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SEC B

SEM 6th

Qno #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.

Water logging reduces the crop yield. It also led to ill aeration which causes the decay of nitrifying bacteria.

(b)

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 Sodiumizing the clay. making it impermeable, ill aerated and highly un-productive Such Soil are called alkaline Soil.

(c)

Reclamation of Salt affected lands

for reclamation we have to avoid efflorescence and following are the methods to avoid efflorescence

★ By maintaining the water ~~level~~ teble sufficiently below the roots.

★ Hence all the measures 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

Qno #2

(a)

Kennedy procedure for irrigation Canal design

following are steps to Considered,

Step # 1

Assume the trail value of D and put it in equation (1) and determine

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

Step #2

In equation (1)

$$Q = AV$$

$$A = Q/V$$

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

$$P = B + D S^{1/2}$$

for assumed D determine B

Find $R = A/P$

Step # 3

Subtitule the value of R in eq (2) (kutters & chazys eqn) to obtain V which will be 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 eqn). Then the assumed depth is Correct. Other wise repeat the procedore with changed value of D.

Given data (b)

$Q = 30$ cumec

$N = 0.0225$

$m = 1$

$S = 1$ in 5000

Step #1

Assume $D = 2.3m$

$$V_0 = 0.546\, m\, D^{0.64}$$

$$V_0 = 0.546\,(1)\,(2.3)^{0.64}$$

$$V_0 = 0.930\ m/s$$

Step #2

$$A = \frac{Q}{V_0}$$

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

For trapezoidal Section

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

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

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

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

$$B = 12.87$$

Now

$$P = B + D S^{1/2}$$

$$p = (12.87) + (2.3)\, S^{1/2}$$

$$p = 18.01\,m$$

Now

$$R = \frac{A}{P} = \frac{32.25}{18.01}$$

$$R = 1.790$$

Step 1103

$$V_o = C\sqrt{RS} \quad \text{— (i)}$$

First to find C

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

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

$$C = 49.918 \quad \text{— (ii)}$$

Putting (ii) in (i)

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

$$V_o = 0.944$$

Now

$$\text{Ratio of velocities} = \frac{V_o}{V} = \frac{0.944}{0.944}$$

$$= 1.00 = 1$$

It means assumed depth was Correct.

Qno #3 (a) Pg#9

Laceys Theory

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 parameters [perimeter, depth and slope) have equally free to vary and adjust according to discharge and Silt grades then the channel is said to have final regime.

(b)

Given data

$Q = 30$ cumec

(M) Silt factor $= 0.56$mm

Solution,

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

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

$$f = 1.3$$

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

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

$$\boxed{V_m = 0.844}$$

$$Q = AV$$

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

$$\boxed{A = 35.54\ m^2}$$

Now

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

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

$$\boxed{P = 26.01}$$

Now for 'R'

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

$$\boxed{R = 1.36}$$

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

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

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

$$26.01 = B + 2.236D \quad - (2)$$

Put eq (2) in eq (1)

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

$$35.54 = 26.01D - 1736D^2$$

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

$$a = -1.736 \;, b = 26.01 \;, C = -35.54$$

by solving Quadratic eq

$$D = - \frac{26.01 + \sqrt{(26.01)^2 - 4(-1.736)(-355)}}{2(-1.736)}$$

$$\boxed{D = 1.52}$$

$$B = 26.01 - 2.236\,[1.52]$$

$$\boxed{B = 22.611}$$

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

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

So

$$\boxed{S = 0.00026}$$

Ans

Qno #4

(a)

Components of headwork

The Components of headwork are following below.

Weir

Normally the water level of any perenniel 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. In such cases weir is constructed across the river to raise the water level. Surplus water pass over the crest of weir.

Barrage

When the water level on the up stream side of the weir is required to be raised to difficult levels at different time, barrage is Constructed. Barrage is an arrangements of adjustable gates or shutters at different tires over the weir.

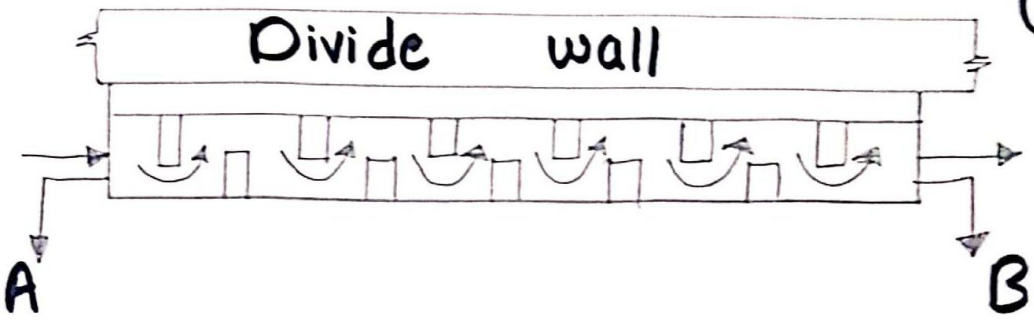
Under Sluices

Also known 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 front of the canal head regulator.

