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exam final term

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subject

Irrigation engineering

program BE (CIVIL)

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Q No:- 01 part (a):- Explain anti water-logging measures. [1]

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 See page 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 water.

Example:- Rice followed by wheat and then by cotton.

3:- Reducing intensity of Irrigation:-

- Small portion of land Should receive Cannal water- in one particular Season.
- The remaining areas of land can receive water in next Seasons by Crop rotation.

4:- Optimum use of water:-

- Paper 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 of Area:-

- water should not be allowed to stay in one area.
- Natural flow is provided by bush and jangle 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 tube wells:-

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

Part:B

Differentiate between Saline and alkaline Soils.

Ans:

Saline Solid	Alkaline Soil.
• By Principle of Osmosis, pure water from roots flow outwords 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 Sodium rising the clay making it impermeable, illacrated & highly unproductive, Such soil are called alkaline Soiles.
• Saline Soil appearence is as a black crusty coat over the surface of earth.	• It is white in appearence as white patches appear over earth's surface.

Part c: 4

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 saltor efforsence.
- An efficient drainage (surface & sub surface) must be provide to lower the water table in saline soils.
- High salt resistant crops like rice are grown on leathed for 1 or 2 seasons.
- land should be flooded with water so that alkaline salts will be disolved in water.

Q No: 02

Part a: Explain the procedure of designing of an irrigation canal by kennef's theory.

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

Step 01 Assume the trial value of D and put it in equation ($Q = AV$) and determine

$$V_0 = 0.546m\ D^{0.64}$$

Step 02 As equation (1) is $Q = AV$

Thus $A = Q/V$

$A = BD + D^2/2$

$P = B + D5''/2$

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 kutters and chezy's agrees that of obtained with the kennedy's equation then the assumed depth is correct. other wise repeat the produce with changed value of D.

Q No 02 Part B

$$A = Q/V = 30/V \quad \text{—(1)}$$

Thus using formula to Consider "v"

$$V_0 = 0.546\, m\, D^{0.64}$$

$$V_0 = 0.546\,(1)\,(2.3)^{0.64}$$

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

put this value in eq (1)

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

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

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

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

put the value in below eqn

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

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

Now $R = A/P = 32.01/17.9 = 1.76$

Substituting the value of "R" in kuttar.. ed

changy equations $V = C(RS)^{1/2}$ — (2)

$$C = \frac{1/n + (27 + \frac{0.00155}{S})}{1 + (23 + 0.00155/S)\, n/\sqrt{R}} = \frac{1/1 + (23 + \frac{0.00155}{0.0002})}{1 + (23 + \frac{0.00155}{0.0002})\, 1/\sqrt{1.75}}$$

$$\boxed{C = 49.526}$$

put the value in eqn (a) $V = 49.525\,(1.76 \times 0.0002)^{1/2}$

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

Initial regime

only bed slope of channel changes but the Cross Section remains same Then there will be no silting and scouring.

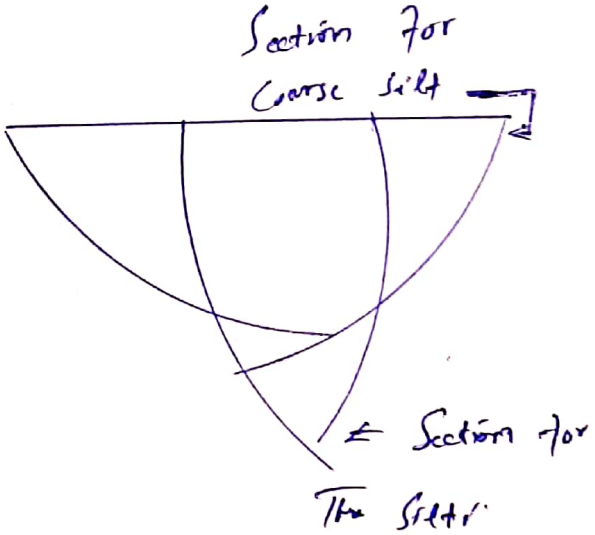
Cross Section or wetted primeter remains unaffected.

