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exam final term

instructor

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subject

Irrigation engineering

program BE (CIVIL)

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Q No1
Part1:-

Explain anti water-logging measures.

Ans: Following are the anti-logging Measures.

1. limning of canals & water courses.
living of canals makes the water align through the proper channel reducing major losses to greter extent.
. It also redces seepage of water.

2 introduction To crop rotation:-
High water requiring crop should be followed by one requiring less water and then requiring by one requiring almost no water.
Example Rice followed by wheat and then by cotton.

3) Reducing intensity of irrigation:
Small portion of land should recieve canal water in one particular season.

- The remaining area of land can receive water in next season by crop rotation.

4. optimum use of water.

paper amount of water gives good result less or more water effect The yeild cultivator should be educated so that there is optimum use of water.

- Revenue should be change or the basic of quantity of water rather than area of load.

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 losses.
- only determined amount of water is supplied to land.

7) Pumping of tube well:

- left irrigation should be introduce to use ground water.
- Canal irrigated may be substituted by tube well irrigation.

Part B:-

Differentiate b/w saline and Alkaline soils.

Ans.

Saline Solid	Alkaline soil
By principle of osmosis, pure water from roots flow outwards in a plant die due to lack of water. Such soil is unproductive. and is called saline soil.	If the efforescence continues for a longer period a base exchange reaction with clay take place Thus Sodiumiging the clay making it immpermeable, illactated and highly unproductive Such soil are called alkaline soil.
• Saline soil appearence is as a black crusty core over the surface of earth.	• It is white in appearence as white patches appear over earth surface.

Part c:- 5

Ans. How do you reclaim salt affected lands?

Following are the major aspect to reclaim salt effected land.

- The practice of crop reversal is necessary to reduce the establishment of soil borne diseases.
- An efficient drainage (surface and sub surface) must be provide to lower the water table in saline soils.
- High salt resistant crop like rice are grown on leached for 1 or 2 seasons
- land should be flooded with water so that alkaline salt will be dissolved in water.

Q2 Explain the procedure of designing of an irrigated canal by kennedy's Theory.

Ans Following are the steps required for designing an irrigation canal using kennedys Theory.

Step 1

Assume the trial value of D and put in an equation [Q = AV] and determined.

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

Step 2

As equation ① is Q = AV

Thus $A = Q/V$

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

$$P = B + D5\frac{1}{2}$$

For assumed D determined B, Find $R = A/P$

Step 3

Substitute the value of R in Kutters and chazy's equation to obtain V which will be the actual velocity for assumed dimension.

Step 04

If the velocity Work out from kutter and chazy's agrees that of obtain with the kennedy's equation then the assumed depth is correct other wise repeat produce with change value of D.

QNo2
Part B

$$A = Q/V = \frac{30}{V} \longrightarrow (1)$$

Thus using formula to consective "v"

$$V_o = 0.548\ m\ D^{0.64}$$

$$V_o = 0.546\ (1)\ (2.3)^{0.644}$$

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

put this value in eq (1)

$$A = 30/0.933 = 32.01\ m^2$$

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

$$32.01 = B(2.3)^2 + 2.3^2/2$$

$$B = 12.77\ m$$

Put the value in below eq.

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

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

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

Substituting the value of "R" in Kutter's & chazy's equation

$$\boxed{V = C(RS)^{1/2} \rightarrow (2)}$$

$$C = \frac{1/n + \left(23 + \frac{0.00155}{S}\right) = 1/1 + \left(23 + \frac{0.00155}{0.0002}\right)}{1 + \left(23 + \frac{0.00155}{S}\right)n/\sqrt{R}\ 1 + \left(23 + \frac{0.00155}{0.0002}\right)1/\sqrt{1.75}}$$

$$\boxed{C = 49.526}$$

Put the value in eq (A)

$$V = 49.526\ (1.7 \times 0.0002)^{1/2}$$

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

Q No 3

Part A

Initial regime

When only bed slop of channel changes but the cross section remain same Then there will be no silting and scouring.

Cross section are wetted perimeter remains unaffected

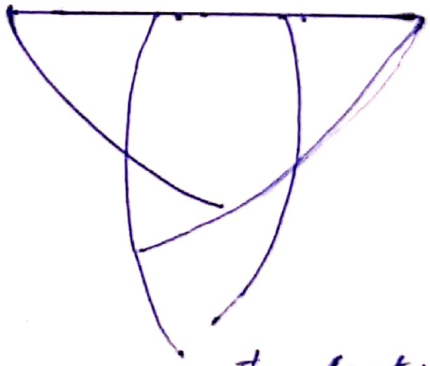
It is the quick process and occur in within short span of time

Final regime

If all the parameter (perimeter depth and slope) have equally free to vary and adjust according discharge and silt grades Then the channel is said to have final regime

In final the cross section assume semi-ellipse shape.

