Final Term paper

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Q.01 (a) Explain The anti water-logging measures

Some of The measures use to control logging are

⇒ control cannal Seepage:-

Canal seepage is major sourse of wated losses and water logging in irrigated area and it can be control by

→ Lining of cannal with impervous material like clay concrete to control seepage

⇒ Reducing Intensity of Irregation:-

The most important aspect to avoid water logging is to provide the water to the small portion of land where necessary.

⇒ Rotation of crop :-

its mean that we should plant crop in such way that its prevent the land from water logging.

→ crop which use large amount of water should be follower by those plant which used less water or no water.

(b) Differentiate between Saline and alkaline soils.

Saline soils	Alkaline soil
→ ~~Mainly Cl and SO_4^{2-} of Na^{2}~~	→ Alkaline soil are those soil that have PH value greater then 8.5
→ Saline soil are those soil that have PH value b/w 7 and 8.5	→ Exchangable sodium percentage greater then 15
→ Exchangable sodium percentage tess then 15	→ Electrical conductivity Usually less then 4 mm hos/cm
→ Electrical conductivity 4 or more mm hos/cm	→ organic matter content are low
→ organic matter content are high	→ colour of the soil are black
→ colour of the soil are white or light gray	

(c) How do you reclaim salt affected land?

Ans

Reclamination of salt effected lands.

* By maintaning the water table sufficiently below the roots
* Hence all the measure which were suggested for preventing water logging hold good for preventing salinity of land
* An efficient drainage (surface and sub surface) must be provided to lower the water table in saline soil.

Q No2 (a)

KENNEDYS THEORY

* R.G Kennedys studied straight reaches of upper Bari Doab cannal which are stable for 30 year.

$V_o = CD^n$

where V_o is critical velocity

C is constant depends upon quantity of silt.

⇒Sediment is kept in suspension solely by the vertical component of eddies.

* Weight of sediment vertically act downward
* Vertical component of eddies act upward
* Result: The Sediment is in suspension

$V_o = 0.84 D^{0.64}$ (FPS system)

$V_o = 0.54 D^{0.64}$ (MKS system)

$V_o = 0.546 D^{0.64}$ (where $m = V/V_o$ critical velocity ratio (C.V.R)

Q#02 Explain the Procedure of designing of any Irregation Canal by Kennedy's Theory.

* Kennedys Procedure for Cannal design

Step#01

Assume the trial value of D and put in eq ① and determine

$$V_o = 0.546 m D^{0.64}$$

Step#02

In eq ① $Q = AV$

$$A = Q/V$$

$$A = BD + D^2/2$$

$$P = B + D5^{1/2}$$

For assumed D determind B

Find $R = A/P$

Step#03

Substitute the value of R in eq ② (Kutters and chazys Eq/n)

to obtain V which will be the actual velocity for assumed dimensions.

Step #4:

if the velocity worked out from eq (2) agrees with that of obtained with the eq (3) (kennedeys Eq) then assume the depth is corrected otherwise repeat the procedure with changed value of D

Q:2 (b) Design an irrigation channel by Keenedys Theory to carry a discharge of $30\ m^3/sec$ with $CV_r(m)$ of 1 and N as 0.0225 and bed slope of 1 in 5000 Assume the depth (D) as 2.3m

Given Data:-

$Q = 30\ m^3/sec$

$CV_r(m) = 1$

$N = 0.0225$

Bed slope = 1 in 5000

Depth (D) = 2.3m

Solution:-

Find velocity

By formula

$$V_K = 0.546 m D^{0.64}$$

⇒ Now calculating Area of canal

By formula

$Q = AV \Rightarrow A = Q/V$

$A = 30/0.930$

$\boxed{\text{Area} = 32.25\ m^2}$

Now we have to calculating B By Using formula

$A = BD + \frac{D^2}{2} \Rightarrow BD + 0.5D^2$

⇒ By Putting value

$A = BD + 0.5(D^2)$

$32.25 = B(2.3) + 0.5(2.3)^2$

$32.25 - 2.645 = 2.3(B)$

$29.605 = 2.3(B)$

$\Rightarrow \boxed{B = 12.87\ m}$

Now we have to calculate wetted Perimeter:-

So by formula

$P = B + \sqrt{5}D$

$= 12.87 + \sqrt{5}(2.3)$

$\Rightarrow \boxed{P = 18.01\ m}$

⇒ Now we have to calculated ~~the~~ Hydraulic Radius:-

$R = A/P$

$= 32.25/18.01$

⇒ $\boxed{R = 1.79\ m}$

⇒ Now calculating mean velocity from Chezy equation:-

$V_c = C(RS_0)^{1/2}$

where

$$C = \frac{\frac{1}{n} + \left(23 + \frac{0.00155}{S_0}\right)}{1 + \left(23 + \frac{0.00155}{S_0}\right)\frac{n}{\sqrt{R}}} \Rightarrow \frac{\frac{1}{0.0225} + \left(23 + \frac{0.00155}{(1/5000)}\right)}{1 + \left(23 + \frac{0.00155}{(1/5000)}\right) \times \left(\frac{0.0225}{\sqrt{1.79}}\right)}$$