· It is a quicik process and occurs within short span of time.

Final regime.

· If all the parametter (perimetter depth and slope) have equally free to vary and djust according to discharge and silt grades Then the channel is said to have final regime.

· In final the cross Section assumes semi-ellilse shape.



Q3 part B

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Given data:..

$Q = 30$ cumec , $d = 0.56\,mm = (M)$

By Formula.

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

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

$\Rightarrow \boxed{f = 1.3}$

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

$\Rightarrow \boxed{V_m = 0.844\ m/s}$

$\Rightarrow Q = AV \quad : \quad A = Q/V = 30/0.844$

$\boxed{A = 35.54\ mm^2}$

where,

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

$\Rightarrow \boxed{P = 26.01}$

$R = 5/8 \; K V^2/f \Rightarrow 5/2 \times \frac{0.844^2}{1.3}$

$\Rightarrow \boxed{R = 1.36\ mm}$

As we know,

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

$\Rightarrow 35.5 = BD + D^2/2$ — (1)

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

Thus $B = 26.01 - 2.236D$ — (3)

Put eq (3) in eq (1)

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

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

$\Rightarrow 1.736D^2 - 26.01D + 35.54 = 0$

using quadratic Formular.

$$\Rightarrow -b \pm \sqrt{\frac{b^2 - 4ac}{2a}}$$

Put value

$$\Rightarrow (-26.01) \pm \sqrt{\frac{(26.01)^2 - (4)(1.73)}{2(1.73)}}$$

$$\Rightarrow \boxed{n = 1.50}$$

Put eq (1) we get;

$$\Rightarrow \boxed{B = 22.611m}$$

Now

$$S = f^{5/3} / 3340 Q^{1/6}$$

$$\Rightarrow (1.3)^{5/3} / (3340)(30)^{1/6}$$

$$\boxed{\Rightarrow S = 0.00027}$$

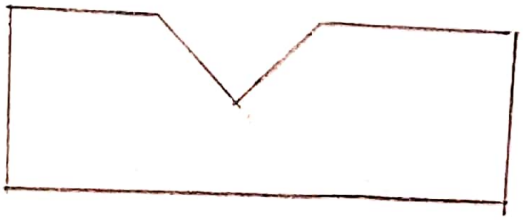
Q No 4 Part A 10

Ans:- Following are the main components of head works.

→ weir or Barrage
→ Under Sluice.
→ Divid wall
→ Fish ladder
→ Cannal head Seguletor.
→ Site excludes / Site prevention devices.
→ River training works.

⇒ Weir & Barrage:-

Normally the water level of any perincoal river is such that it cannel be divater to the Irrigational cannal. The bed level of the Cannal may be high than the existing water level on the top stream side of the weir is required to different time, barrage is Constructed.

