NAME:-

NAVEED AHMAD

I.D:-

7880

SECTION:- B

SEMS:- 6th

INSTRUCTOR:- JAHANGIR DURRANI.

SUBJECT:- IRRIGATION ENGG.

QUESTION - 1 <a>

ANTI WATER LOGGING

1> Lining of canals and water Coarse

It reduces seepage of water.

2> Reducing Intensity of Irrigation:-

A small portion of land should recieve canal water is one particular season.

3> By Introducing Crop Rotation

High water requiring crop should be followed one requiring less water and then by requiring almost no water

EXAMPLE:-

Rice followed by wheat and then by cotton.

4) Improving Natural Drainage of Area:-

↳ Water should not be allowed to stay in one area.

↳ Natural flow is provided by bush and jungle cutting.

5) Economical use of water according to need.

6) Adoption of Sprinkler method of Irrigation

↳ Only predetermined amount of water is supplied to land

↳ No percolation losses from water courses.

<b>

SELINE AND ALKALINE SOIL:-

SALINE:-

↳ Seline soil is soil that have been harmed by soloouble salt consisting mainly of sodium, calcium, Magnesium, chloride, and sulphate bicorbonate.

↳ Dominating Compound is sodium salt.

↳ It is basic in nature.

↳ It pH is 7-8.5

↳ It has less pH.

ALKALINE SOIL:-

↳ Alkaline soil is known as clay soil.

↳ Dominating compound in sodium is Carbonate.

↳ PH is greater than 8.5.

↳ It is more basic

↳ It has high PH value.

<1-C>

HOW DO YOU RECLAIM SALT EFFECTED LAND:

Alkali salt (Sodium chloride, Sodium Sulphate and Sodium Carbonate) are harmfull for agricultural use.

$NaCl$ ⟶ Least harmfull

Na_2SO_4 ⟶ Medium harmfull

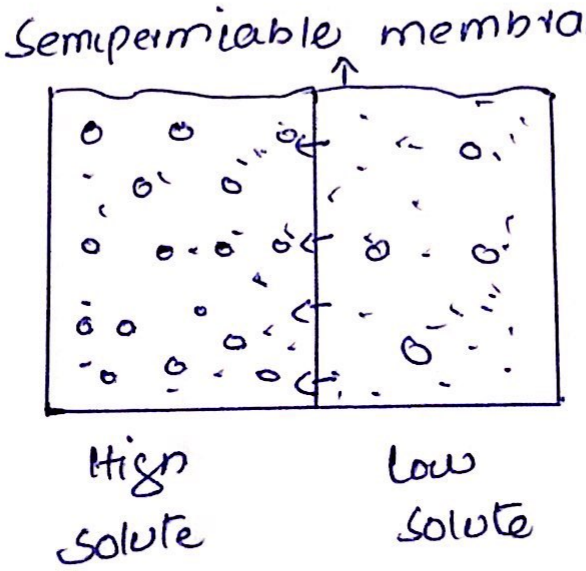
Na_2CO_3 ⟶ Most harmfull.

The above salts are Soloubl e in water

When W.T rises up or roots are in capillary zone the G.W moves upward and salts are deposited in roots zone and surface of soil

The phenomena of salts coming up in solution and forming a thin crust (5-7.5) on the surface after evaporation of water is called Efforesence.

Land affected be efflorescence is called Saline Soil Salts Sorrounding the roots reduces the osmotic activity of plant.



QUESTION- 2-<a>

KENEDY'S THEORY:-

Kennady studied straight reaches of upper Bari Doab canal which are stable for 30 yrs.

$V_o = CD^n$

where Vo is critical velocity (non-silting or non scouring)

C is constant depends upon quantity of silt.

KENEDY PROCEDURE FOR CANAL DESIGN.

STEP I:-

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

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

STEP : 2 :-

In eq ①

$Q = AV$

$A = Q/V$

$A = BD + D^2/2$

$P = B + D\sqrt{5}/2$

for assumed D determine B

Find $R = A/P$.

