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SECTION = A

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QUESTION NO = 1 (Part=A)

Water logging Measures:-

Following are the measures which are control the water logging.

Control of canal Seapage:-

Canal seapage is major Resource of water losses and water logging in irrigated areas and it can be control by;

⇒ lining of canal with impervious material like clay, concrete to control seepage.

⇒ Convert water system from canal to pipe system.

Reduce intensity of irrigation:-

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

⇒ Apply only the Request amount of water so that all the water applied is used by plants.

⇒ Use efficient irrigation method. i.e:- drip irrigation.

Rotation of crops:-

It Means that we should plant crops in such away that it prevent the land from water logging.

⇒ Crops which used large amount of water should be followed by those plants which used less water OR No water.

Example:-

Rice followed by wheat and then by cotton.

Optimum use of water:-

Awareness should be provided to the farmers about particular crop. So that they can understand

how much water should be provided to the crop, so that they should not use more water and use certain amount of water.

Improving Natural drainage Area:-

The water should not allowed to stay in crops for long time there fore proper storage system should be provided:

QUESTION NO = 1 (Part = B)

Differentiate b/w saline and alkaline:-

Saline Soil:-

The soil with excess salt is called saline solid.

Alkaline Soil:-

Alkaline soil are clay soil which have pH greater than 7.3 having poor soil structure.

Saline Soil	Alkaline Soil
⇒ Saline Soil are the Soil that have a pH b/w 7 and 8.5 an exchangible Sodium Percentage below 15%.	Alkaline Soil are the Soil that have a pH greater than 8.5 and exchangeble Soidicem percentage greater than 5%.
⇒ pH less than 8.5	pH greates than 8.5
⇒ Sodium percentage less than 15%.	Sodium percentage greates than 15%.
⇒ Electricity conductivity is 4 or more mmhos/cm	usually less than 4 mmhos/cm.
⇒ Organic matter content is high in Saline Soil.	organic content is low in alkaline Soil.
⇒ Saline Salt are white or slightly gray in colour.	Alkaline Soil are black in colour.

DA Gt # 05

QUESTION NO = 1 (Part = C)

Salt affected lands can be Reclaimed by the following two Matters.

Avoiding Efflorosences:-

By Maintaining the water table sufficiently below the Roots.

Hence all the Measure which were suggested for preventing water logging hold good for preventing Salinity of lands.

An efficient drainage must be provided to lower the water table in saline soil.

Leaching Process:-

In this process;

⇒ Land is flooded with water.

⇒ Alkaline salts will be dissolves in waters.

⇒ percolation to the ground water.

⇒ Doainage by sub-surface doain.
High salt Resistant coop like rice are goown on leached land foo once in two season.
Then ordinary coops like wheat cotton are goown.
Then the land is said to be Reclaimed.
When sodium carbonate is present in soil gypsem is added before leachin g.
Sodium sulphate is formed which is leached out easily.

$Na_2CO_3 + CaSO_4 \longrightarrow Na_2SO_4 + CaCO_3$.

QUESTION NO = 2 (Part = A)

The Equations chosen by Kennedy are;

1) $Q = AV$

2) $V = C(RS)^{1/2}$ Chazy Equation

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

(In MKS System)

$$C = \frac{41.65 + \frac{0.00281}{S} + \frac{1.811}{n}}{1 + \frac{n}{\sqrt{R}}\left(41.65 + \frac{0.00281}{S}\right)}$$

(In FPS System)

3) $V_0 = 0.546 m)^{0.64}$

(MKS System)

Following data should be known

1) Design Discharge (Q)
2) Slope (S)
3) Regosity coefficent (n)
4) C.V.R = m = V/Vo

Kennedy Procedure for canal design:-

Step # 1

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

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

Step # 2

In Eq ①: $Q = AV$

$$A = Q/V$$

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

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

Step # 3

Substitute the value of R in Eqn (2) (Kutters and chozy Eqn) 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 that obtained with Eqn (3). (Kennedy's Eqn) Then the assumed depth is correct. Other wise Repeat the procedure with the changed value of D.

