NAME = Subhan Ullah Khan

ID# = 7861

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QNO-1 :-

(a) Explain anti water Logging measures-

Ans:- i)⇒ Lining of Canals and water Course:-

it reduce Seepage of water-

ii)⇒ Reducing Intensity of irrigation:-

Only Small portion of land Should relive Canal water is one particular Season-

iii) ⇒ By Introducing Crop rotation:-

High water requaring Crop Should be followed by one requaring Less water and then by requiring almost no water-

Example:- Rice followed by wheat and then by Cotton-

iv) ⇒ Improving natural drainage of area:-

water Should not be allowed to

To Stay in One area-

→ Nutral Flow is provided by bush and Jungle Cutting-

v) ⇒ Economical use of water according To need-

vi) ⇒ Economical use of water according to need-

vii) Adoption of Sprinkler method of irrigation-

→ Only predetermined amount of water is Supplied to land-

→ No percolation Losses from water Courses-

QNO1- b) Different b/w Saline and alkaline Soil:-

⇒ SALINE:- ① Saline Soils are Soil that have been harmed by Soluble Salts Consisting mainly of Sodium, Calcium, magnesium, chloride and Sulfate, biocarbonate.

2) They have Less pH.

3) It is basic in nature.

4) It pH is 7- 8.5

5) Dominating Compound is Sodium Salts.

⇒ ALKALINE SOIL:- ① Alkaline soil are clay soil.

② They have high pH.

③ they are more basic.

4) pH grater than 8.5

5) Dominating Compound in Sodium Compound in Sodium Carbonate.

QNO2:- c) How do you reclaim salt effected Lands?

ANS:- Alkali salts (Sodium Chloride, Sodium Sulphate and Sodium Carbonate) are injurious to agricuture.

NaCl — Least harmful.

Na_2SO_4 — Medium harmful.

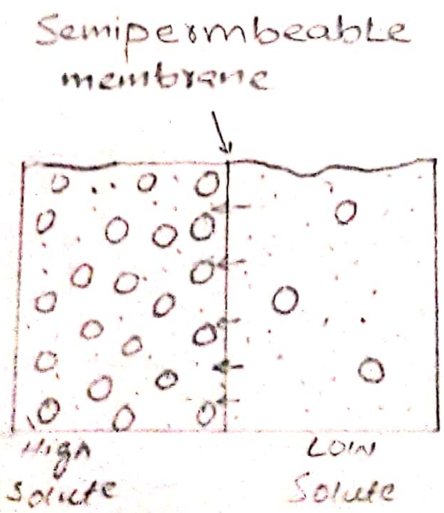
Na_2CO_3 — Most harmful.

→ The above Salts are soluble in water.

→ When W.T rises up or roots are in Capillary Zone, the G.W moves upwards and Salts are deposited in in root zone and surface of soil.

The phenomena of salts coming up in solution and forming a thin crust 15-7.5cm) on the surface after evaporation of water is called Efforesence.

Land affected be efforescence is called Saline soil. Salts surrounding the roots reduce the osmotic activity of plants.



QNO2→ a) Explain the procedure of designing of an irrigation Canal by kennedy's theory.

ANS:- KENEDYS THEORY:

→ R.G kennedy Studied Straight reaches of upper Bari Daab Canal which are Stable for 30 years.

→ $V_o = CD^n$

where V_o is Critical velocity (Non-Silting or Non-Scouring)

C is Constant depends upon Quantity of Silt.

Sediment is kept in Suspension Solely by the vertical Component of eddies.

• weight of Sediment vertically acts downwards.

→ weight of Sediments vertically acts downwards

→ vertical Component of eddies acts upwards.

→ Result :- The Sediment is in Suspension

- $V_0 = 0.84 D^{0.64}$ FPS System.
- $V_0 = 0.546 D^{0.64}$ MKS System, D is depth.
- $V_0 = 0.546 D^{0.64}$ Where $m = V/V_0$ = Critical velocity ratio (C.V.R) depend upon Silt grade.
- V = Critical velocity for all sizes of Sediment, V_0 is vcr for upper Bari Doab Canal Only.

Kennedy procedure for Canal design.

Step 1:-

Assume the trial value of D and

and put in eq 1 and determine

$$V^{\circ} = 0.540 m D^{0.64}$$

Step#02:- in equation 1 $Q = AV$

$A = Q/V$

for assumed D determine B find $R = A/P$

$A = BD + D^2/2$

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

Step # 03:- Substitute the value of R in equ.2 (Kutter and Chazys Eq,n) To Obtain V Which will be actual velocity for assumed dimension.

