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Section	B
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Q:No:01

Part 2: Explain anti water-logging measures.

Ans: Following are the anti water-logging measures

1 Lining of canals & water courses:

- lining of canals makes the water align through the proper channel reducing major losses to greater extent
- It also reduces seepage of water

2 Introduction to crop rotation:

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

Example: Rice followed by wheat and then by cotton.

3 Reducing intensity of irrigation:

. small portion of land should receive canal water

in one particular season.

- The remaining areas of land can receive water in next seasone by crop rotation.

4 Optimum use of water:

- Poper amount of water gives good results; less or more water effects the yield. cultivators should be educated so that there is optimum use of water.
- Revenue should be charged on the basis of quantity of water rather then area of land.

5 Improving natural Drainage of Area:

- Water should not be allowed to stay in one area.
- Natural flow is provided by bush and jungle cutting.

6: Adaption of Sprinkler method of irrigation:

- There should be no Percolation losses from water courses.
- only determined amount of water is supplied to land.

7: Pumping of Tubewells:

- Lift irrigation should be introduced to use ground water.
- canal irrigation may be substituted by tube well irrigation.

Part:- b

Differentiate between Soline and alkaline soils.

Ans:-

Soline soil

- By Principle of OSMOSIS, Pure water from roots flow outwards in a Plant die due to lack of water. such soil is unproductive

Alkoline soil.

- If the salt efflorescence continues for a longer Period, a base exchange reaction with clay take place thus sodiumizing the clay making

and is called saline soil

- Saline soil appearence is as a black crusty core over the surface of earth

it impermeable, illaerated & highly unproductive, such soil are called alkaline soils.

- It is white in appearence as white patches appear over earth's surface

Part:c

How do you reclaim salt affected lands?

Ans: Following are the major aspect to reclaim salt affected lands

- The Practice of crop reversal is necessary to reduce the establishment of salt or efflorescne.
- An efficient drainage (surface & sub surface) must be Provided to lower the water table in saline soils.
- High salt resistant crops like rice are grown on leached land for 1 or 2 seasons.
- Land should be flooded with water so that alkaline salts will be dissolved in water.

Q:No:02

Part:a Explain the Procedure of designing of an irrigation canal by kennedy's theory.

Ans:- Following are the steps required for designing an irrigation canal using kennedy's theory.

Step01:

Assume the trial value of D and put it in equation (Q=AV) and determine

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

Step02:

As equation (1) is $Q = AV$

Thus $A = Q/V$

$A = BD + D^2/2$

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

For assumed D determine B; Find $R = A/P$

Step:03:

Substitute the value of R in kutters and Chezy's equation to obtain V which will be the actual velocity for assumed dimensions.

Step:04:

If the velocity worked out from kutter's and Chezy's equation agrees that of obtained with the kennedy's equation then the assumed depth is correct. Otherwise repeat the procedure with changed value of D.

Q:-No:-02

Part:b: Design an irrigation channel by kennedy's theory to carry a discharge of 30 cumecs with CVR (m) of 1 and N as 0.022s and bed slope of 1 in 5000. Assume the depth (D) as 2.3m.

Sol:-

Given data: $D = 2.3M$

$Q = 30\ cumec$

$C.V.R = m = 1$

$N = 0.022s$

$S = 1/5000 = 0.0002$

As we know

$Q = AV$

$$A = \frac{Q}{V} = \frac{30}{V} \quad \text{— (1)}$$

Thus using formula to compute "V"

$$V_0 = 0.5416\, m\, D^{0.64}$$

$$V_0 = 0.5416\,(1)\,(2.3)^{0.64}$$

$$\boxed{V_0 = 0.935\ m/s}$$

Put this value in eq (1)

$$A = \frac{30}{0.935} = 32.08\ m^2$$

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

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

$$\boxed{B = 12.77\ m}$$

Put the value in below eqn.

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

$$P = 12.77 + 2.3\sqrt{5}$$

$$\boxed{P = 17.9\ m}$$

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

Substituting the value of "R" in kutter's and chazy equations. $V = C(RS)^{\frac{1}{2}}$ — (2)

$$C = \frac{\frac{1}{n} + \left(23 + \frac{0.00155}{S}\right)}{1 + \left(23 + \frac{0.00155}{S}\right)n/\sqrt{R}} = \frac{\frac{1}{1} + \left(23 + \frac{0.00155}{0.0002}\right)}{1 + \left(23 + \frac{0.00155}{0.0002}\right)\frac{1}{\sqrt{1.76}}}$$