STEP 3 :-

Substitute the value of R in eq ② (Kutter's and chazy's eq) to obtain V which will be the actual velocity for assumed dimension.

STEP 4 :-

If velocity worked out from eq ② agrees with that of obtained with the eq ③. Then the assumed depth is correct. Other wise repeat the procedure with changed value of D.

<R-D>

GIVEN DATA:-

$D = 2.3\ m$

$Q = 30\ cusec$

$C.V.R = m = 1.$

$N = 0.0225$

$S = 1/5000 = 0.0002$

As we know

$Q = AV$

$A = Q/V$

$30/V$ —— (1)

Thus using formula to compute "V"

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

$V = 0.935\ m/s$

Put this volueme in eq (1)

$A = \frac{30}{0.935} = 32.01\ m^3$

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

$32.01 = B(2.3)^2 + \frac{2.3^2}{2}$

$$B = 12.77\ m$$

put the value in below eq

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

$$= 12.77 + 2.3(\sqrt{5})$$

$$P = 17.9\ m$$

Now $$R = \frac{A}{P} = \frac{32.01}{17.9m} \Rightarrow 1.76$$

Substituting the volueme of R in Kuller's and chazy's equation

$$V = C(Rs)^1 \quad \text{—①}$$

$$C = \frac{\frac{1}{n} + \left(23 + \frac{0.00155}{S}\right)}{\left(1 + 23 + \frac{0.00155}{0.5}\right)\sqrt{R}}$$

$$C = \frac{\frac{1}{1} + \left(23 + \frac{0.00155}{0.0002}\right)}{\left(1 + \left(23 + \frac{0.0155}{0.0002}\right)\right)\sqrt{1.76}}$$

Put the value in eq ②

$$V = 49.526\,(1.76 \times 0.0002)^{1/2}$$

$V = 0.93\ m/s$ This eq is to V0 this no more trial required.

QUESTION - 3 (a)

INITIAL AND FINAL REGIME

LACEY'S THEORY:-

According to Kennedy a chennel is regime (NO silting, NO scouring) but according to Lacy even though channel with no silting or scouring may actually be not in regime

He differentiated between intial regime and final regime but this theory is applical to final regime

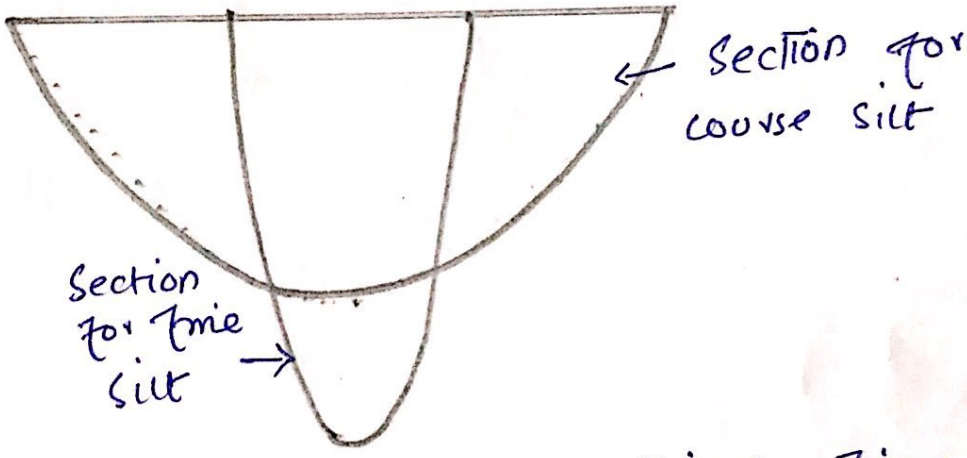
INITIAL REGIME:-

When only bed slope of channel changes but the cross section remains same then also no silting or scouring take place. But in rare case.

FINAL REGIME :-

If all the parameters depth and slope have equally free to vary and adjust according to discharge and silt grade then the channel is said to have final regime.

In final regime the cross section assumes semi-ellipse shape.



Coarse the silt flatter the ellipse fine the section the section is semi circle.