$$C = \frac{75.19}{1.517}$$

$\boxed{C = 49.56}$

⇒ $V_c = 49.56\left(1.79\left(\frac{1}{5000}\right)\right)^{1/2}$

$V_c = 0.93$

⇒ $\boxed{V_c = 0.93\ m}$

QNo3 (a) **Defferentiate between initial regime and final regime accordance to Laceys Theory:**

According to Laceys Theory initial regime and final regime:-

Initial Regime:-

* When only bed slope of channel changes but the cross section remain same then also no silting or scouring take place. But this is rare.

Final Regime:-

if all the Parameter (Peripmeter, depth and slope) have equally free to vary and adjust according to discharge and silt grades then the Channed is said to have final regime.

QNo3 (b) Design a regime channel by Laceys Theory for discharge of 30 cumecs and mean diameter silt particals of 0.56 mm.

Given Data:-

$Q = 30\ m^3/sec$

$m = 0.56\ mm$

Solution:-

Silt factor $= f = 1.76 \times m^{0.5}$

$f = 1.76 \times (0.56)^{0.5}$

$f = 1.3$

$$V_m = \left[\frac{Qf^2}{140}\right]^{1/6}$$

$$= \left(\frac{30\,(1.3)^2}{140}\right)^{1/6}$$

$\Rightarrow$ $\boxed{V_m = 0.844}$

Now

$Q = AV \Rightarrow A = Q/V = \frac{30}{0.844}$

$\Rightarrow \boxed{A = 35.54}$

Now

$P = 4.75\sqrt{Q}$

$P = 4.75\sqrt{30}$

$\Rightarrow \boxed{P = 26.01}$

$R = \frac{5}{2} \times \frac{v^2}{f} = \frac{5}{2} \times \frac{(0.844)^2}{1.3}$

$\Rightarrow \boxed{R = 1.36}$

Now

$A = BD + D^2/2$

$35.54 = BD + \frac{D^2}{2} \rightarrow (1)$

$P = B + D\sqrt{5}$

$26.01 = B + 2.236D$

$B = 26.01 - 2.236D \rightarrow (2)$

Put eq (2) in eq (1)

$$35.54 = (26.01 - 2.236D)D + \frac{D^2}{2}$$

$$35.54 = 26.01D - 2.236D^2 + \frac{D^2}{2}$$

$$35.54 = 26.01D - 1.736D^2$$

$$-\frac{1.736D^2}{a} + \frac{26.01D}{b} - \frac{35.54}{c} = 0$$

$a = -1.736 \quad b = 26.01 \quad c = -35.54$

By Quadratic equation

$$D = \frac{-(26.01) + \sqrt{(26.01)^2 - 4(-1.736)(-35.54)}}{2(-1.736)}$$

$D = 1.52$ Put in eq (2)

$\Rightarrow B = 26.01 - 2.236(1.52)$

$B = 22.611$

$$S = \frac{f^{(5/3)}}{3340 d^{1/6}} = \frac{(1.3)^{5/3}}{3340(30)^{1/6}} \Rightarrow S = 0.00026$$

Q.04 (a) Explain the component of headwork with neat diagram.

Head work :

Any hydraulic structure which supplies water to the off-taking Cannal is called a head work

Components of a diversion head work :-

① Weir :-

→ Normally the water level of any Perennial ~~de~~ river is such that it can't be diverted to irrigation Cannal

→ The bed level of the canal may be higher then the existing water level of the river.

2) Barrage :-

When the water level from the up stream side of the weir is required to be raised to different time barrage is constructed.

3) Under Sluices :-

→ Also know is Scouring sluices

→ The under sluices are the opening Provided at the base of the ~~wide~~ weir or barrage.

4) Divide wall :-

The divide wall is the long wall constructed at right angle of the weir or barrage it may be constructed with stone masonry are cement concrete.

