Name # M=IKRAM

ID # 7874

Sec # B

Sub # Irrigation

Q.# 1

Anti water logging measures:-

It can be simply defined as.

rendering the soil unproductive and infertile due to excessive moisture and creation of anaerobic conditions. This phenomenon can be better understood by the equation of hydrologic equation.

So water logging reduces

the crop yeild by it also lead to ill cavation which causes the decay of nitrifying bacteria.

Saline Soil

By principle of Osmosis, the pure water from root flows outwards in a plant die due to lack of water. Such Soil is unproductive and is Called Saline Soil. Saline Soil is affected by efforescence

Alkaline Soil

if the Salt efforescence Continue for a longer period, a base exchange reation with clay with took place. thus Sodiumzing the Clay. making it Impermeable, illaerated and highly un-productive Such Soil are Called alkaline Soil.

"Reclamation of Salt affected lands":

For reclamation we have to avoid efforescence and following are the method to avoid offorescence

* By maintaining the water table Sufficiently below the roots.
* Hence all the measures which were Suggested for preventing water logging hold good to

5

for preventing salinity of land.

An efficient drainage (surface and sub-surface) must be provided to lower the water table in saline soil.

Q:- 2

Ans:

⇒ Irrigation Kennedy Procedure For Canal design:

Step 1. Assume the trial Value of D and put in eqn. 1 and determine

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

Step 2. in Eqn. 1: $Q = AV$

$$A = Q/V$$

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

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

for assumed D determine B find $R = A/P$

Step 3. Substitute the Value of R in eqn. 2 (Kutter ∫ Chezy eq) to obtain V which will be the actual Velocity for assumed dimensions.

Step 4. if the Velocity worked out from Eqn. 2 agree with that of obtained with the Eqn. 3 (Kennedy's Eqn) Then the assumed depth is Correct. other wise repeat the procedure with Changed Value of D.

Q: 2 (b) (b) Pg # 8

Ans:

Given data:

$Q = 30 \text{ cumec}$

$N = 0.0225$

$m = 1$

$S = 1 \text{ in } 5000$

Step #1

Assume

$D = 2.3 \text{ m}$

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

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

$V_o = 0.930 \text{ m/s}$

$$A = \frac{Q}{V_o}$$

$$A = \frac{30}{0.930} = \boxed{32.25 m^2}$$

For Trapezoidal Section

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

$$A = B(2.3) + \frac{(2.3)^2}{2}$$

$$32.25 = B(2.3) + \frac{(2.3)^2}{2}$$

$$32.25 = \frac{2B(2.3) + (2.3)^2}{2}$$

$$\boxed{B = 12.87_m}$$

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

$P = (12.87) + (2.3)\,5^{1/2}$

$P = 18.01_m$

Now $R = A/P = \dfrac{32.25}{18.01}$

$$\boxed{R = 1.790_m}$$

Now

$V_c = C(RS)^{1/2}$ —(1)

first to find C

(11)

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

$$C = \frac{\frac{1}{0.0225} + 23 + 0.00155/1 \times 5000}{1 + \left(23 + \frac{0.00155}{1} \times 5000\right) \frac{0.0225}{\sqrt{1.790}}}$$

$$\boxed{C = 49.918} \quad \text{— (ii)}$$

Putting (ii) in (i)

$$V_x = 49.918 \sqrt{\frac{1.790 \times 1}{5000}}$$

$$V_K = 0.944_m$$

Q:3@ (13)

Ans: Different between Initial regime & final regime.

* Differentiated between Initial regime and final regime but this theory is applicable to final regime.

* According to Lacey even though Channel with no sliting or scouring may actually be not in regime.

Q:3 (a) ⇒ INITIAL REGIME:- (12)

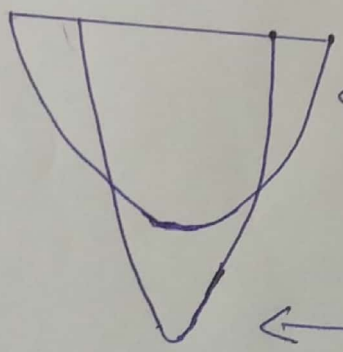
* when only be slop of channel changes but the Cross Section remains same then also no silting take place. But this rare.

⇒ FINAL REGIME:-

* If all the parameters (perimeter, depth and slope) have equally free to vary and adjust according to discharge and silt

graded then the channel is said to have final regime.

* in final regime the cross section assumes semiellipse shape.



coarser the silt flatter the ellipse.
finer the silt the section is semi circle.