Step #04:- If the velocity worked out from Eqn-2 agress with that of obtained with the Eqn. 3 (Kennedeys Eqn) then the assumed depeat is Correct Other wise repeat the procedure with changed value of D

QNO 2-(b):- Given data:-

Discharge $(Q) = 30\ m^3/sec$

C.V.R (m) = 1 $\quad N = 0.0225$

Bed Slope = 1 in 5000

Depth (D) = 2.3m.

Solutions:- finding velocity.

By formula $V_K = 0.546\, m D^{0.64}$

$= 0.546(1)(2.3)^{0.64}$ $\Rightarrow V_K = 0.930m$

→ Now Calculating Area of Canal.

By formula.

$Q = AV \Rightarrow A = Q/V = \frac{30}{0.930}$

$A = 32.25\ m^2$

→ Now we have to Calculate B by using formula $A = BD + \frac{D^2}{2} \rightarrow BD + 0.5D^2$

→ By putting values

$A = BD + 0.5D^2$

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

$B = \frac{29.605}{2.3}$ $\Rightarrow$ $12.87m = B$

→ Now we have to Calculate wetted perimeter so By formula.

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

$$= 12.87 + \sqrt{5}(2.3) \Rightarrow \boxed{P = 18.01 m}$$

→ Now we have to Calculate ~~ts~~ Hydraulic Radius

$$R = \frac{A}{P} = 32.25/18.01$$

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

→ Now Calculating mean velocity from Chezy equation

$$V_C = C(RS)^{\frac{1}{2}}$$

Where

$$C = \frac{\frac{1}{2} + \left(23 + \frac{0.00155}{S}\right)}{1 + \left(23 + \frac{0.00155}{S}\right)\frac{n}{\sqrt{R}}}$$

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

$$C = \frac{75.19}{1.517} = 49.56 \Rightarrow V_C = 49.56\left(1.79\left(\frac{1}{5000}\right)\right)^{\frac{1}{2}}$$

$$\boxed{V_C = 0.93 m}$$

QNO3 → (a) :- Differentiate between intial regine and final regine in accordance to Laceys theory.

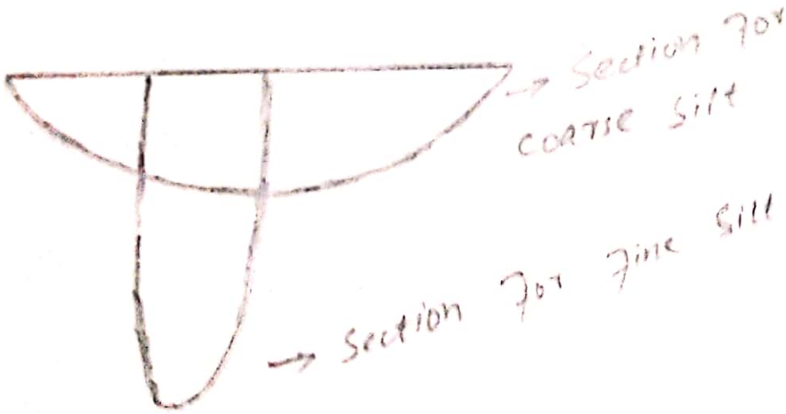
ANS:- LACEY'S Theory:-

- According to kennedy. a channel is regime (NO Silting NO Scouring) but according to lacey even through Channel with no Silting or Scouring may actually be not in region.

- He differentiated b/w intial regime and final regime but this theory is applicable to final regime.

⇒ INITIAL REGIME :- When only bed slope of channel but the cross section remains same then also no silting or scouring take place. But this is rare.

⇒ **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.



Q3-(b):- Given Data:-

$Q = 30 m^3/sec$ $M = 0.56$

Solution:- $f = 1.76 M^{0.5} \Rightarrow 1.76 \times (0.56)^{0.5}$

$F = 1.3$

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

$V_m = 0.844$

$$Q = AV \Rightarrow A = \frac{Q}{V} = \frac{30}{0.844}$$

$A = 35.55$

$P = 4.75\sqrt{Q} \Rightarrow P = 26.00$

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

$R = 1.36$

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

$$35.5 = BD + \frac{D^2}{2} \longrightarrow (i)$$

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

$26.01 = B + 2.236D \longrightarrow (ii)$

put (i) and (ii)

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

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

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

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

By Quadratic EQ

$$D = \frac{-(26.01) \pm \sqrt{(26.01)^2 - 4(-1.736)(-35.54)}}{2(-1.736)}$$

$$\boxed{D = 1.52}$$ put in eq (2)

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

$$B = 22.611$$

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

$$\boxed{\delta = 0.00026}$$

QNo-19: Explain the Components of headworks With neat diagram:-

ANS:- Components of a diversion headworks:-

→ weir or barrage.

