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Section B

Semester 6th

Subject Irrigation Engineering.

Submitted To,

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QNO(01)

(a) 'Anti water logging measures"

(1) Lining OF Canals and water Coures :-

⊙ It is Reduce SEEPage of water.

(2) Reducing Intensity of Irrigation :-

⊙ Only Small portion of land Should recive Canal water in One particalar Season.

⊙ Remaining area Can receive water in next Season by rotation.

(3) By Introducing Crop rotation :-

⊙ High water requiring Crop Should be followed by One requiring less water

⊙ And also then by one

Requiring almost no water.

Example:-

⊙ Rice followed by Wheat and then by Cotton.

(4) Optimum use of water :-

⊙ Certain amount of water gives the best result.

⊙ less or more water reduce the yield.

⊙ Cultivators Should be educated So that not to use more water

(5) Improving natural drainage of area :-

⊙ What Should not be allowed to stay in One area

⊙ Natural flow is provided by bush and Jungle Cutting.

(6) Vertical Drainage:-

- Life Irrigation Should be introduce to use GW.
- Canal Irrigation may be Substitude by tube well Irrigation.

(7) Adoption of Sprinker method of Irrigation :-

- Only predetermined amount of water is Supplied to land.
- No precolation losses From water course.

part (b)

Saline Soil	Alkaline Soil
⊙ By principle of Osmosis the pure water from root flows outwards in a plant die due to lack of water Such Soil is uprodutive and called Saline Soil	⊙ If the Soil efforence Contain for a large period a base exchange reaction with Clay with took plare Thus Sodioum clay making it impermeable illecrated and highly un prodtive Such Soil called alcaline Soil.
⊙ It Contain excess Soluble Soil in root Zone	⊙ It is related to Hp
⊙ yield is limiting.	⊙ pH is measure through a Soil test.

part(c) :- Reclamation of Salt affected lands.

- In the arid regions of the world and along coastal area subject to periodic inundation by sea water. Soil may have such a high content of soluble salt that production of economic plants is not possible. The salts found in soil are generally the chlorides, carbonates, bicarbonat and sulfates of sodium with lesser amount of potassium, magnisum and calcium salt.
- The salt in soil disolive in the soil water and demage plant growth by penetration preventing the plants from getting needed water from soil.

⊙ Since the energy required to remove a given quantity of water from a salt solution increases as the salt concentration of the solution increases.

QNO(02)

(a) Kennedy procedure for Irrigation Canal design :-

The following steps should be considered ;

Step # 1 :-

⊙ Assume the trail value of D and put it in eq ① and determine (V_o)

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

Step # 2 :-

In eq ①

$$Q = AV$$

$$A = Q/A$$

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

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

For assume 'D' determine 'B'

Find $R = A/P$

Step # 3:-

Subtitude value of 'R' in ev ②

(Kutters and chozys ev) to Obtaine 'V' which will be actual velocity For assumed dimensions.

Step # 4:-

⊙ If the velocity work out from ev ② agrees with that of obtained with ev ③ (Kemedeye ev) Thus the assume depth is correct. Other wise repeat depth produre with changed value of 'D'

(b) Given Data:-

- Discharge $Q = 30\ m^3/sec$
- CUr $m = 1$
- $N = 0.0225$
- Bed Slop $S = 1$ in 5000
- Depth $D = 2.3m$

Required:-

- $V_o = ?$

Solution:-

Finding velocity

According formula

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

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

$$V_K = 0.930m$$

=> Now calculating area of canal By formula

$$Q = AV$$

$$A = Q/V \Rightarrow A = 30/0.930$$

$$\boxed{A = 32.25\ m^2}$$

Now we have to find "B" using formula

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

$$\Rightarrow BD + 0.5D2$$

By putting valus we get

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

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

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

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

Now To Find wetted perimeter

So We know formula

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

$$= 12.87 + \sqrt{5(2.3)}$$

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

Now Radius

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

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

mean velocity From chezy eq.

$$V_C = C(Rs)^{1/2} \quad \text{—④}$$

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

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

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

$$C = 49.56$$

Put 'C' in eq (6)

$$V_0 = 49.56\,(1.79)\left(\frac{1}{5000}\right)^{1/2}$$

$$\boxed{V_0 = 0.930 m/s}$$

Now Ratio of velocities

$$= V_0/V = \frac{0.930}{0.930} 1$$

$$= 1$$

Assumed depth is Correct.

For trapozidal Section

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

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

$$32.25 = B(2.3) + (2.3)^2/2$$

$$B = 12.87$$

Now

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

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

$$P = 18.01m$$

Now

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

$$R = 1.790$$

$\sqrt{5}$

$\sqrt{A}$

QNO(03)

(a) Different b/w initial regime and final regime but this theory is applicable to final regime.

↳ Initial Regime :-

⊙ When only bed slope of channel changes but cross section remains same then also no silting or scouring take place but this is rare.