Q3:(b) (16)

Given data:-

$Q = 30\ m^3/Sec$

$M = 0.56\ mm$

Sol:-

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

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

$$\boxed{f = 1.3}$$

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

$$V_m = 0.844$$

$$Q = AV$$

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

$$A = 35.54$$

$$P = 4.75\sqrt{Q}$$

$$P = 4.75\sqrt{30}$$

$$P = 26.01$$

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

$$R = 1.36$$

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

$$35.54 = BD + \frac{D^2}{2} \quad \text{—(1)}$$

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

$$26.01 = B + 2.236D$$

$$B = 26.01 - 2.236D \quad \text{—(2)}$$

Put eq (2) in (1)

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

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

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

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

$$a = -1.736 \qquad b = 26.01$$

$$c = -35.54$$

By Quadartic eqn

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

$$D = 1.52$$

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

$$B = 22.611$$

$$S = \frac{f(5/3)}{3340 Q^{1/6}}$$

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

$$S = 0.00026$$

Q:4 (a)

Ans:

Components of headwork

* Weir :
* Undersluices :
* Divide wall :
* Fish ladder :
* Canal head regulator :
* Silt excluders
* River training works

① ⟹ Weir :-

Normally the water level of any perennial 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.

(2) ⇒ Barrage:-

When the water level on the up stream side of the weir is required to be raised to different time, Barrage is Constructed.

* Barrage is an arrangement of adjustable gates or Shutters at different time over the weir.

In such cases, weir is constructed across the river to raise the water level.

* Surplus water pass over the crest of weir.

* Adjustable shutters are provided on the crest to raise the water level to some required height.

(3) ⇒ Under Sluices:

Also know as Scouring Sluices.

* The under sluices are the openings provided at the base of the weir or barrage.

* These openings are provided with adjustable gates. Normally, the gates are kept closed.

The suspended silt goes on depositing in the front of Canal head regulator.

* when the silt deposition becomes appreciable the gates are opened and the deposited silt is loosened with an agitator mounting on a boat.

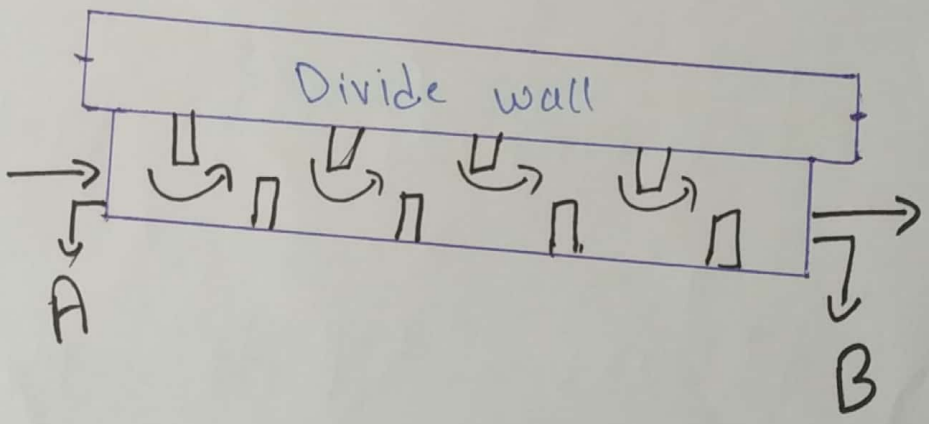
* The muddy water flows toward, the downstream through the Scouring sluices.

* The gates are then Closed. But, at the Period of flood the gates are kept opened

Divide wall:-

The divide wall is a long wall Constructed at right angles in the weir or barrage, it may be Constructed with Stone masonry or Cement Concrete. on the upstream side the wall is extended just to covers the Canal head regulator

and on the downstream side, it is extended up to the launching apron.



⇒ Fish ladder :-

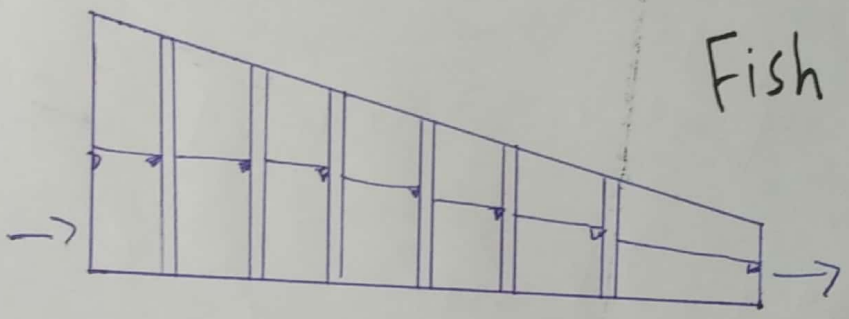
The fish ladder is provided by the side of the divide wall

for the free movement of fishes.

* Rivers are important source of fishes.

* The tendency of fishes moves from upstream to downstream and from downstream to upstream in monsoon. This movement is essential for their

survival. Due to Construction of weir or barrage, this movement gets obstructed.



Fish ladder

⇒ Canal head regulator:

A structure which is Constructed at the head of the Canal to regulate flow of water is know as

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 piers consists of number tiers on which the adjustable gates are placed.