Section for course silt



≠ section for the silter

Q3 part B

Given Data:

$Q = 30 m^3/sec$

$M = 0.56 mm$

Sol:

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

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

$\boxed{f = 1.3}$

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

$\boxed{V_m = 0.844}$

$Q = AV$

$A = Q/V = \frac{30}{0.844} \Rightarrow \boxed{A = 35.54}$

$P = 4.75\sqrt{Q}$

$P = 4.75\sqrt{30} = \boxed{P = 26.01}$

$\boxed{P = 26.01}$

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

$R = 1.36$

$A = BD + D^2/2$

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

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

$26.01 = B + 2.236D$

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

Put eq (2) in eq (1)

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

$$35.54 = 26.0D - 2.236D^2 + \frac{D^2}{2}$$

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

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

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

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

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

$a = -1.736$ $\quad b = 26.01$ $\quad c = -35.54$

By Quardatic eq.

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

$D = 1.52$ put in eq (2)

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

$$B = 22.611$$

$$S = \frac{f(5/3)}{3340\, Q^{1/2}}$$

$$S = \frac{(1.3)^{5/3}}{3340\,(30)^{1/2}} = \boxed{S = 0.00026}$$

Qy Part A

Ans:- Following are the main component of head work.

→ Weir or Barrage.
→ under sluice
→ Fish ladder
→ cannal head Sequlator.
→ Side exclude / site prevention device
→ River training works.

⇒ Weir & Barrage:- Normally the water level of any perincoal revir in such that it cannel be dirater to the cannal may be high then the existing water level on the top stream side of the weir is required to different time, barrage is constructed.

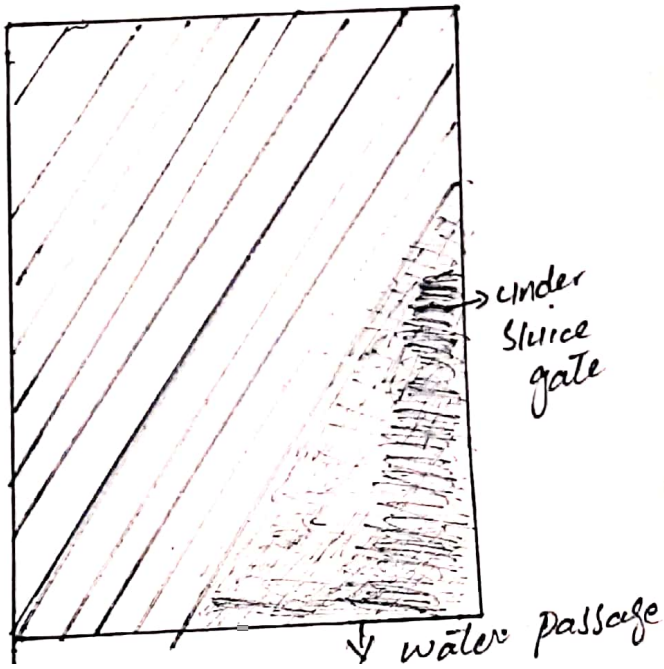
weir.