QUESTION NO = 2 (Part = B)

GIVEN DATA:-

Discharge = $30\ m^3/sec$

CVR (m) = 1

N = 0.0225

Bed Slope = 1 in 5000

Depth (D) = 2.3 m

SOLUTION:-

Finding velocity by formula:

$$VK = 0.546(D)^{0.64}$$

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

$$\boxed{VK = 0.930\ m}$$

Now calculating Area of canal; BY formula;

$$Q = AV$$

$$A = Q/V$$

$$A = 30/0.930$$

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

Now we have to calculate B; By using formula;

$$BD + 0.5D^2$$

Putting the values

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

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

$$32.25 - 2.645 = 2.3\ (B)$$

$$29.605 = 2.3(B)$$

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

Now we have to calculate Wetted Parimeter; so by formula,

$$P = B + \sqrt{5}D = 12.85 + \sqrt{5}(2.3)$$

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

Now to find hydraulic Radius

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

$$\boxed{R = 1.79m}$$

Now calculating Mean velocity from chazy Equation.

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

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

$$C = \frac{75.19}{1.517} = 49.56$$

$$V_o = 49.56\,(1.79\,(1/5000)^{1/2}$$

$$V_o = 0.93$$

$$\boxed{V_o = 0.93m}$$ (Which Equal to V)

QUESTION NO = 3 (Part = A)

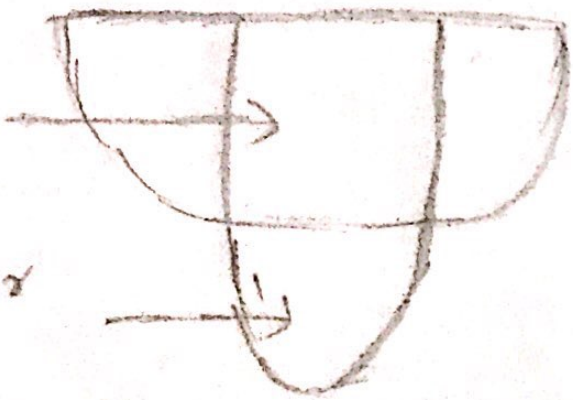
Differentiate b/w initial Regime and Final Regime according to Lacey's theory

Initial Regime:-

When only bed slope of channel changes but cross section Remain same then also no silting or scouring take place. But this is Rare.

Final Regime:-

If all the parameters (Parimeter, 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.



QUESTION NO = 3 (Part = B)

Given Data:-

$Q = 30 m^3/sec$

$M = 0.56 mm$

Solution:-

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

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

$\boxed{f = 1.3}$

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

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

$\boxed{V_m = 0.844}$

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

$\boxed{A = 35.54}$

$P = 4.75\sqrt{8}$

$P = 4.75\sqrt{30}$

$\boxed{P = 26.01}$

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

$\boxed{R = 1.36}$

$A = BD + D^2/2$

$35.54 = BD + D^2/2 \rightarrow (1)$

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

$26.01 = B + 2.236D$

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

put Eq (2) in (1)

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

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

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

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

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

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

13) Quadratic formula

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

$$\boxed{D = 1.52}$$

put in Eq (2)

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

$$\boxed{B = 22.611}$$

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

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

$$\boxed{S = 0.00026}$$

QUESTION NO = 4 (Part: A)

Head Works:-

Any hydraulic structure which supplies water to the off-taking canal is called a headwork.

Head work may be defined into two.