The channel is said to be regime when the following condition are satisfied

1. The channel is following is unlimited in coherent alluminium of same character.
2. Silt grade and silt charge is constant.
3. Q is constant.

<3- b>

DATA:-

$Q = 30 m^3/sec$

$m = 0.56 mm$

SOLUTION:-

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

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

$\boxed{f = 1.3}$

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

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

$V_m = 0.844$

$Q = AV$

$A = Q/V = 30/0.844$

$A = 35.54$

$P = 4.75\sqrt{Q}$

$P = 4.75\sqrt{30}$

$P = 26.01$

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

$$\boxed{R = 1.36}$$

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

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

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

$$26.01 = B + 2.236D$$

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

Put eq ② in eq ①

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

$$35.54 = 26.01D - 2.236D^2 + D/2$$

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

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

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

$a = -1.736$, $b = 26.01$, $c = -35.54$

By quadratic equation

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

$$D = 1.52$$

Put in eq (2)

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

$$\boxed{B = 22.611}$$

(3)

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

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

$$\boxed{S = 0.60026}$$

QUESTION 4-(a)

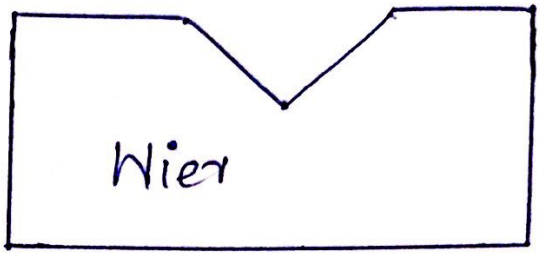
COMPONENTS OF HEAD WORK.

Following are the components of head work.

- Wiers or barrages
- Under sluices
- Divide wall
- Fish ladder
- Canal Head Regulator
- Silt excluder
- River training Work.

BARRAGE:-

It is an arrangement of adjustable gates at different bays over the wiers. Normally the water level of any perenial river is such that it can not be diverted to the irrigation canal



UNDER SLUICES:-

It is also known as scouring sluices. The under sluices are openings provided at the base of the weir or barrage. These opening are provided with adjustible gates. normaly the gates are kept closed.

DIVIDE WALL:-

It is a long wall constructed at right angles in the wiers or barrage, it may be constructed with stone masonary or cement concrete.

The function of divide wall are to form a still water pocket in front of canal head so that the suspend silt can be settled down which

Then later be cleaned through the scouring sluice from time to time. It controls the eddy current or cross current in front of the canal head.

FISH LADDER :-

The ladder is provided just by the side of the divide wall for the free moment of fishes. Rivers are important source of fishes. The tendency of fishe is to move from upstream to down stream in winter and from down side to upstream in moonsoon.

WIER :-

Normally the water level of any perenial river is such that it can not be diverted to irrigation canal. The bed level of the canal may be higher than the existing water level of the ~~level~~ river. In such cases wier is constructed across the river to raise the water level.

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 consits of a number of piers which divide the total width of canal into a number of span which are known as bays. The piers consists of number tiers on which the adjustable gates are placed.