2

under Sluices :-

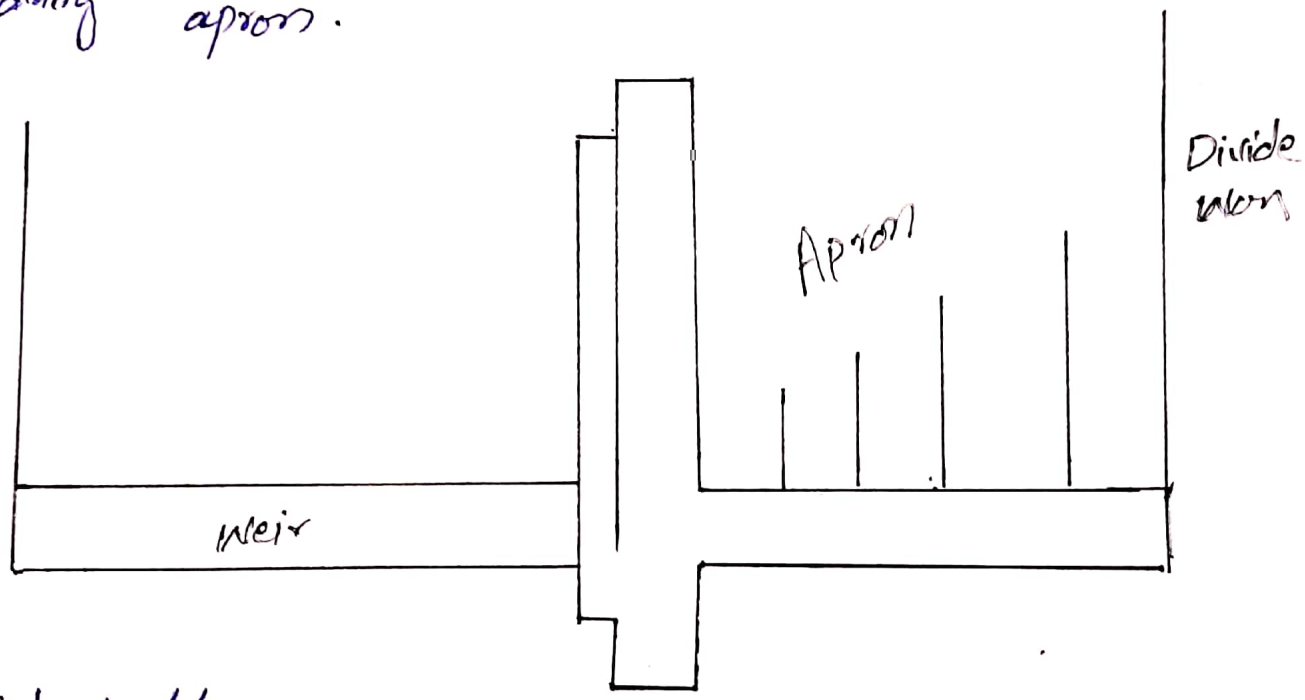
It is also known as Scouring Sluices the under sluices are the openly provided at the base of the weir or barrage These opening are provided with adjustable gates.

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



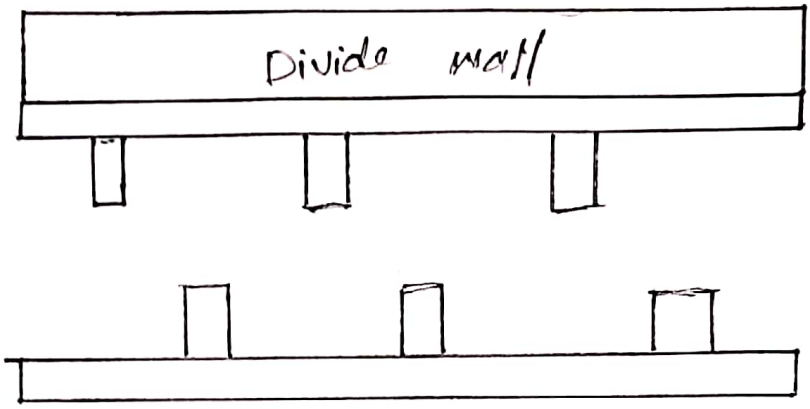
3

Divide Wall:- The divide wall is a long wall constructed at right angle in the weir or barrage it may be constructed with stone masonry or cement concrete. on the upstream side the wall is extented just to cover the canal head regulator and on the down stream side. it is extended up to the loundring apron.



