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Subject :> Irrigation Engineering

Section :> "B"

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Q NO. 1

PART-A

⇒ Explain anti water-logging measures?

Ans ⇒ Following are the anti water-logging measures.

(1) ⇒ Lining of canal and water courses:-

→ Lining of canal make the water align through the proper channel reducing major losses to greater extent

→ It also reduces seepage of water.

(2) ⇒ Introduction of 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 recieve canal water in a particular season.

→ The remaining areas of land can recieve water in next season by crop rotation.

(4) ⇒ Optimum Use of Water :-

→ Paper amount of water gives good result 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 than area of land.

(5) ⇒ Improving natural Drainage of Area :-

→ Water should not be allowed to stay at one area.

→ Natural flow is providing by bush and Jungle cutting.

(6) ⇒ Adaption of Sprinkler method of irrigation :-

→ There should ~~not~~ be no percalation loses from water courses.

→ Only determined amount of water is supplied to land.

(7) ⇒ Pumping of tubeWELLS :-

→ Lift irrigation should be introduced to used ground water.

→ Canal irrigation may be substituted by tube well irrigation.

Q NO. 1

PART-B

⇒ Differentiate between saline and alkaline Soil-

SALINE	ALKALINE
→ 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.	→ It is white in apparance as white patches appears over earth surface.
→ Saline soil apparance is as a black crusty core over the surface of earth.	→ It is the salt efforesence continues for a conger period, a base exchange reaction with clay takes place thus Sodiumizing the clay, making it impermeable Illerated & highly unproductive such soil are called Alkaline soil.

Q NO. 1

PART-C

⇒ HOW DO YOU reclaim Salt affected lands?

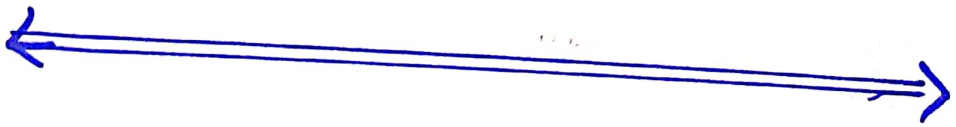
Ans/ Following are the major aspects to reclaim Salt affected lands

→ The practice of crops reversal is necessary to reduce the establishment of Salt or efforesene

→ An efficient drainage (surface and Sub-Surface) must be provided to lower water table in Saline Soil.

→ High Salt resistant crops like rice are grown on reached land for 1 or 2 Seasons.

→ Land Should be flooded with the water So that alkaline Salts will be dissolved in water.



Q No. 2

PART-A

⇒ Explain the procedure of designing of irrigation canal by Kennedy's theory.

Ans/ Following are the steps required for the procedure of designing irrigation canal using Kennedy's theory.

⇒ Step#1 :-

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

$Y_0 = 0.546m$, $D = 0.64$.

⇒ Step#02 :-

As equation (1) is $Q = AV$

thus $A = Q/V$

$A = BD = D^2/2$

$P = B + 2.5\,D$

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

⇒ step#03 :-

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

Step #04:-

Q) the velocity worked out from Kutter's and Chagy'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. 2

PART-B

⇒ Design irrigation channel by kennedy's theory to carry, discharge of 30 cumecs with C.V.R (m) of 1 and N as 0.0225 and bed slope of 1 in 5000. Assume the depth (D) as 2.3m.

Sol:-

GIVEN DATAS:

$D = 2.3m$

$Q = 30 cumec$

$C.V.R = M = 1$

$N = 0.0225$

$S = 1/5000 = 0.0002$

As we know that:

$$Q = AV$$

$$A = Q/V = 30/V \quad \text{— (1)}$$

⇒ Thus using formula to calculate "V"

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

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

$$V_0 = 0.935 \ m/s$$

put the value in eq (1).

$$A = \frac{30}{0.935} = 32.01 \ m^2$$

Now,

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

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

$$B = 12.77\,m$$

⇒ Put the value in below eq:-

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

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

$$P = 17.9\,m$$

Now,

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

Substituting the value of "R" in kutter's and Chazy's equation

$$V = C(RS)^{1/2} \quad \text{—(a)}$$

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

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

putting value in eq a

$$V = 49.826\,(1.76 \times 0.0002)^{1/2}$$

$$V = 0.93\ m/s$$

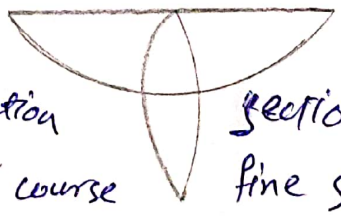
⇒ This is equal to V_0 thus no more trails required.

Q.NO.3

PART-A:-

⇒ Differential B/w initial regime and final regime and accordance to Lacey's theory.

INITIAL Regime	FINAL REGIME.
→ When only bed slope of channel changes but the cross section remains same then their will be no silting and scouring	→ If all the parameters depth and slope have equally free to vary and adjust according to discharging and silt grades then the channel is said to have final regime the cross.
→ cross section or wetted parameters remains un effected.	→ In the final regime the cross section ossumes semi ellipes shape
→ It is a quick process and occurs in short time of span.	



Section for course silt.

Section for fine silt

Q No. 3

PART-B

⇒ Design a regime channel by Lacey's Theory for discharge of 30 cumecs and mean daimeter of silt particles of 0.5mm.

Solution:

Given DATA:-

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

By formula:

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

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

$f = 1.3$

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

$V_m = 0.844$ m/s

$\rightarrow Q = AV$; $A = Q/V = 30/0.844$

$A = 35.54\ m^2$

→ $P = 4.75\sqrt{Q} = 4.75\sqrt{30}$

$P = 26.01$

→ $R = 5/2 \times V^2/f = 5/2 \times \frac{0.844^2}{1.3} \Rightarrow R = 1.36$ mm.