↳ Final Regime :-

⊙ If all parameters (depth, and slope) have equally free to vary and adjust according to discharge and silt graces then the channel is said to have final regime.

⊙ In final regime cross section assumed semi-ellipse shape.

(b) Given Data:-

- $Q = 30\ m^3/sec$
- $m = 0.56\ mm$

Req:- $S = ?$ (Regime channel)

Solution:-

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

$$f = 1.76 * (0.56)^{0.5}$$

$$f = 1.3$$

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

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

$$\boxed{V_m = 0.844}$$

$$Q = AV$$

$$A = Q/A = 30/0.844$$

$$\boxed{A = 35.54}$$

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

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

$$\boxed{P = 26.01}$$

$$R = 5/2 * v^2/f$$

$$R = \frac{5}{2}\left(\frac{(0.844)^2}{1.3}\right)$$

$$\boxed{R = 1.36}$$

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

$$B = 22.611$$

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

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

$$\boxed{S = 0.00026}$$

Thus the Required Result.

QNO(04)

(a) Components of headworks :-

(1) Weir :-

- Normally the water level of any perennial river is such that it can not be diverted to the Irrigation canal
- bed level of canal may be higher then existing level of water river.
- In case weir constructed accross the river to rise water level.
- Surplus water pass over crest of weir.
- Adjustable Shutters are provided on Crest.
- To raise water level to Some Required height.

(2) Barrage :-

- When water level on the up stream side of the weir is required to be rasid to different level at different time.
- Barrage is an arrangment of adjustable gates at different tires.

(3) Under Sluices :-

- Also known as Scouring Sluices.
- Under Sluices are opening provided at base of barrage.
- These opening provided adjustable gates.
- Suspended silt goes on depositing in front canal head regulator.
- Silt deposition becomes appreciable gates opened and the deposite silt is lossed with an agitator mounting on a boat.

⊙ Gates are then closed But are clo period of flood gates kept opened.

(4) Divide wall :-

⊙ Divided wall is a long wall.
⊙ Constructed at right angle in weir.
⊙ It is Constructed with Cement Concrete.
⊙ It is extended upto the launching apron. See on Fig ⓐ

Functions :-

⊙ To form a still water pocket in front of canal.
⊙ To cleaned through the Scouring sluices from time to time.
⊙ It control the eddy current.
⊙ It provid straight approach in front of canal head.
⊙ It resist Overturning effect on weir.

(5) Fish ladder :-

- The Fish ladder is provided just by the side of the divided wall for free movement fishes.
- Rivers are Impotant Source of fishes.
- This movement is essential for their Survival.
- This movement gets obstructed and determental to the fishes.
- velocity of ladder does not exceed 3 m/s
- width, lenght and height of it depend on river and type of barrage or wire. on Fig (b)

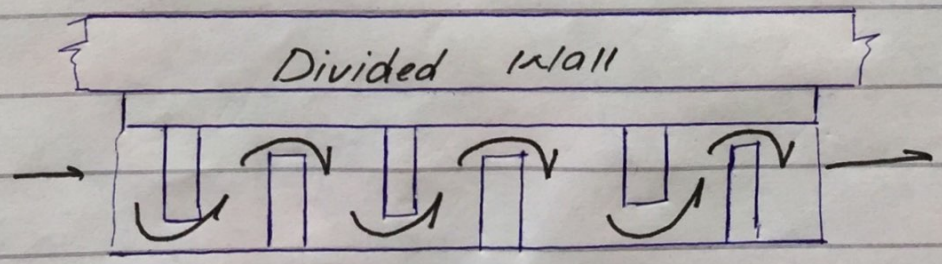

Fig (a)

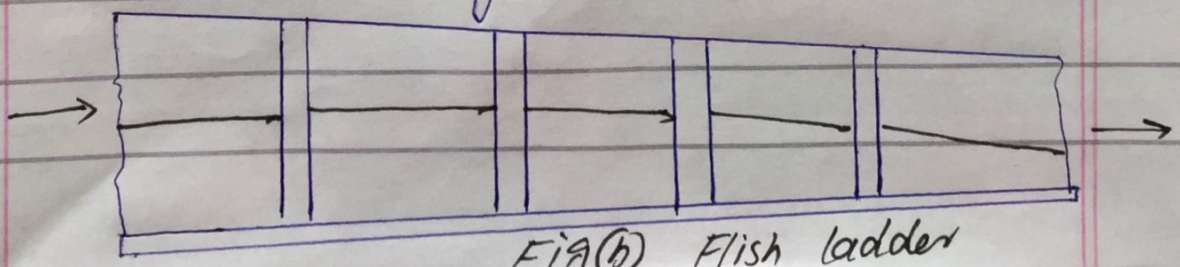

Fig (b) Flish ladder

(6) Canal head regulator :-

- A Structure which is constructed at the head of canal to regulate flow of water.
- Consists number of piers.
- gates operated from top by suitable mechnical device.
- Some peir are constructed on down stream side of the canal head.
- It Support the roadway.

