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Q1 (a) **Explain anti- water-logging measures?**

Some of the measures use to control water logging are

Control of Cannal Seepage:-

Cannal seepage is major source of water losses, and waterlogging in irrigated areas and it can be control by:-

* Lining of cannal with impervious material like clay, concrette to control seepage
* Convert water system from cannal to piped system

Reducing intensity of irrigation:-

The most important aspect to avoid watter logging is to provide the water to the small portion of land where necessary.

* Applying only the requist amount of water so that all the water applied is used by plants
* Use efficient irrigation method i-e drip irrigation

Rotation of Crop:-

It's mean that we should plant such crops in such way that it prevent the land from water logging.

* Crops which used large amount of water should be followed by those plants which used less water or no water.

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

Optimum Use of Water:-
Awarness should be provided to the farmers about the particular crops. So that they can understand how much water should be provided to the crop. So that they should not use more water and use certain amound of water.

Improving natural drainage of area:-
The water should not be allowed to stay in crops for long time therefore proper drainage system should be provided.

Q5) Differentiate Saline and alkaline soils?

Saline Soil:-
The soil with excess salt is called saline soil.

Alkaline Soil:-
Alkaline soil are clay soil which have PH greater than 7.3 ~~8.5~~ having poor soil structure.

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Alkaline Soil	Saline Soil
Those soil which have PH >8.5* They have poor soil structure and infiltration capacity* They have hard layer at 0.5 to 1m depth* Alkaline soil have Sodium carbonate which cause the soil to swell. and difficult to settle* Agriculture is difficult on such type of soil only grass and rice can be grown* They are black in colour	Those soil which have PH less than 7* Saline soil contain large amount of water solube salt* It effect seed germination and plant growth* These salts contain Potassium, carbonate sulfate etc* Organic matter content is higher in saline soil* Saline soil are white, grey in colour* Sugar beet, safflower, Barley grown in this soil

Q) How do you reclaim Salt affect..?

Salt effected areas can be reclaimed by the following methods:-

* **Leaching:-** The process of removing salt from the effected area by flooded the land with water. The water will dissolved the salt and then this soluble water is drain out from the land which took salt with it self. High salt resistance crops can be grown on leached land i-e rice, cotton etc. for two seasons

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Good Surface and Internal Drainage:-

The use of tile drains and open ditches in the field can increase drainage and remove some of the salt

* Land Grading:-

It is continous land slope towards field drains. It is necessary for surface irrigation and help removing salt

Applying Magnetized water:-

Magnetized water break down the salt crystal twice as fast as unmagnetized water allowing the salt to be extract from soil.

Q2 Explain the procedure....,

(a) Kennedy theory says that; the silt carried by flowing water in a channel is kept in suspension by the eddy current rising to the surface.

(Procedure)

* Kennedy's critical velocity:- (Step 1)

The main velocity which will just make the channel free from silting and is given as

$$V_0 = CD^n \rightarrow eq\ (i)$$

where V_0 = Critical velocity, D = full supply depth, C & n = constant (0.546 and 0.64)

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Putting the values of C and n we get

$V_o = 0.546 D^{0.64}$ → eq (2)

Channel Parameter:- Step (2)

In eq (1) $Q = AV$ or $A = Q/V$

$A = BD + D^2/2$

Let $B/D = y \Rightarrow B = yD$

$A = yD \therefore A \leftrightarrow B$

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

* Calculate area from $A = BD + D^2/2$
* Calculate perimater from $P = B + D5^{1/2}$
* Calculate mean depth from $R = A/p$
* Assume the value of D.

Step 3:-

Determine mean velocity from chazys or kutters eq. which will be actual velocity.

Step 4:-

If $V_c = V_k$ then ok

otherwise repeate the above procedure with another value of D untill $V_c = V_k$

* Increase D if $V_k < V_c$
* Decrease D if $V_k > V_c$

Q2 (B) **Given Data:-**

Discharge $Q = 30 m^3/sec$

$Cvr\ (m) = 1$

$N = 0.0225$

Bed Slope = 1 in 5000

Depth $(D) = 2.3m$.

Formula & Solution:-

Finding velocity:-

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

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

$V_K = 0.930m$.

