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Q1:

a) Explain Anti water-logging measures?

Ans: Some of the measures use to control logging are

→ CONTROL OF CANNAL SEEPAGE:

Cannal Seepage is major Sourse of water losses and water logging in irrigated Areas and it can be control by

→ Lining of Cannal with impervious material like Clay, Concrete TO control Seepage.

→ Convert water System from Cannal To piped System.

→ Reducing Intensity of irrigation:

The most important aspect To avoid water-logging is To provide The water To The Small portion

of land, where necessary.
→ Applying only the required amount of water so that all the water applied is used by plant.
→ Use efficient irrigation method i-e drip irrigation.

→ Rotation Of Crop:

Its mean that we should plant crops in such way that it prevent the land from water logging.
→ Crops which used large amount of water should be follower by those plants which used less water or no water.

b) Differentiate between Saline and alkaline Soils.

Ans:

Saline Soil	Alkaline Soil
→ Mainly Cl^- and SO_4^{2-} of Na^+ but also Cl^- SO_4^{2-} and HCO^- of Ca^{2+} and Mg^{2+} in Small Amount	→ Mainly CO_3^{2-} of Na^+ but also CO_3^{2-} of K^+, Ca^{2+} and Mg^{2+} in Small amount
→ Soluble salt concentration is Equal To or more Than 0.1%	→ Soluble salt conc $< 0.1\%$.
→ pH < 8.5	→ ESP > 15%
	→ pH > 8.5
→ White / light Grey Colour hence Called white alkali	→ Black Colour hence Called black alkali.
→ O.M or humus is always found in Soil	→ very less amount of O.M or humus or even absent
→ On Rainy Seaon, Some naturell vegetation is obtained.	→ No any naturell vegetation Except Some grases.

c) How do you Reclaim Salt affected Lands?

Ans: Reclamation of Salt affected Lands

↳ By maintaining the water Table Sufficiently below the Roots.

↳ Hence all the measures which were suggested for preventing water logging hold good for preventing salinity of lands.

↳ An efficient drainage (Surface and Subsurface) must be provided To lower the water Table in saline soils.

→ **Leaching:**

On This process.

↳ Land is flooded with water.

↳ Alkaline salts will be

dissolved in water.
↳ percolation to the ground water.
↳ Drained by sub-surface drains.

Q#02

a) Explain the ..... Theory.

→ **Kennedys Theory:**

↳ R.G kennedy studied straight Reaches of upper Bari Doab Canal which are stable for 30 years.

↳ $V_o = CD^n$

. where V_o is critical velocity.
. C is constant depends upon quantity of silt.

→ KENNEDY (7) PROCEDURE FOR CANAL DESIGN:

STEP#01

Assume the Trial value of D and put in Equation and determine

→ $V_o = 0.54 m D^{0.64}$

STEP#02

→ On Equation ⇒ $Q = AV$

⇒ $A = Q/A$

⇒ $A = BD + D^2/2$

⇒ $P = B + D\,5^{1/2}$

→ For Assumed D determine B find

$R = A/P$

→ STEP#03

Substitute the value of R in other Equation, to obtain V which will be the Actual velocity for assumed dimensions.

→ STEP#04

If the velocity worked out From the other Equation agrees with the Thired Equation (Kenneakys Equation) Then the assumed depth is Correct. Otherwise Repeat the procedure with Changed value of D.

b) Design an irrigation . . . . . as 2.3m

Given:

Discharge (Q) = 30 m^3/sec

CV(m) = 1

N = 0.0225

Bed Slope = 1 in 5000

Depth (D) = 2.3m

Solution:

→ First of all find the velocity.

By formula.

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

$= 0.546(1)(2.3)^{0.64}$

⇒ $V_K = 0.930$ m/s

→ Area

⇒ $Q = AV$ or $A = Q/V$

⇒ $A = 30/0.930 = 32.25\ m^2$

↳ Now

$A = BD + 0.5D^2$

putting values.