Functions :-

- To Regulate water supply enterning to canal.
- It control entry of slit in the canal.
- It prevent river flood from enterning the canal.

(7) Silt regulation work :-

- The entry of silt into canal which takes off from head work can be reduce by constructed certine special work called silt control the are two types silt Excluder and Silt Ejector.

(8) River training works :-

⊙ River training works Required near the wire site in order to ensure a Smooth and on axial flow of water.

⊙ prevent the river from outflanking the work due to change in its Course.

⊙ For their work required. Guide bank, Marginal and Spurs.

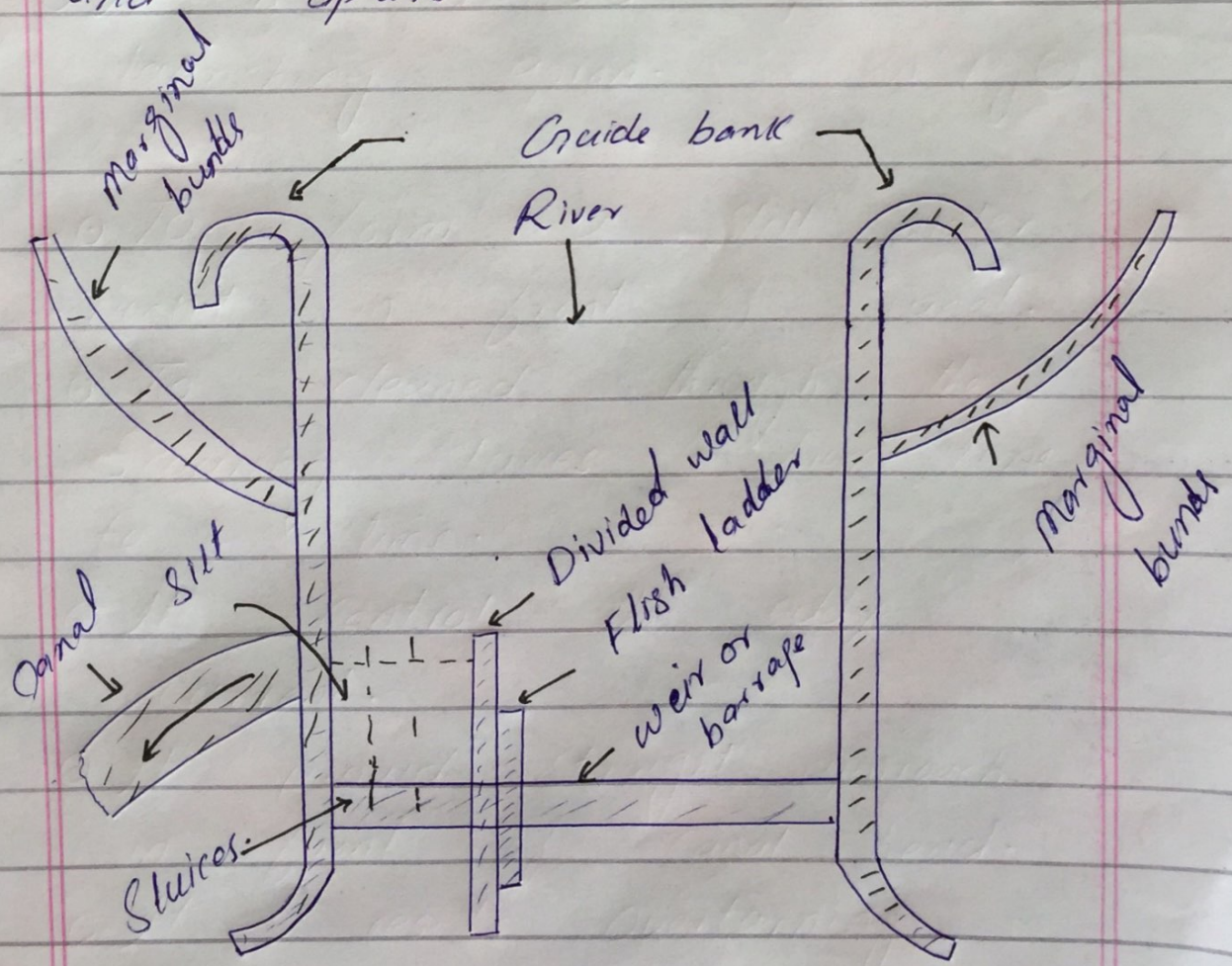

Diagram of headwork

(b) Functions of head Regulator:-

- It Regulates the Supply of water entering the Canal.
- It Control the entry of Silt in the Canal.
- It prevent the river flood from entering the Canal.
- To admit water into the off taking Canal.
- To regulates the Supplies into Canal.
- To indicate the discharge passed into Canal from design discharge formula and observed head of water on the crest.
- To Control the Silt entry into the Canal.