5) Fish ladder :-

The fish ladder is provided just by the side of the divide wall for free movement of fishes.

6) Canal Head regulator:-

A structure which is constructed at the head of the cannal to regulate flow of water is known as cannal head regulator.

7) Silt regulator work:-

The entry of silt into a cannal which take off from a head work can be reduced by constructing certain special work called silt control work.

8) River traing work:-

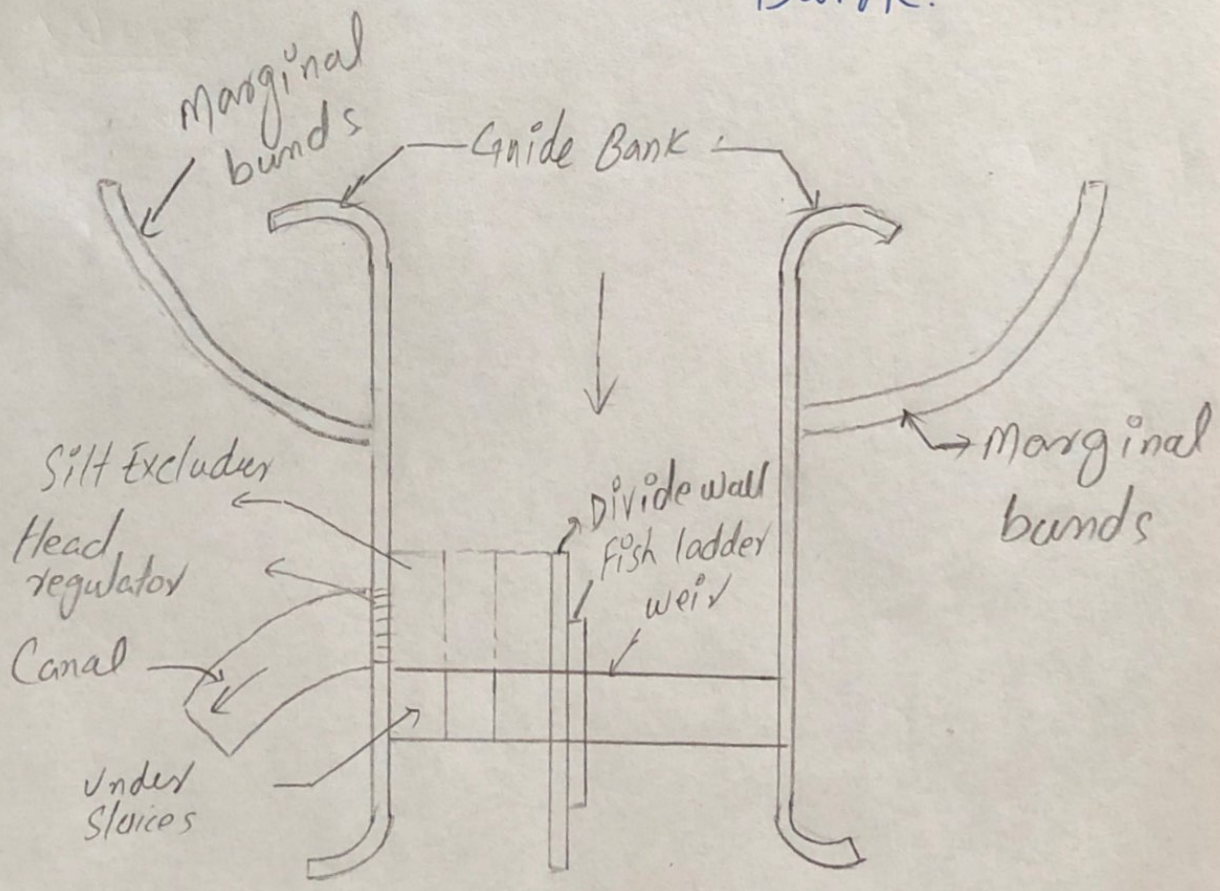
River traing work are required near the ~~wire~~ ~~side~~ weir site in order to ensure a smoth and an axial flow of water

9) Guide Bank:-

When a barrage is constructed across a river which flow through the alluvial soil the guide bank must be constructed on both to approch to protect the structure from erosion

10) Marginal Bunds:-

The marginal bunds are earthen embankment which are constructed parrallel to the river bank.



QNo4 (b) What are The function of Head regulators?

Function of Head regulators:-

→ it regulates The supply of water entering The cannal

→ it control the entry of silt in The Cannal

→ it prevent the river-floods from entering the cannal.