$$\boxed{C = 49.526}$$

Put the value in eqn (a) $V = 49.526\,(1.76 \times 0.0002)^{\frac{1}{2}}$

$$\boxed{V = 0.93\ m/sec}$$

Q No:. 03

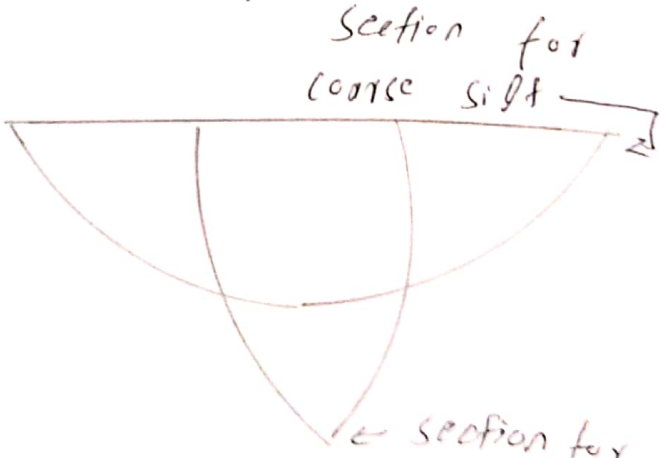
Part : a Differentiate between initial regime and final regime in accordance to Laceys theory.

Initial regime

- When only bed slope of channel changes but the cross section remains same then there will be no silting and scouring.
- Cross section or wetted Perimeter remains unaffected
- It is a quick Process and occurs within short span of time

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



Q:No:03

Part:b Design a regime channel by Laceys theory for discharge of 30 cumecs and mean diameter of silt particle of 0.56mm

Sol: Given dat

$Q = 30$ cumec

$d = 0.56\,mm = (M)$

By formula; silt $= f = 1.76 \times M^{0.5} = 1.76(0.56)^{0.5}$

$$\boxed{f = 1.3}$$

$$\rightarrow V_m = \left[\frac{Q f^2}{140}\right]^{\frac{1}{6}} = \left[\frac{30 \times (1.3)^2}{140}\right]^{\frac{1}{6}} \Rightarrow \boxed{V_m = 0.844\,mm/sec}$$

$$Q = AV, \quad A = \frac{Q}{V} = \frac{30}{0.844} \Rightarrow \boxed{A = 35.54\,mm^2}$$

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

$$\boxed{P = 26.01}$$

$$\rightarrow R = S/2 \cdot V^2/f = \frac{5}{2} \times \frac{0.844^2}{1.3} \Rightarrow \boxed{R = 1.36mm}$$

-> As we know that

$A = \frac{BD + D^2}{2}$; $35.5 = BD + \frac{D^2}{2}$ — (1)

$P = B + D\sqrt{5}$; $26.01 = B + 2.236D$ — (2)

Thus $B = 26.01 - 2.236D$ — (3)

Put eqn (3) in eqn (1)

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

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

$35.54 = 26.01D - 1.736D^2$

$1.736D^2 - 26.01D + 36.54 = 0$

Using quadratic formula

$$\Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-26.01) \pm \sqrt{(26.01)^2 - 4(1.736)(35.54)}}{2(-1.736)}$$

$D = 1.52$ Put in eqn (3) we get

$B = 26.01 - 2.236(1.52)$

$\boxed{B = 22.611\ mm}$

-> Now

$$S = \frac{f^{5/3}}{3340\,Q^{\frac{1}{6}}} = \frac{(1.5)^{5/3}}{3340(30)^{\frac{1}{6}}} \Rightarrow \boxed{S = 0.00027}$$

. . ..

Q:No:011 Explain the components of Part d) Head works with neat diagram.

Ans: Following are the components of headworks.

- ~~Divide wall~~
- Weir or barrage
- under sluices
- Divide wall
- Fish ladder
- Canal head regulator
- Silt excluders/Silt prevention devices.
- River training works.

1) Weir and Barrage:

Normally the water level of any perennial river is such that it cannot be diverted to the irrigation canal. The bed level of 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 Adjustable shutters

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

Weir

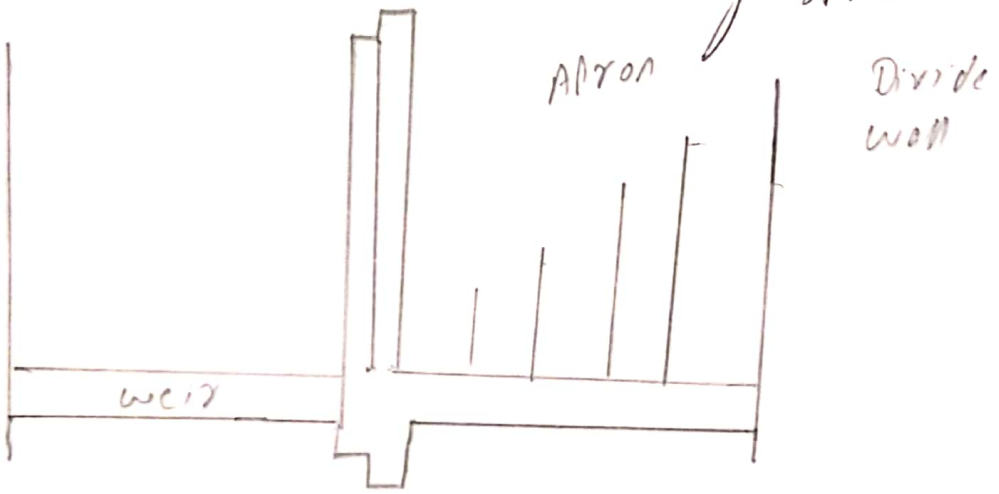
2 Under sluices:

It is 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.