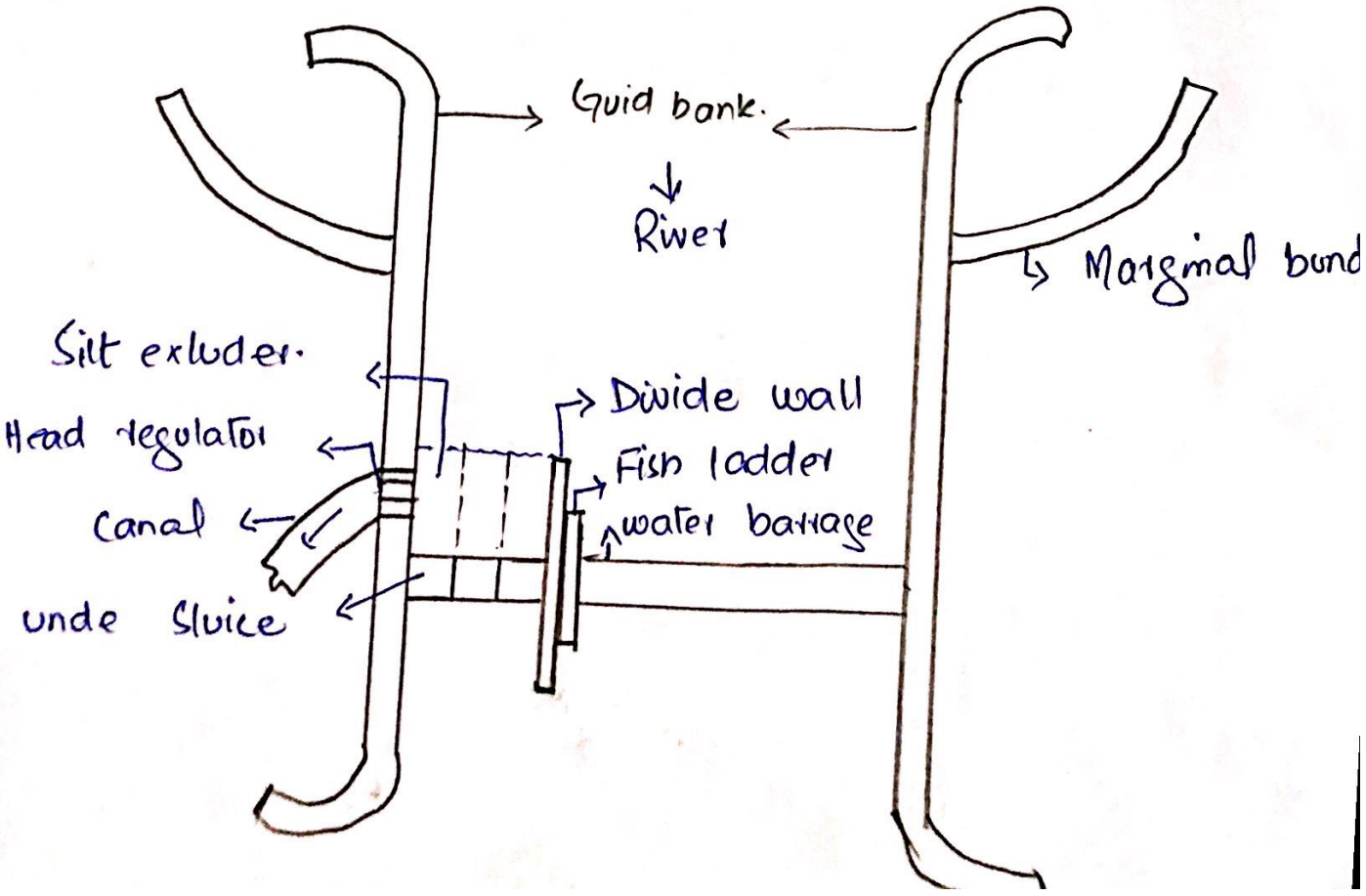
SILT EXCLUDERS :-

Silt excluder are those works which are constructed on bed of the river upstream of head regulator and silted water enters the head regulator and silted water enters the silt water enters the silt excluder.

RIVER TRIANING WORKS.

River training works are required near the wier site in order to ensure a smooth and an axial flow of water and thus prevent the river from out flanking the works due to a change in its course. The river training requires on a canal headwork are

① Guide banks ⓑ Marginal bunds
ⓒ spurs or Groynes.



QUESTION - 4 <b>

HEAD REGULATOR:

Regulator constructed at off taking point are called head regulator. when it is constructed at the head of main canal it is known as canal head regulator.

CANAL HEAD REGULATOR:

A structure that consists of 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 of of tiers on which the adjustable gates are placed. gates are operated from top by suitible mechanical device A flat form is provided on top of

of the pier for facility of operating the gates. Again some piers are constructed on the down stream side of canal head to support the roadway.

FUNCTION :.

It regulates the supply of water entering the canal. It controls entry of silt in the canal. It prevents river flood from entering the canal.