Area of canal:-

$Q = AV \Rightarrow A = Q/V$

$A = 30/0.930 \Rightarrow 32.25m^2$

Calculate B:-

$A = BD + D^2/2$

Putting values

~~A= BD B(~~ $32.25 = B(2.3) + 0.5(2.3)^2$

$32.25 - 2.645 = 2.3(B)$

$B = 12.87 m$

Wetted Perimeter:-

So By formula:-

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

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

$P = 18.01m$

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Hydraulic Radius :-

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

$R = 1.79m$

Mean velocity from chazzy equation

$V_c = C(RS)^{1/2}$

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

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

$C = \dfrac{75.19}{1.517} = 49.56$

$V_c = 49.56 (1.79 (\frac{1}{5000}))^{1/2}$

$V_c = 0.93m.$

$V_c = 0.93m$

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Q3 (a)

Lacey's Theory:-

Silt is kept in suspension by the vertical component of eddies generated at all points of forces normal to the wetted perimeter.

Regime channel:- A channel is said to be in regime if there is no silting or scouring

Initial Regime:-

When only the bed slope of a channel varries due to dropping of silt and it's cross section or wetted perimeter remains uneffected, even then the channel can exibit "no silting no scouring" properties called Initial regime

Final Regime:-

If there is no resistance from the sides and all the variables such as perimeter depth, slope etc are equally free to vary and get adjusted according to discharge and silt grade then the channel is said to have achieved permanent stability. called Final Regime.

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(b) Given :-
$Q = 30 m^3/Sec$
$m = 0.56 mm$

Solution:-
Silt factor $= f = 1.76 \times M^{0.5}$
$f = 1.76 \times (0.56)^{0.5}$
$f = 1.3$
$V_m = 0.844$ (velocity)
$Q = AV \Rightarrow A = Q/V$ putting values
$A = 30/0.844$
$A = 35.54$ (AREA)
$P = 4.75\sqrt{Q}$
$P = 4.75\sqrt{30}$
$P = 26.01$ (wetted Perimeter)
$R = 5/2 \times V^2/f$
$R = 5/2 \times \frac{(0.844)^2}{1.3}$
$R = 1.36$ (mean depth)
$A = BD + D^2/2$
$35.54 = BD + D^2/2$
$P = B + D\sqrt{5} \rightarrow eq(i)$
$26.01 = B + 2.236 D$
$B = 26.01 - 2.236 D \rightarrow eq(ii)$
Put eq (2) in eq (i)

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

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

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

$35.54 = 26.01D - 1.736D^2$

$\underbrace{-1.736D^2}_{a} + \underbrace{26.01D}_{b} - \underbrace{5.54}_{c} = 0$

$a = -1.736$

$b = 26.01$

$c = -35.54$

By quadratic eq

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

$D = 1.52$

Put in eq (2)

$B = 26.01 - 2.236(1.52)$

$B = 22.611$

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

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

$S = 0.00026.$

or $S = 0.26 \times 10^{-3}$

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Q4(a) **Parts of headworks:-**

following component of hydraulic structure i-e headwork are given below:-

Weir or Barrage:-

Weir is a structure constructed across river to raise the water level and divert the water into the cannal. Weir aligned to right angle to the direction flow.

Divide wall:-

Long wall constructed at right angles to the weir or barrage with stone masonary or cement concrette.

On the upstream side, the wall is extended just to cover the cannal head regulator and on the down stream side it is extended upto the launching apron.

Fish ladder:-

It is provided just by the side of divide wall for the free movement of fishes.

Canal head regulator:-

A structure which is constructed at the head of canal to regulate flow of water is known as canal head regulator.

It consist of no of piers which divide

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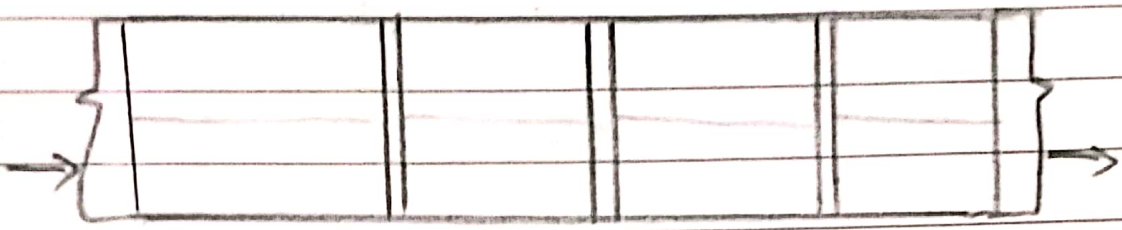
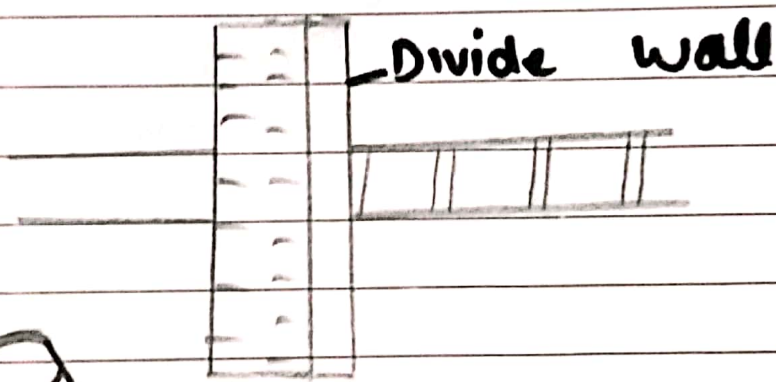
total
width of channel.