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

$\Rightarrow 32.25 - 2.645 = 2.3B$

Or

$\Rightarrow B = 12.87m$

↳ Wetted parameter

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

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

$\Rightarrow P = 18.01m$

↳ Now we have To Calculate hydraulic Radius.

$\Rightarrow R = A/P = 32.25/18.01 = 1.79m$

↳ Mean velocity

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

Where.

$$C = \frac{1/n + \left(23 + \frac{0.00155}{S}\right)}{1 + \left(23 + \frac{0.00155}{S}\right) n/\sqrt{R}}$$

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

$$\Rightarrow C = 49.56$$

Now

$$V_c = 49.56\left(1.79\left(\tfrac{1}{500}\right)\right)^{1/2}$$

$$\Rightarrow V_c = 0.93 m$$

Q#03

a) Differentiate between Initial regime and final Regime in accordance to laceys Theory.

Ans:

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:

Of all The parameter (depth, Slope and parameter) have equally Free To vary and adjust according To discharge and silt grades Then The Channel is said To have final Regime.

b): Design a regime . . . . . 0.56mm.

Given:

Discharge $Q = 30\ m^3/sec$

Mean diameter = 0.56mm

Solution:

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

$\Rightarrow f = 1.76\ (0.56)^{0.5} = 1.3$

Now,

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

$$\Rightarrow V_m = \left[\frac{30\ (1.3)^2}{140}\right]^{1/6} = 0.844$$

Now,

$Q = AV$ Or $A = Q/V$

$\Rightarrow A = 30/0.844 = 35.54$

$\Rightarrow P = 4.75\sqrt{Q} = 4.75\sqrt{30} = 26.01$

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

$$\Rightarrow R = 1.36$$

Now,

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

$$\Rightarrow 35.54 = BD + D^2/g \longrightarrow (1)$$

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

$$\Rightarrow 26.01 = B + 2.236D$$

Or

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

Put Eq(2) in Eq(1)

$$\Rightarrow 35.54 = (26.01 - 2.236D)D + D^2/g$$

$$\Rightarrow 35.54 = 26.01D - 2.236D + 0.5D^2$$

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

$$\Rightarrow -\frac{1.736D^2}{9} + \frac{26.01D}{D} - \frac{35.54}{C} = 0$$

By Quardatic Equation. Solve it. we get.

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

$$\Rightarrow D = 1.52$$

put value of D in Eq(2)

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

$$\Rightarrow B = 22.611$$

Now,

$$\Rightarrow S = F^{5/3} / 3340 Q^{1/6}$$

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

$$\Rightarrow S = 0.00026$$

Q#04

a) Explain the components of headworks with neat diagram.

Ans:

Component of headwork

→ Weir:

. Normally the water level of any perenial river river is such that it cannot be diverted to the irrigation canal.

. The bed level of the canal may be higher than the existing water level of the River.

→ Divide WALL:

Long wall constructed at the Right angles in the weir or barrage, with stone mansory or cement Concrete.

→ On the upstream side, the wall is extended just to cover the sand head regulator and oth the down stream side. Or is extended up to the launching.

→ fish ladder:

