=> Monthly precipitation in area.
=> Wind velocity in locality.
=> soil and topography.
=> sun light hours.

Q NO 2

b) Given:-

useful rainfall (cm) = 10

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

commulative consumptive use (CU) = 40 cm

Req:-

FIR = ?

CIR = ?

SOL:-

AS

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⇒ Consumptive irrigation requirement (CIR)

= CU − Re

= 40 − 10

CIR = 30cm

⇒ Field irrigation requirement (FIR) = $\frac{CIR}{\eta a}$

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

Q NO 3

c) :- Class A Pan evaporation :-

The Class A Evaporation pan may be a standard device for manual measurement of evaporation (Australian Bureau of meteorology) class A type). The pan represents an open body of water; it's crammed with water and exposed on a flat plateau. The evaporation rate is calculated by the change in level of the free water surface (daily manual readings) and therefore the recorded rainfall (in millimeters). Data are often calculated for any period required for estimation of evaporation and evapotranspiration rates.

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D) Rabi crop season:-

⇒ Rabi crop or rabi harvest are agriculture crop that are sown in winter and harvested with in the spring in india and pakistan. The term spring from the arabic word for spring which is employed within the indian subcontinent, where it is the spring harvest. also referred to as the winter crop.

Khanit crop:-

⇒ Khanit crop, monsoon coops or autumn crops are domesticated plants like rice that are cultivated and harvested in india, Bangladesh during the india subcontinents monsoon season, which starts from june to november depending on the area. Monsoon rains may

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~~begin~~ begin as early as may in some parts of the indian subcontinent, and crops are generally harvested from 3rd week of September to October, again depending upon the region and therefore the crops. Rice, maize, sorghum and cotton are the main Kharif crops in Pakistan.

**Kharif rabi ratio:-**

⇒ The area to be irrigated for rabi crop is usually quite that for the Kharif crop. This ratio of proposed areas, to be irrigated in Kharif season there to with in the rabi season is named, Kharif rabi ratio. This ratio is generally 1:2 i.e Kharif area is one half of the rabi ratio.

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⇒ **Field capacity:-**

In many soils after a rain or irrigation, the soil immediately starts draining to the deeper depth. After one or two days the water content in the soil will reach with time. For many soil, a nearly constant value for a particular depth in question. This some what arbitary value of water content expressed as percent is called field capacity.

⇒ **permanent wilting point:-**

permanent wilting point is defined as the minimum amount of water in the soil that the plant requires not to wilt. If the soil water content decreases to this or any lower point a plant wilts and can no longer recover its turgidity when placed in a saturated atmosphere to 12 hours.

**Available moisture contents:-**

The difference is soil moisture content of the soil between field capacity and permanent wilting is termed the available moisture. Available moisture can be expressed as percentage moisture.

## Readily moisture contents:-

Soil moisture content near the wilting point is not readily available to the plant. Hence, the term readily available moisture has been used to refer to the portion of available moisture that is most easily extracted by plants; approximately 75% of the available moisture.

## optimum utilization 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 and then falls down. The quantity of water at which the yield is maximum, is called the optimum water depth.

Therefore, optimum utilization of irrigation generally means, getting maximum yield with any amount of water. The supplies of water to various crops should be adjusted in such a fashion, a to get optimum benefit ratio, not only for the efficient use.