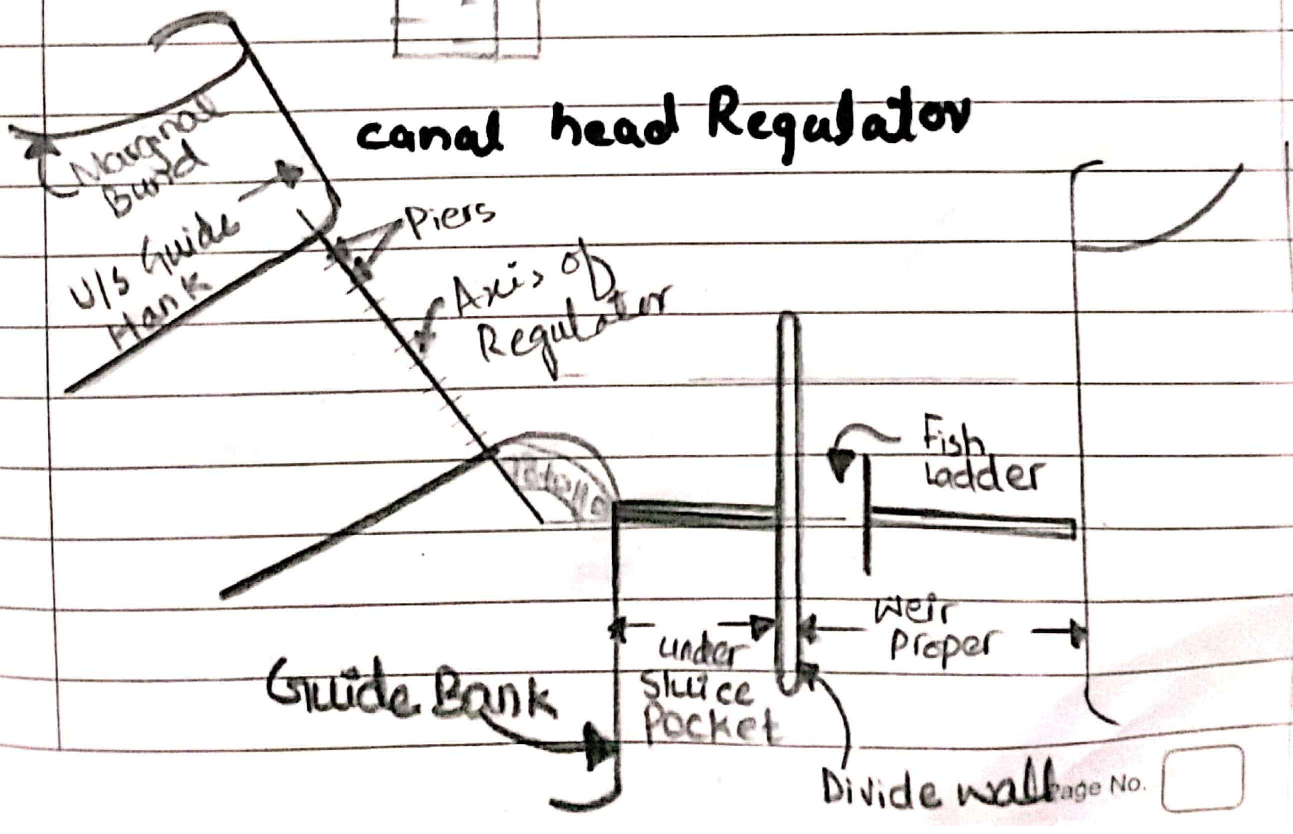
FUNCTION:- Controls entry of silt in the cannal
Regulates supply of water entering the cannal.



Fish laddar



canal head Regulator



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Head work regulators function:-

=> To regulate flow of water.
=> Divide the total width of canal into number of spans known as bays.
=> Gates are present at piers of head regulator.
=> These gates are used to prevent the river floods from entering the canal.
=> It main function is to regulate the supply of water entering the cannal.
=> It controls the entry of silt into the canal
=> To indicate the discharge passed into the cannal from design discharge formula and observed head of water on the crest.

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