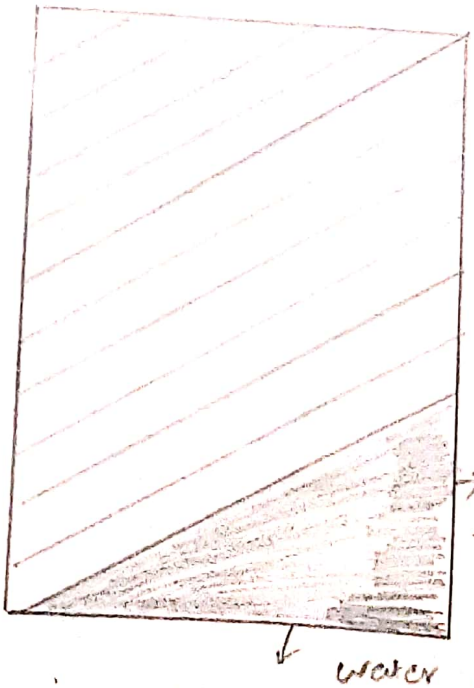


Weir

2 **under Sluices:**

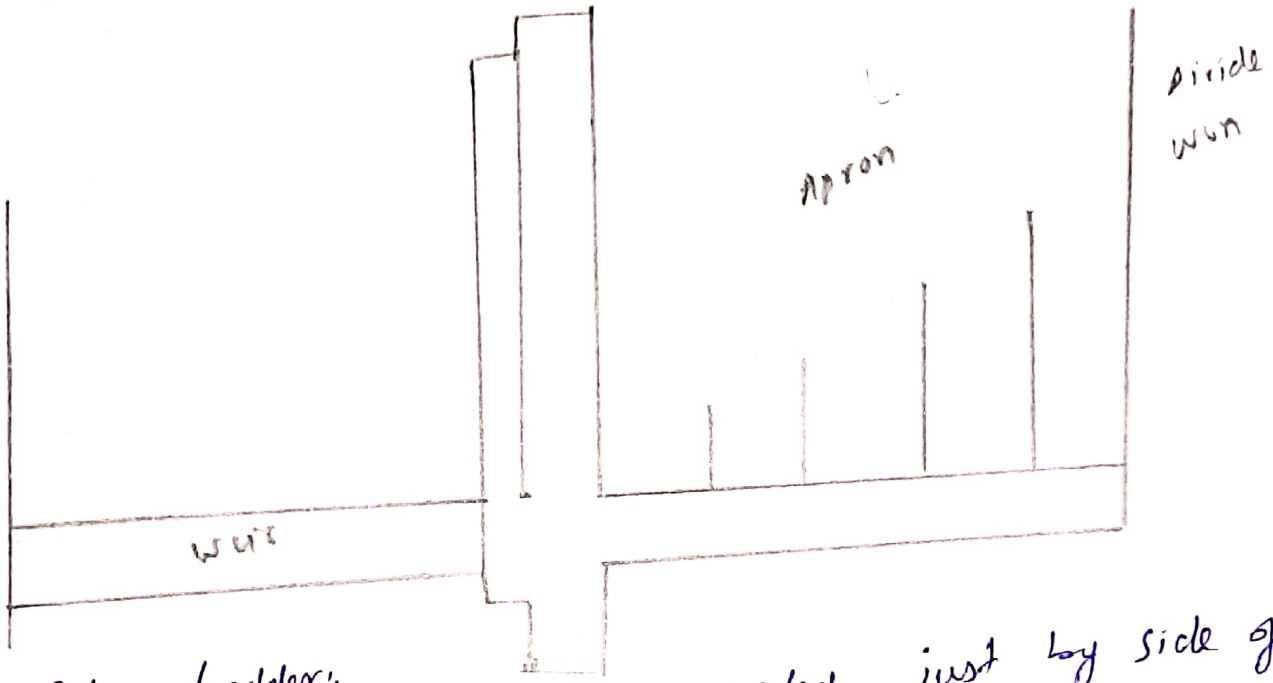
It is also known as Scouring Sluices. The under sluices are the openly provided at the base of the weir or barrage. These openings are provided with adjustable gates.

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



3 Divide wall:-

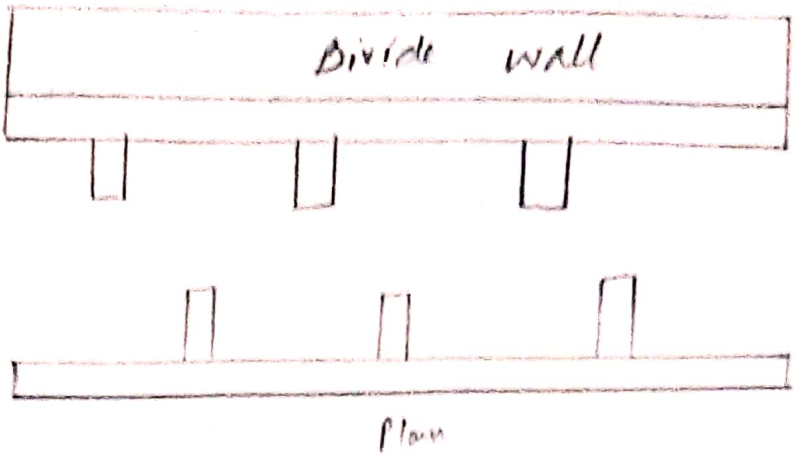
The divide wall is a along wall constructed at right angles in the weir or barrage it may be constructed with stone masonary or cement concrete. on the upstream side the wall is extended just to cover the canal head regulator and on the down stream side. it is extended up to the flooring apron.