- When the silt deposition becomes appreciable the gates are opened and the deposited silt is loosened with an agitator mounting on a boat. The gates are then closed. But at the period of flood, the gates are kept opened.

3) 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 ulstream side the wall is extended just to cover the canal head regulator and on the downstream side. it is extended up to the launching apron.

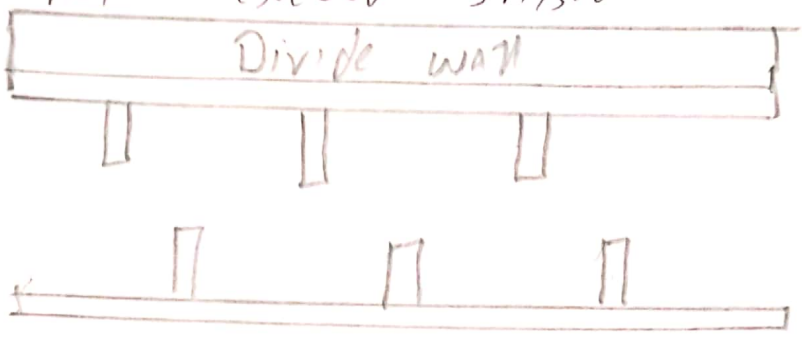


4) Fish Ladder:

It is provided just by side of the divide wall for the free movemet of fishes. Rivers are important source of fishes The tendency of fish is to move from ulstream to downstream in winters and from downstream to ulstream in moosoons.

- In the fish ladder, the fable walls are constructed in a Zig Zag manner. so that the

velocity of flow within the Sadder does not exceed 3 m/sec

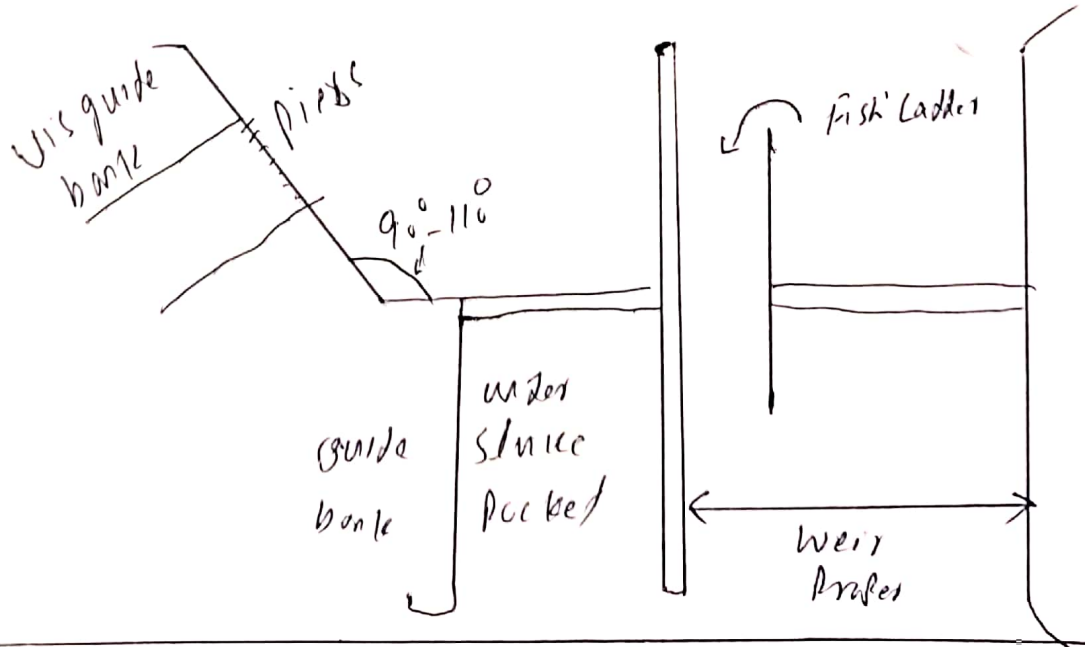


Plan

5) 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.

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



Q:.No:- 04

Part :- b

What are the functions of Head regulators?

Ans:

The major function is to regulate the supply of water entering the canal. It controlls the entry of silt in the canal.

- It Pavements the river floods from entering the canal.
- It regulates/indicates the discharge passed into the canal from design discharge formula.