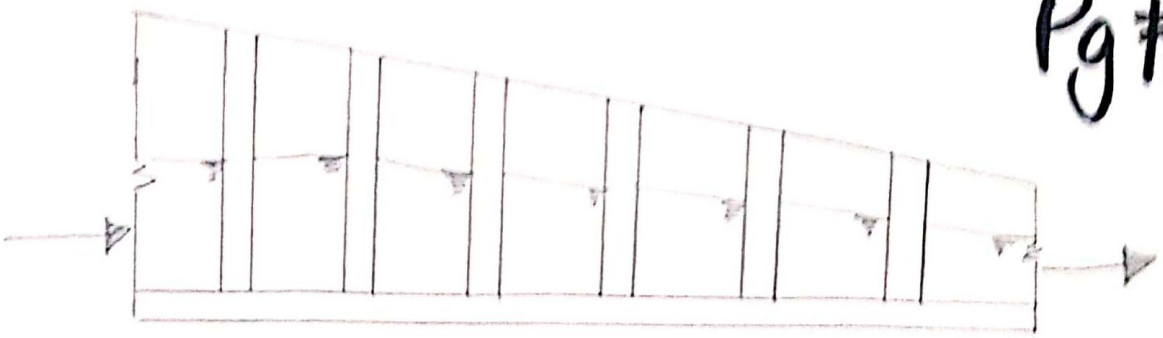
Divide wall

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 Sources of fishes. The tendency of fishes moves from upstream to downstream and from downstream to upstream in moonsoons. This movement is essential for their survival. Due to Construction of weir or barrage, this movements gets obstucted.



Fish Ladder

Canal head regulator

A Structure which is constructed at the head of the Canal to regulate flow of water is known as Canal head regulator. It Consists of number of piers which divide total width of canal into numbers of span which are known as bays. The pier Consist of number tiers on which the adjustable gates are placed.

Silt Excluder

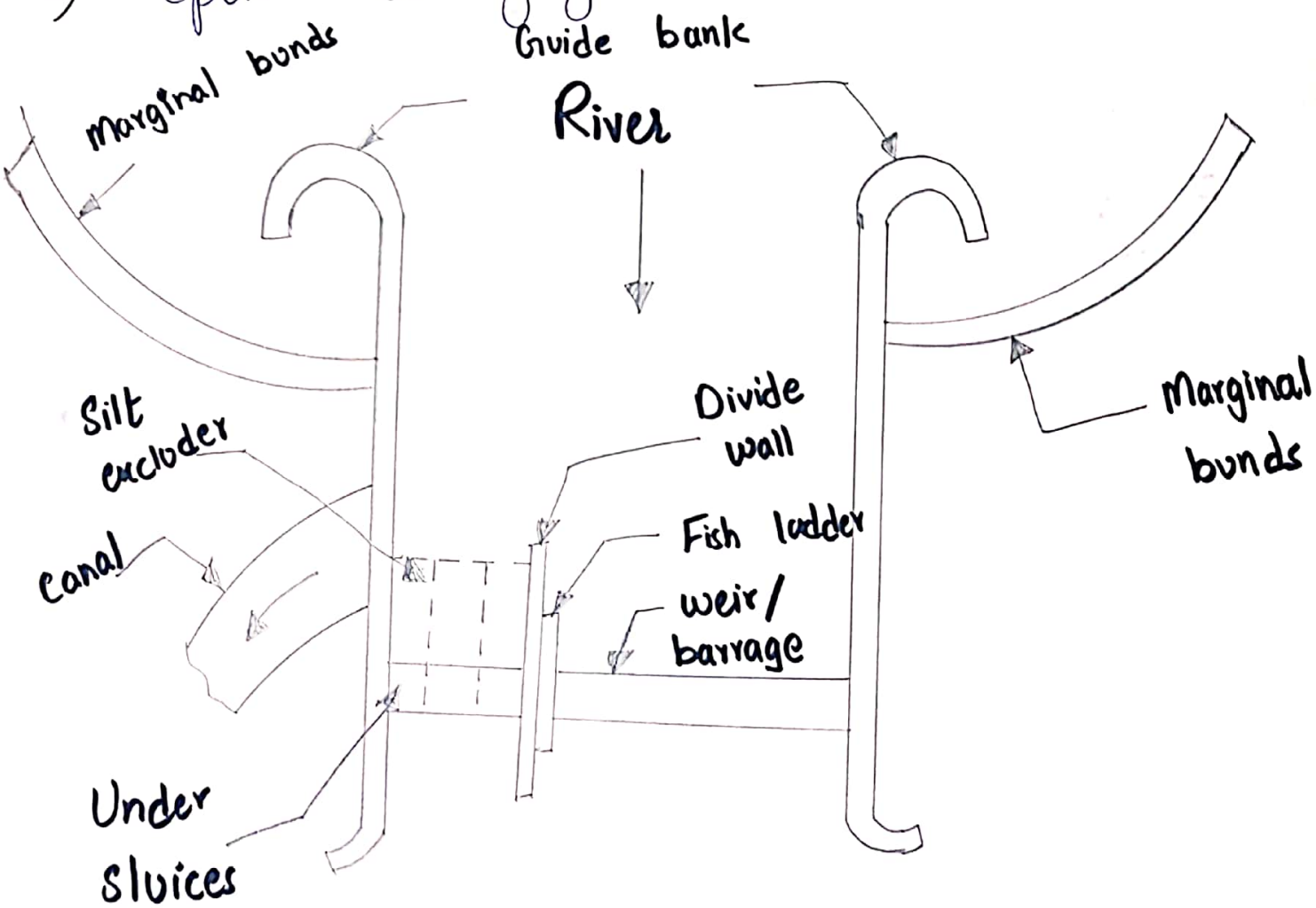
Silt excluders are those works which are Constructed on the bed of the rivers, upstream of head regulator. The clearer water enters the head regulator and Silted water enters the silt excluder. In this type of works, the silt is therefore, removed from the water before it enters the canal.

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 work due to a change in its course. The river training work required on a Canal headwork are

a) Guide bank.
b) Marginal bunds.
c) Spurs or groynes.



(b)

Functions of head regulators

The following are the functions of 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 waters on the crest

★ To Control the Silt entry into the Canal.