4 Fish Ladder:-

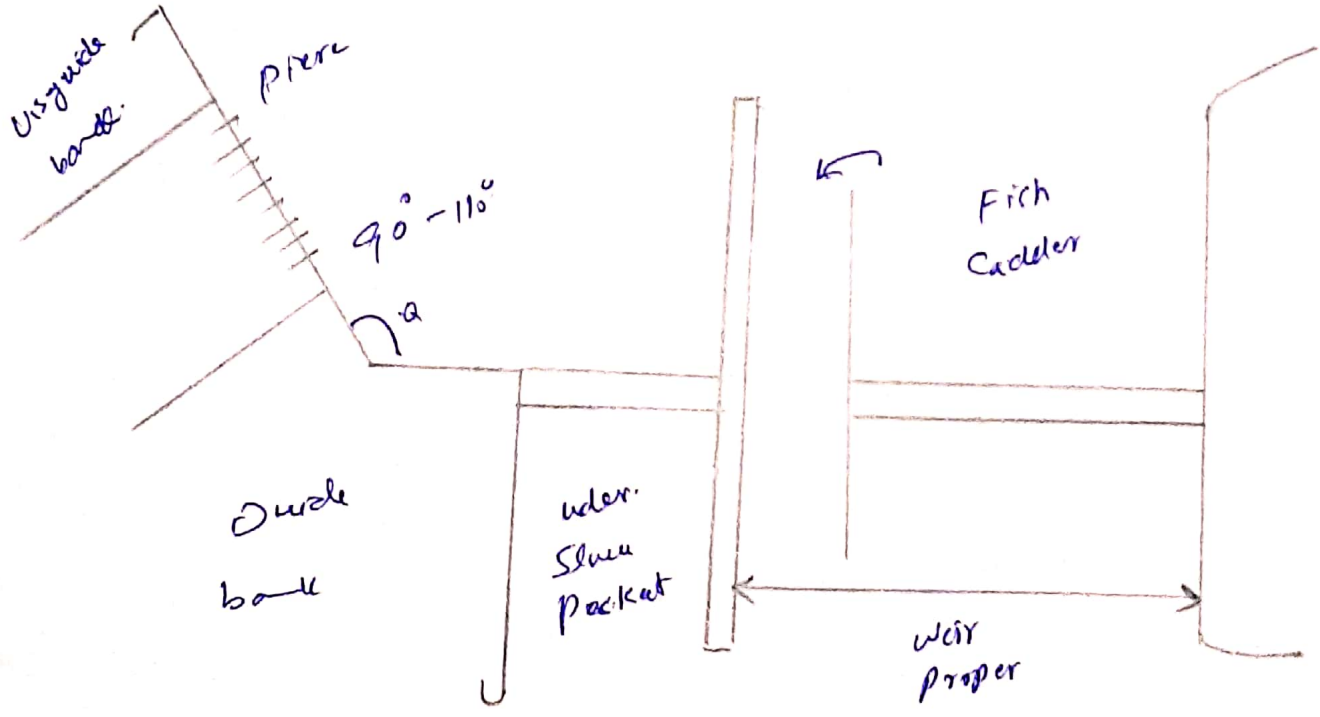
It is provided just by side of the divide wall for the free movement of fishes Rivers are important source of Fishes the tendency of Fish to move from upstream to down stream in winters and from down stream to upstream in moon soons.

It the fish ladder, the fable walk are constructed in a zig zag manner, so that the velocity of flow with in the ladder does not exceed 3m/sec.



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 tiers on which the adjustable gates are placed.