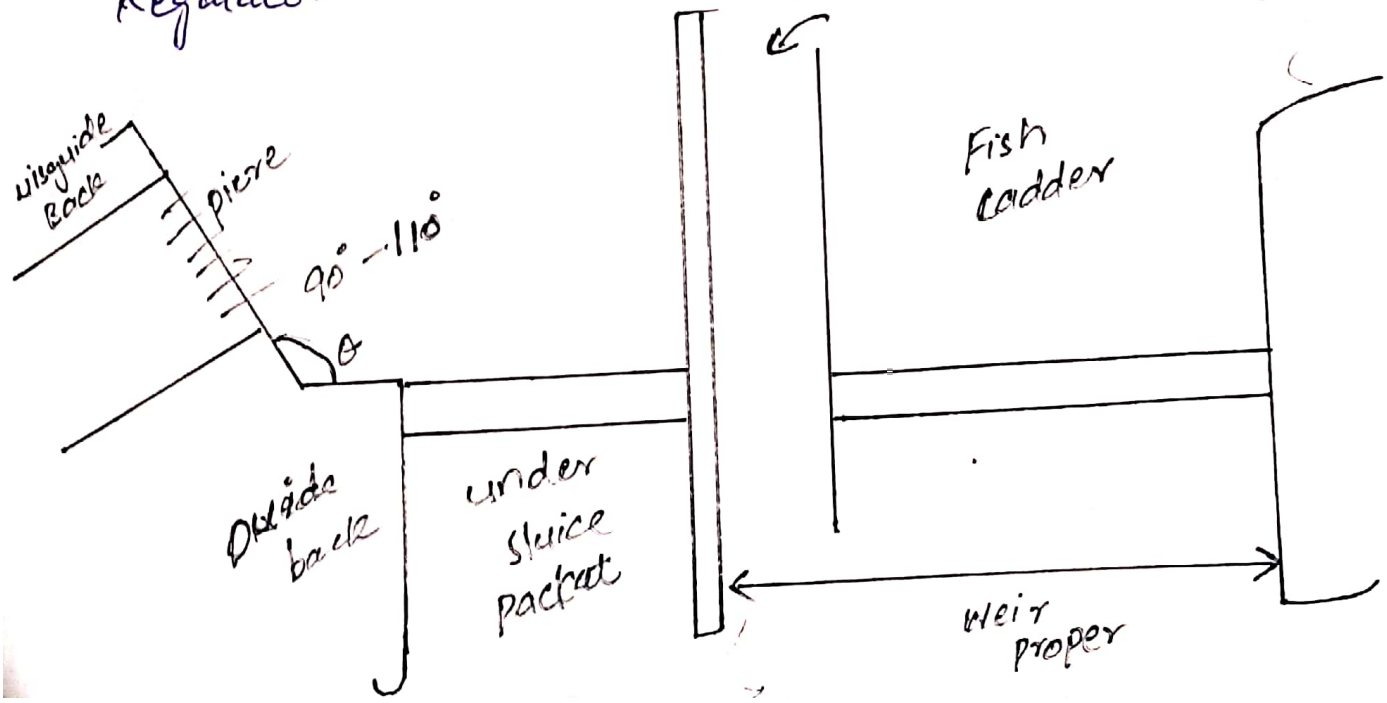
4 **Fish Ladder:-** It is provided just by side of the divide wall for the free movement of fish River are are importatant sources of fish the tendency of fish to move from upstream to down stream in weinfere and from downstream in moon soon.

If is the fish ladder the foble walk are constructed in a zig zag manner. So that the velocity of flow within the ladder does not exceed 3m/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.

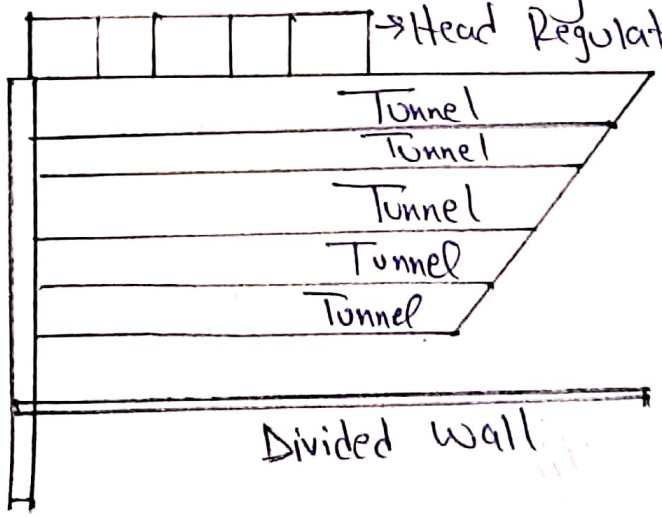


a. SILT EXCLUDERS:-

Silk excluders are those works which are constructed on the bed of the river, upstream for the head regulators. The clearer water enter 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.

b. SILT EJECTORS:-

Silt ejectors are also called silt extractors, are those devices which extract the silt from the canal water after the silted water has traveller a certain distance in the off take canal. These works are constructed on the bed of the canal, and little distance downstream from the head regulator.



Q4 Part B 16

Ans The major Function is to regulator The sipply of water enterring th canal. It control the entry of silt in the canal

⇒ It prevent the river floods from entering the canal.

⇒ It regulate /indicate discharge passed into the canal from design discharge formula.