Final Term. Paper

Subject:- Irrigation Engineering and practices

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QNo#01 (a)

Delta:- A crop needs a certain amount of water at fixed interval Through out its base period Depth of each watering scm - 10cm

the depth of water in cm or inches Requires for the crops Through out the Base period is called Delta of the crop.

Duty of water (D):- the Duty of water is the Relationship b/w the volume of water and Area of the crops it matures.

Volume of water is generally expressed by a unite discharge flowing for a time of base periods of the crops.

$1 m^3$ of water supplied for 8 days matures D hectares of land this quantity of water (V) matures D ha of land OR $10^4 Dm^2$ of Area.

Significance of duty of crop:- (2)

The duty of crop means the Area of land that can be irrigated with unit volume of irrigation water. It is the relation b/w the Area of the crop irrigated and the quantity of irrigation water requires during the entire period of the growth of the 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 years. the Area which can be irrigated if we know the crop Area required to be irrigated and their duties we work out the discharge required for designing canal.

QNo#02 (b) Problem

wheat Requires about 10cm of water After every 35 days and the base Period OR crop Period of wheat is 140 days. Find out the delta for wheat.?

Solution:-

No of required watering = 140/35 = 4 days

the depth of water required each time = 10cm

total depth of water Required in 140 days =

4 x 10cm = 40cm

Δ for wheat = 40 cm Ans

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QNO#02 (c) Factor affecting consumptive use:-

(i) precipitation:- the amount and rate of precipitation may have some minor effect on the amount of water consumptivielly.

(ii) Temperature:-

It is important factor and may effect consumpitive use more as in sumer more water will be lost due to evaporation while in cold weather less.

(3) humidity in air:- humidity air shall effect on consumptive use in such a way that less evporation will be done and as a result less wastage will be done.

(4) velocity of wind:- if velocity of wind is more water loss will be more.

(5) **Soil topography:-** if soil topography is plane and even the consumptive use of water will be less otherwise more.

(6) **Sunlight:-** Sunlight offcourse a cause of high Temperature and more evaporation will done.

QNo#02 (a) principal causes and ill effects of water logging.-

(a) Intensive irrigation:- if maximume area of land is irrigated, percolation of water takes place. this causes the rise of water table and then water logging occurs.

(b) Seepage of water from adjoining high land causes water loggieg.

(c) Seepage of water through canal reserviors.

(iv) water seeping below the soil moves horizentally which may cause obstruction and water table may rise.

(v) Inadequate surface drainage like strome water and excess of irrigation water should be removed if proper drainage is not provided water percolated to rise water table.

6. Excessive rain may cause temporary water logging and no drainage causes permanent.

7. Submergance due to flood:- continued floods causes the growth of water loving plants which obstruct natural surface drainage and increase water logging.

8. Irregular and flat topography:-

In depression the drainage is poor water detention is more the percolation increase the water Table.

Q No #OR (b) Anti water logging measures:-

① Lining of canal and water courses will reduce the seepage of water and no water logging.

② By Reducing intensity of irrigation such as small portion of land should receive canal water in one particular season. Remaining area can receive water in next season by rotation.

③ By introducing crop rotation.
High water requiring crop should be followed by one requiring less water and then by one requiring almost no water.

④ optimum use of water.
certain amount of water gives the best result less or more water Reduce the yield. cultivators should be educated so that not to use more water.

(5) Improving natural drainage of area.

water should not be allowed to stay in the Area natural flow is provide by bushes and Jungle cutting.

(6) Tube wells or Vertical Drainage:

Lift irrigation should be introduced to use Ground water. Canal irrigation may be substituted by Tube well irrigation.

(7) Adoption of Sprinkler method of irrigation.

only pre determined amount of water is supplied to land. No percolation losses from water courses.

Q No 02 (c) Methods to adopt to Reclaim Saline Soils:-

(1) By maintaining the water table sufficiently below the roots.

(2) An efficient drainage must be provided to lower the water table in saline soils.