⇒ As we know;

* $A = \frac{BD + D^2}{2}$; $35.5 = \frac{BD + D^2}{2}$ — (1)
* $P = B + D\sqrt{5}$; $26.01 = B + 2.236D$ — (2)

Thus $B = 26.01 - 2.236D$ — (3)

Put eq (3) in eq (1)

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

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

$35.54 = 26.01D - 1.736D^2$

$1.736D^2 - 26.01D + 35.54 = 0$ (using quadrant formula)

$\Rightarrow \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \Rightarrow \frac{-(26.01) \sqrt{(26.01)^2 - 4(1.73)(35.54)}}{2(1.73)}$

$D = 1.52$

put in eq (3), we get

$B = 22.611$m.

→ Now; $S = \frac{fQ^{1/3}}{3340Q^{1/6}} = \frac{(1.3)^{5/3}}{(3340)(30)^{1/6}} \Rightarrow S = 0.00027$

Q4.

PART :- A

⇒ Explain the components of head works with neat diagram.

Ans:- Following are the components of head works.

→ Weir or Barrage
→ Undersluices
→ Divid wall
→ Fish ladder
→ Canal head regulator.
→ Silte excludes / Silte prevention devices.
→ River training work.

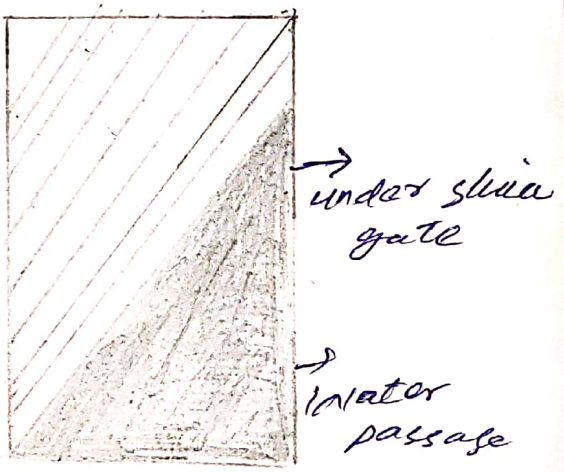
⇒ Weir And Barrage :-

Normally the water level of any Perinial river is such that it cannot be divorted to the irrigational canal. The bed level of the canal may be higher then the existing water level of the river. When the water level on the top stream side of the weir is required to different level different time, barrage is constructed. Barrage is the arrangement of adjustable gates or shutters at different tise over the weir.

→ Under Sluices:-

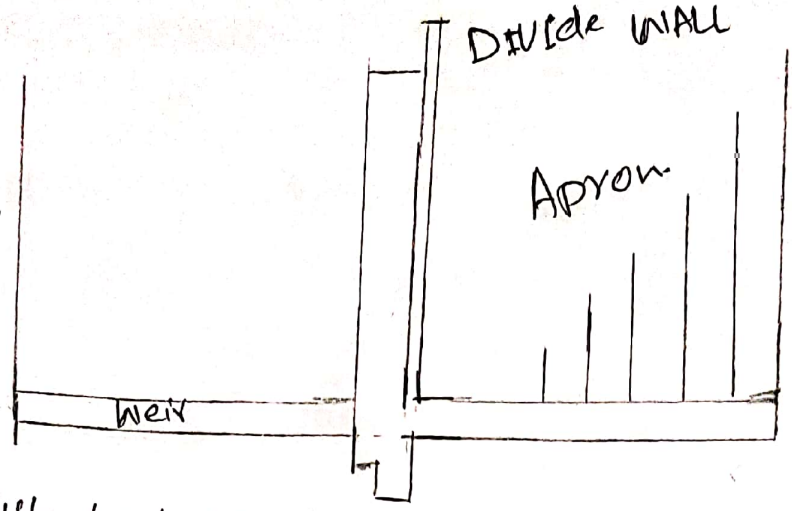
→ It is also known as Souring Sluices. the under sluice are the openings provided at the base of the weir or barrage - these openings are provided with adjustable gates.

→ When the silt deposition becomes appreciable the gates are opened and the deposited silt is loosened with an agitator mounting on a boat. The muddy water flows towards the down stream through the scouring sluices.



⇒ DIVIDE WALL:-

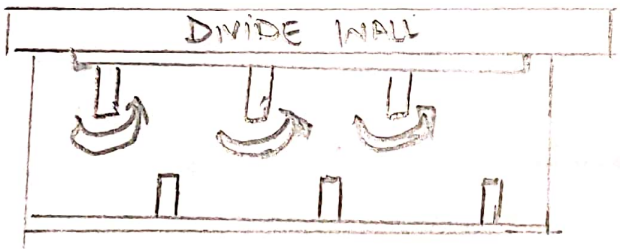
The Divid wall is a long wall constructed at right angle at weir or barrage, it may be constructed with Stone masonary or cement concrete. On the upstream side, the wall is extend just to cover the canal head regulator and on the down stream side. it is extended upto the launching apron.



⇒ Fish Ladder :-

It is provided just by side of the divide wall for the free moment of fishes. Rivers are important source of fishes the tendency of fish is to move from upstream to down stream in winters and from down stream to upstream in mooscons.

→ In the fish ladder, the fable walls are constructed in a zig zag manner. So that the velocity of flow with in the ladder does not exceed 3 m/sec.



Fish Ladder.

Q NO.4

PART=B

⇒ What are the functions of Head regulators

Ans/ The major function is to regulate the supply of water entring the canal. It control the entry of silts in the canal.

→ It prevents the river floods from entring the canal.

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

THE END