Storage head work

Diversion headwork

Components of head works:-

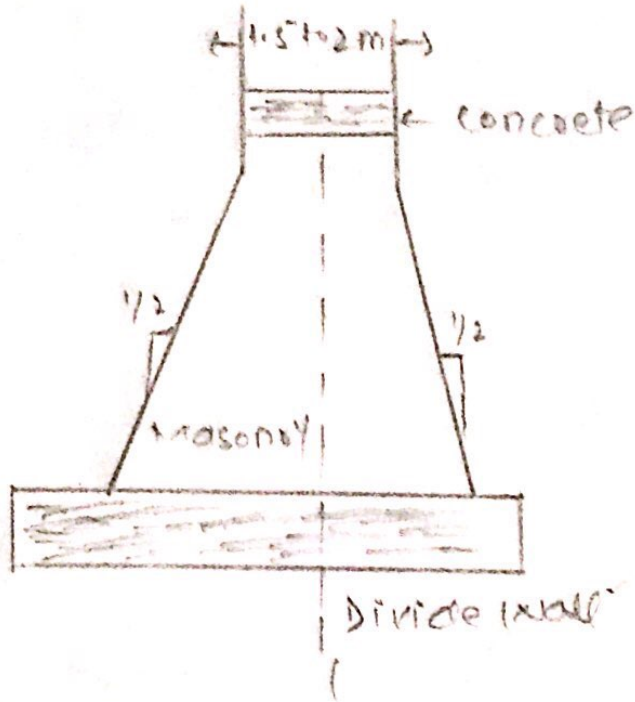
Weir or Barrage:-

Weir is a structure constructed across River to Raise the water level and divert the water into the canal, weir alligned at Right angles to the direction flow. Shutter are provides at the crest of weir so that part of Raising up to water is carried out by shutters.

Divide Wall:-

Long wall constructed at Right angle in the weir or barrage with stone

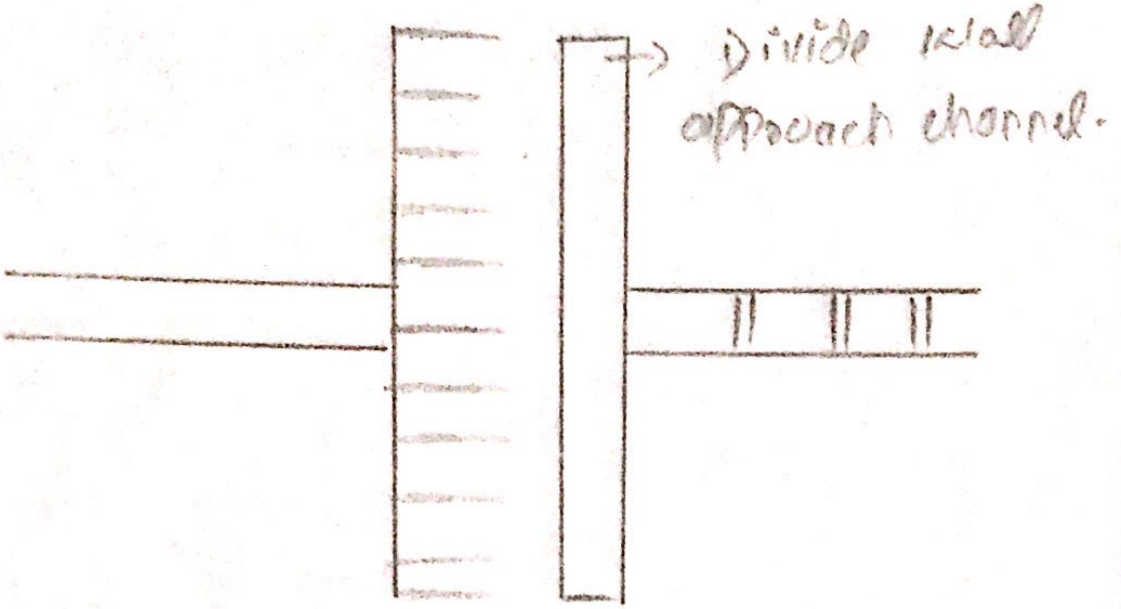
Masonary or cement concrete.
On the upstream side the wall extended just to cover the canal head Regulator and on the dowstream side it is extended upto the launching apron



Function:-

Foom a still water pocket in front of the canal head in which help in setting of silt.
Controls the eddy current or cros current in front of the canal head.

Provide a straight approach in the front of canal head.



Fish ladder:-

Consists of an inclined channel with a slope not exceed 1 in 10

The compartment of bays of fish ladder should be sufficiently large so that the fish do not collid with the walls of the bay when ascending.

Fish ladder

Silt Excludes

Device to excludes silt from intake entering the cannal.
Consists of a number a "No" of Regulatory tunnels.
The tunnels are of different lenghts.
The lenght of tunnel gradually decrease as the distance of head Regulatory.