→ Undersluices.

→ Divide wall.

→ Fish Ladder.

→ Canal head regulator.

→ River Training workes (Marginal bunds and guid bankes)

→ Silt excluders/silt prerection derices

⇒ weir:- Normally the water level of any perennial river is such that it cannot be directed to the irrigation canal the bed level of the canal may be higher then 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.

⇒ **Barrage:-** When water level on the up Stream Side of the weir is required to be raised TO different levels at different time barrage is Constructed Barrage is an arrangement of adjustable Sates or Shatters at different tires over the weir-

⇒ **Under Sluices:-**

Also Known as Scouring Sluices the under Sluices are the openings provided at the base of the weir or barage these openings are provided with adjustable gates Normally the gates are kept closed the Suspended the gates are kept closed the Suspended Silt goes on depositing in front of the Canal head regulator-

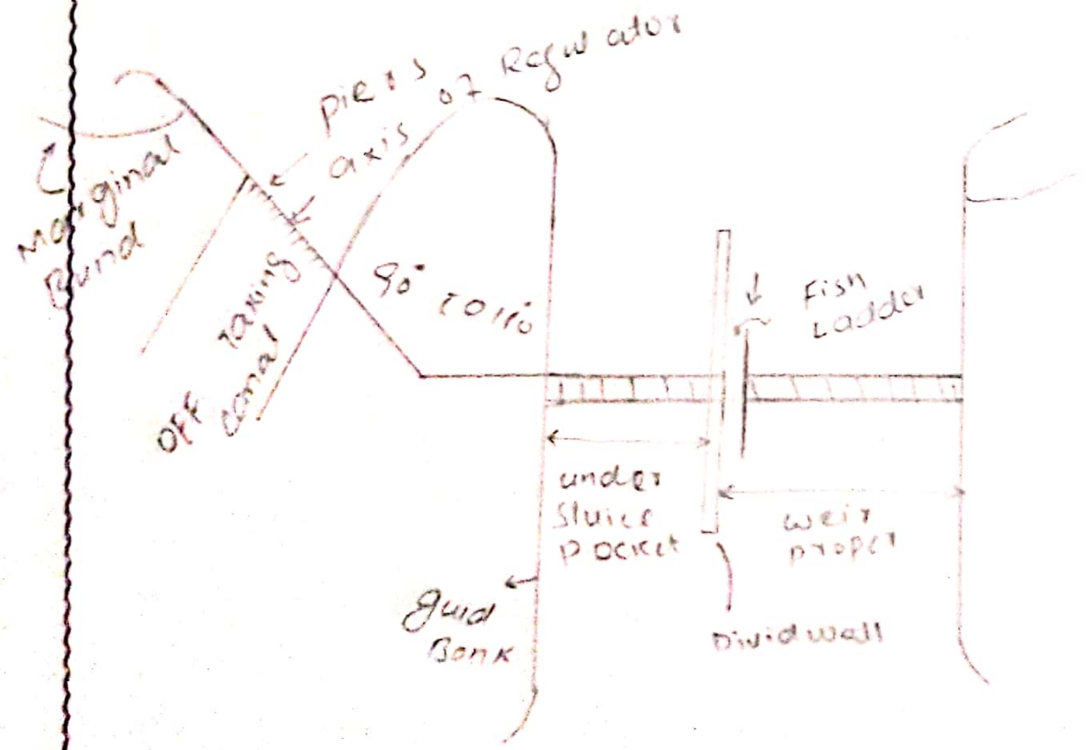
⇒ **Divide wall:-** The divide wall is a long wall Constructed at right angles in the weir or barrage it may be Constructed with Stone massniry or Cement Concrete on the upstream.

⇒ **Fish ladder :-** The Fish ladder is provided Just by the Side of the divide wall for the free movement of fishes. River are important Source of fishes.

⇒ **Canal head Regulator:-**

A Structure which is Constructed at the head of the cannal to regulate flow of water is known as Canal head regulate it consists of a member of piers which divide the total width of the Canal.

⇒ Functions of Canal Head Regulator:- It regulates the Supply of water entering the Canal it Controls the entry of Silt in the Canal it Prevents the river Floods From entering the Canal.



QNO4 (b) What are the functions of Head regulators?

ANS:- Head regulator is constructed at the off taking are called head regulators.

→ when it is constructed at load of main canal it is known as cannal head regulator

Function:-

To control the entry of water either from the reservoir or from the main canal

→ To control the entry of silt into off taking or main canal.

→ To serve as a meter for measuring discharge of water.