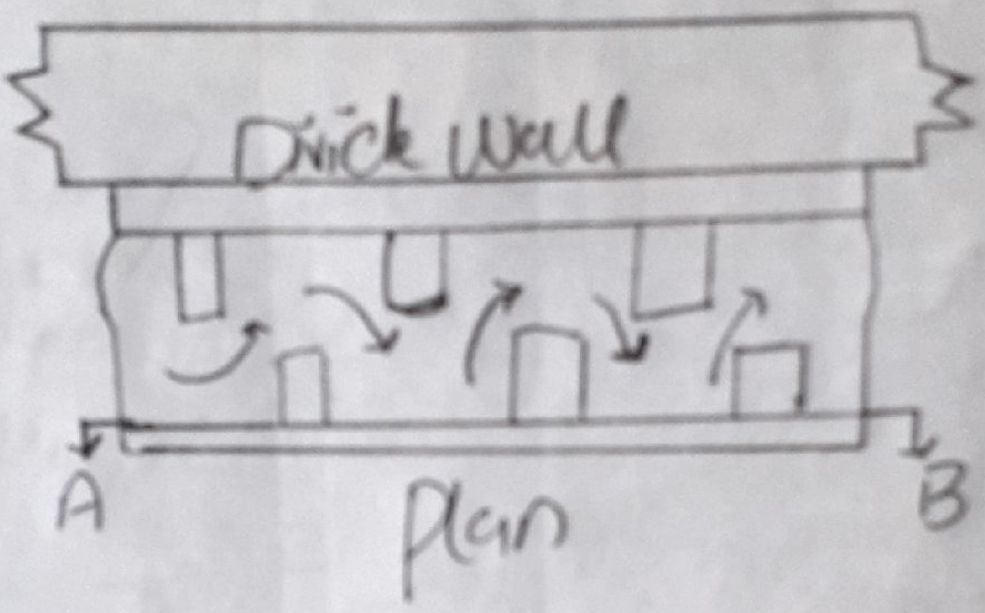
↳ The fish ladder is provided just by the side of the divide wall for the free movement of fishes.

↳ Rivers are important source of fishes

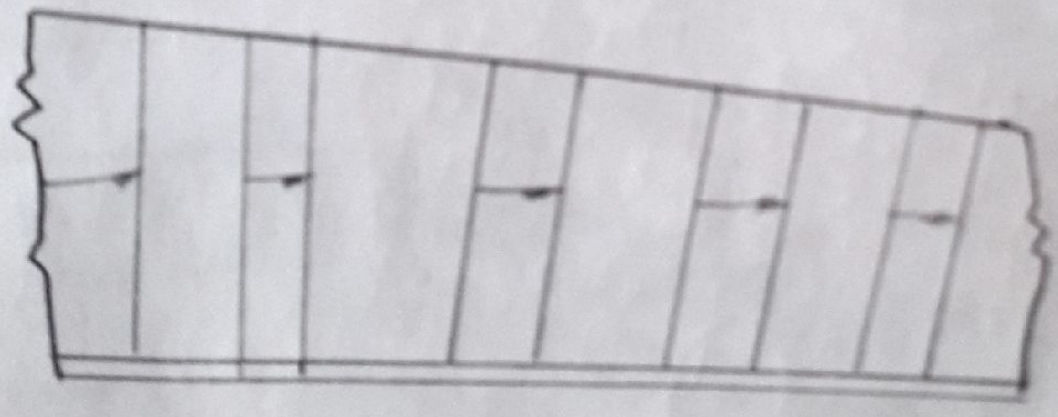
↳ The tendency of fish is to move from upstream to downstream in winters and from downstream to upstream in monsoons.

↳ The width, length and height of the fish ladder depend on the nature of the river and type of the weir or barrage.

(18)



Plan



Section on AB

Fish Ladder

→ Canal head Regulator:

→ A structure which is constructed at the head of the canal to regulate flow of water is known a Canal head Regulator.

→ It consists of a number of piers which divide the total width of the canal into a number of spans which are known as bays.

→ The pair consist of number piers on which the adjustable gates are placed.