(3) Leaching process:-
Land is flooded with water which dissolve the Alkaline salts and water get percolates which is then drained off by subsurface drains.

(4) high salts resistant crops like rice are grown on Leached Land for 1 or 2 seasons.

(5) Land drainage:-
Sub Surface drains and Surface drains are made in water Logged soils / Land to drain off the water and to reclaim the Soil.

(8) Land Gradient:-

continuous land slope towards field drains is maintained to drain off the water.

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QNo#03 (a)

Kennedy Theory	Lacey Theory
1. it states that the silt carried by the following water is kept in suspension by the vertical component of eddies which are generated from the bed of the channel.	1. It states that the silt carries by the following water is kept in suspension by the vertical component of eddies which are generated from the entire wetted perimeter of the channel.
2. Relation between V and D	2. Relation between V and R
3. critical velocity ratio m is introduced to make the equation applicable to diff channel.	3. silt factor f is introduced to make the equation applicable for diff channel with diff silt grades
4. Kutter equation is used for finding the mean velocity	4. This Theory given an equation for finding the mean velocity
5. this Theory gives no equation for bed slope.	5. This Theory gives an equation for bed slope.
6. in this Theory the design is based on trial and error method.	6. This Theory does not involve Trial and error Method.

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QNO# 4

(a) field capacity :- (F.C)

When all gravity water has drained down to water table a certian 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

F.C measured After 2 OR 5 days

There are Two Type of field capacity

(a) capillary water :- water Attached to soil by surface Tension which can easily be extracted by Plants by capillary actim

(b) Hygroscopic water :- water Attached to soil by chemical bonds which can not be extracted by plants by capillary action

Field capacity :- $\frac{\text{weight of water retained in a certian volume}}{\text{wt of same volume of soil}} \times 100$

QNO#4 (b)

permanent wilting point:-

A plant can extract water from soil till permanent willing 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 - PWP water

PWP water = W.C - Water available to Plant + Field capacity

QNO#4 (C) Canal Head Regulator:-

A structure which is constructed at the head of canal to Regulate flow of water is known as canal head Regulator.

It consists of a number of piers which divided the total width of canal into a number of spans which are known as bays. the piers consist of number tiers

in which the adjustable gates are placed. the gates are operated from the top by suitable mechanical device. a platform is provided on the top of the pier for the facility of the operating the gates. Again some piers are construced on the down stream side of the canal head to support the roadway.

QNo#4(d) under sluices:-

Also known as scouring sluices. the under sluices are the opening provided at the Base of the weir OR Barrage. These opening are provided with adjustable gates normally the gates are kept closed. the suspended silt goves on depositing in front of the canal Head Regulator. when the silt depositim becomes appreciable the gates are opened and the depositim silt is

observed with an agitator mounting on a Boat. The gates are the closed but at the period of flood the gates are kept opened.

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QNo#03 (b) problem

Design a regime channel for a discharge of 30 cumecs and mean diameter of the particle of 0.56mm using Laceys Theory:?

Solution:- $Q = 30$ cumecs $\quad m = 0.56\,m$

1 $F = 1.76m^{0.5}$ $\quad f = 1.76(0.56)^{0.5} = \boxed{1.317}$

2 $V_m = \left(\frac{Qf^2}{140}\right)^{1/6} = V_m = \left(\frac{30 \times 1.317^2}{140}\right)^{1/6} = \boxed{0.848\,m/sec}$

3 $R = \frac{S}{2} \cdot \frac{V^2}{f} = R = \frac{S}{2} \times \frac{0.848^2}{1.317} = \boxed{1.37m}$

4 $P = 4.75\sqrt{Q} = R = 4.75\sqrt{30} = \boxed{26.02m}$

5 $S = \frac{f^{5/3}}{3340Q^{1/6}} = S = \frac{1.317^{5/3}}{3340 \times 30^{1/6}} = \boxed{0.0003}$

$A = Q/V_m = A = \frac{30}{0.848} = \boxed{35.38m^2}$