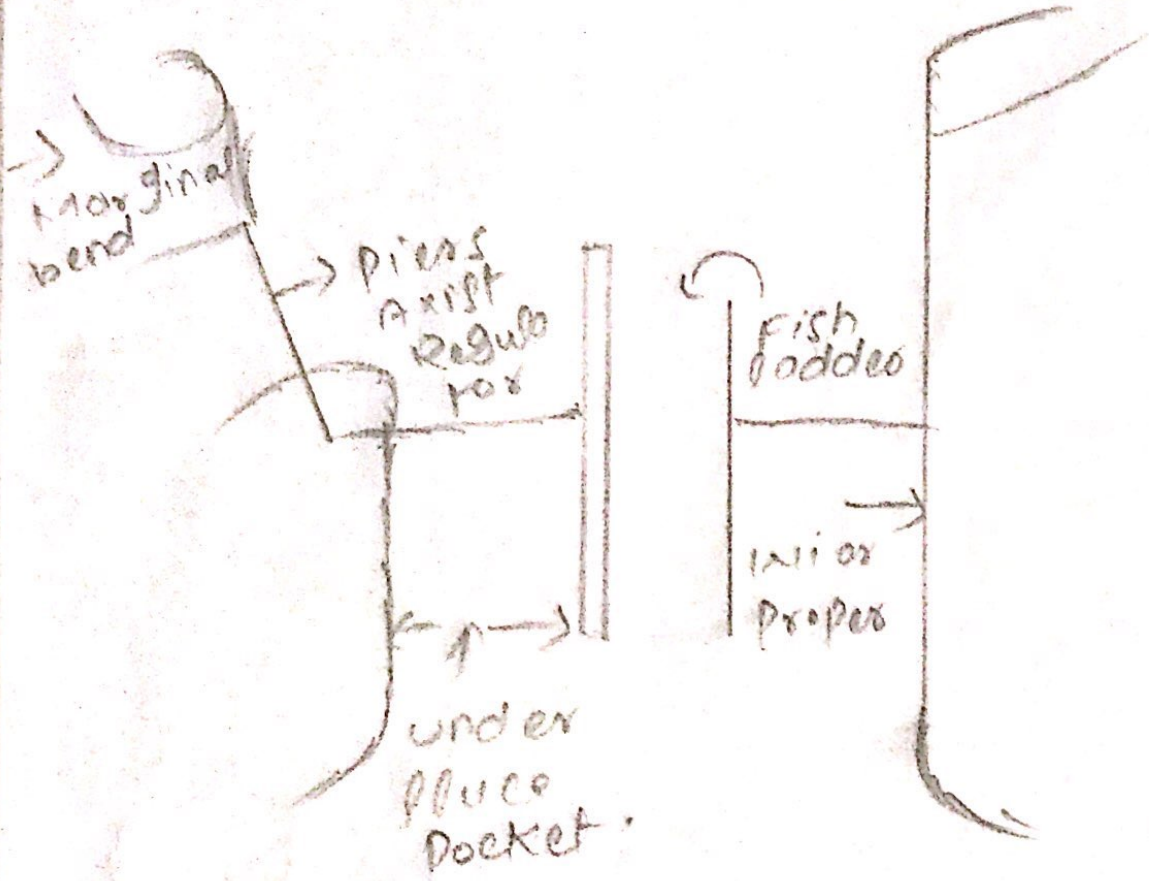
Canal head Regulatory:-

A structure which is constructed at the head of canal to Regulate flow of water is known as canal head Regulator
It consist the no of piers which divide the total width of a canal to a number of span which are known as bays
The piers consist of number Heal on which the adjustable gates are placed.

Function:

=> It Regulates the supply of water entering the canal.

=> It controls the entry of silt in the canal.



QUESTION NO = 4 (Part = B)

Function of head Regulator:-

⇒ It Regulates the supply of water entering the canal.

⇒ It controls entry of silt in the canal.

⇒ It Prevents the River floods from entering the canal.

⇒ To indicate the discharge passed into the canal from design discharge formula and observed head of water on the crest