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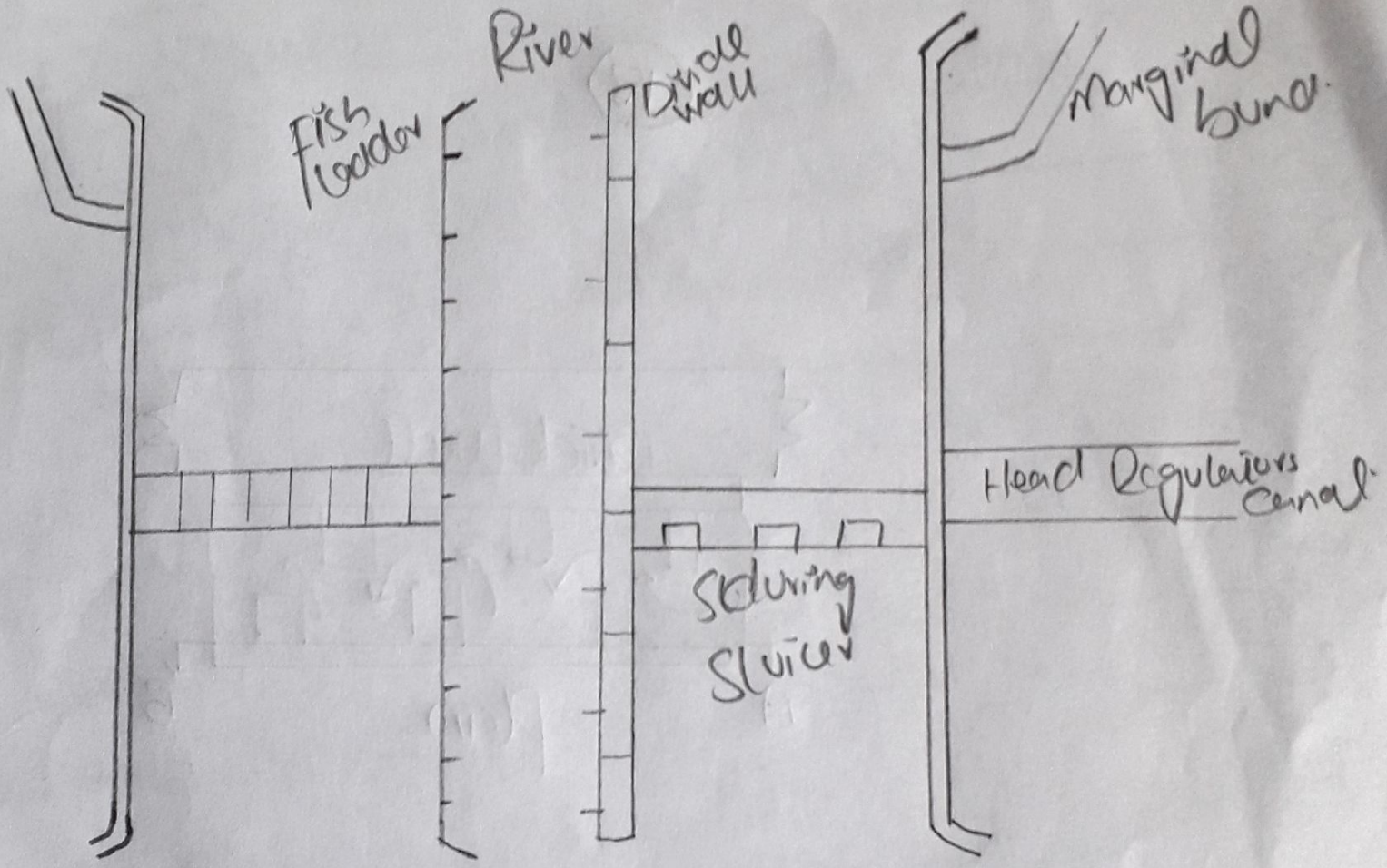
River
Fish ladder
Divide wall
Marginal bund
Head Regulators
Canal
Scouring Sluices

b) What are the function of head regulators?

Ans:

Head Regulator:

→ Regulators constructed at the of taking point are called head Regulators.

→ When it is constructed at the head of main canal it is known as canal head Regulator.

→ And when it is constructed at the head of distributary, it is called distributary head Regulator.

→ Function:

→ To control the entry of water either from the reservoir or from the main canal.

→ To Control the entry of silt into off Taking or main Canal.

→ To Serve as a meter for measuring discharge of water.