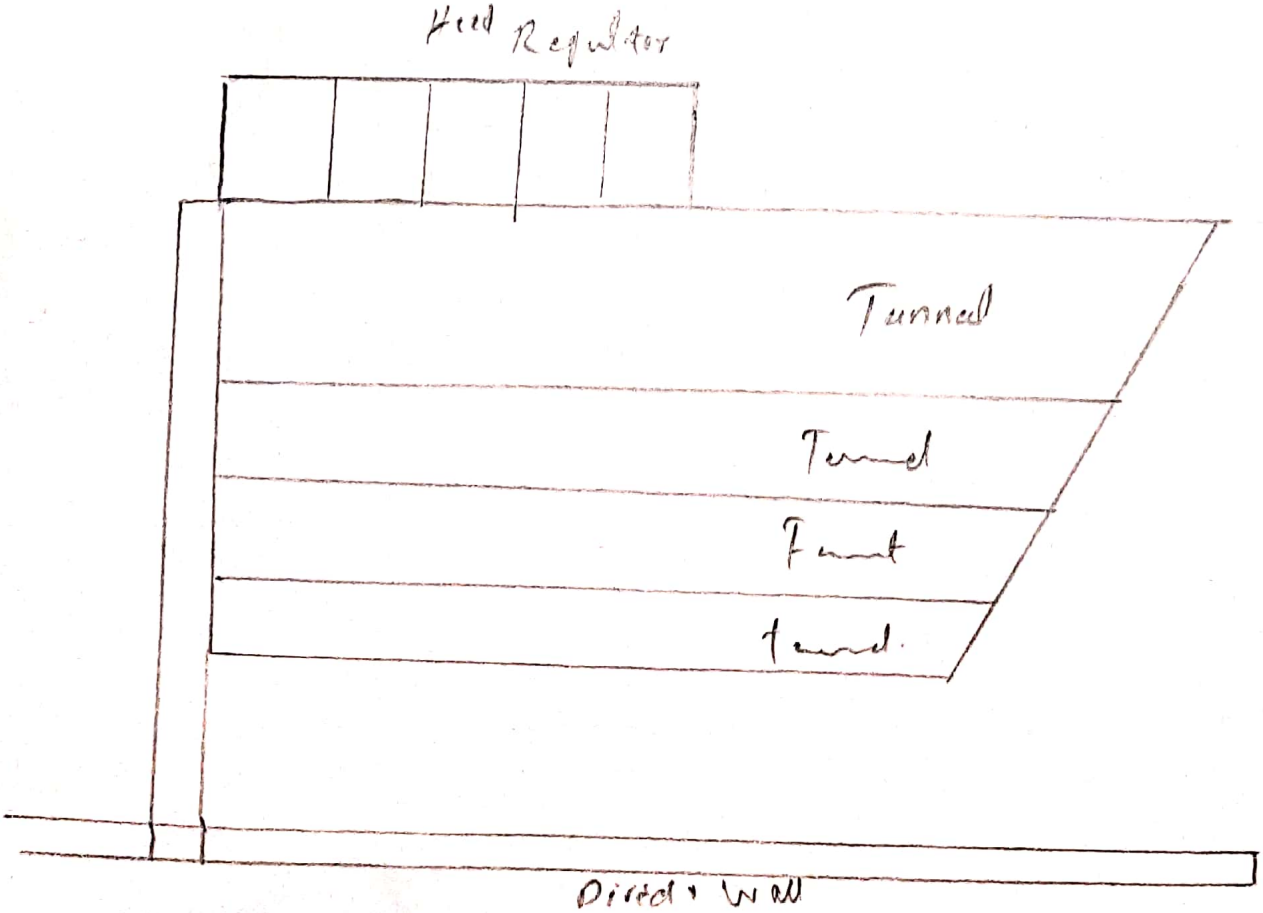


(6) a) Silt Regulation works:

The entry of silt into a canal, which takes off from a head works. can be reduced by constructed certain special work, called silt control works. These work may be classified in to following two types (a) silt excluded (b) silt Ejectors.

b) Silt Ejectors:

Those silt ejectors are also called silt extractors are devices which extract the silt from the canal water after the silted water has travelled a certain distance in the canal and the little distance downstream from the head regulator.



Q4 Part B 15

Ans

⇒ The major function is to regulator the supply of water entering the canal.

⇒ It controls the entry of silt in the cannal.

⇒ It prevents the river floods from enting the cannal

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