⇒ Silt Excluder :-

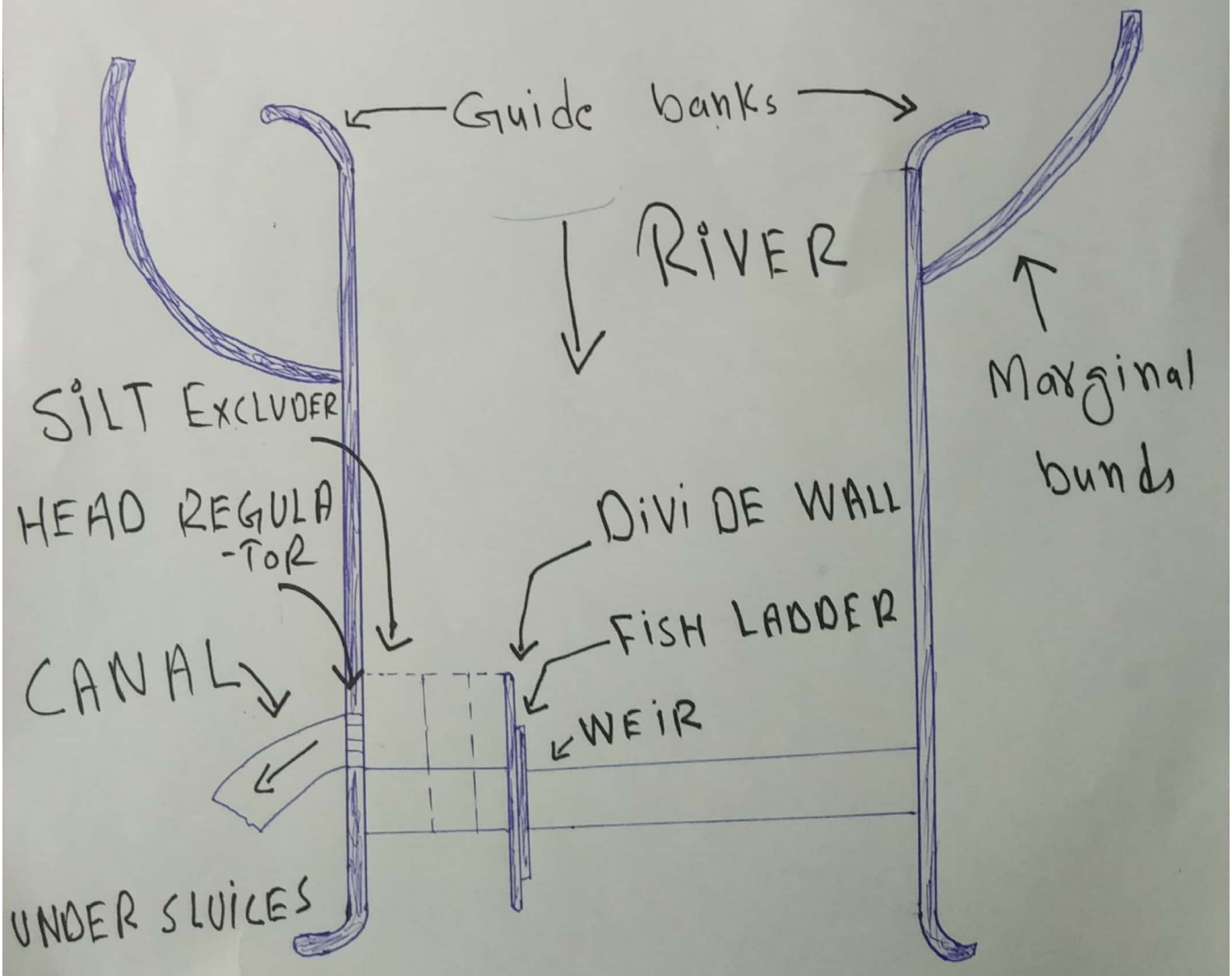
Silt excluders are those works which are constructed on the bed of the rivers. (upstream of head regulator and - Silted water enters the Silt excluder. In this type of works, the Silt is therfore removed from the water before in enter the Canal.

⟹ River training works:

River training works are required near the weir site in order to ensure a smooth and an axial flow of water, and thus to prevent the river from outflanking the works due to a change in it's course.

The river training work required on a Canal headwork are

(a) Guide bank (c) Spurs
(b) Marginal bund



Q.4 (b) (30)

Ans: Function of head regulators.

The following are the functions of the Canal head regulator.

* It regulates the supply of water entering the Canal.

It Controls the entry of silt in the Canal. It prevents the

River floods from entering the Canal.

* To admit water into the off taking Canal

* To regulate the supplies into the Canal

* To indicate the discharge passed into the Canal from design discharge

formula and observed head of water on the Creast.

* To Control the Salt entry into the Canal