Name: M. Mustafa

ID # 7866

Sec # B

Semester # 6th

PAPER Irrigation Engineering

Submitted To Engr Dr Durani

DATED: 23/6/2020

ANSWERS :-

Q.N.O # 1

PART (A) :- Following are the anti-water logging measures.

(i) LINING OF CANALS & WATER COURSE:-

⊙ Lining of canals makes the water align through the proper channel reducing the major losses to greater extent

⊙ It also reduces seepage of water.

(ii) Reducing intensity of Irrigation:

⊙ Small portion of land should receive Canal water in one particular Season

⊛ The remaining areas of land can receive water in next seasons by crop rotation.

(iii) 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.

(iv) OPTIMUM USE OF WATER:-

* Revenue should be charged on the basis of quantity of water rather than area of land.
* Proper 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.

(v) Improving Natural Drainage of Area:

* Water should not be allowed to stay in one area.
* Natural flow is provided by bush and jungle culling.

(vi) ADAPTION of sprinkler Method of irrigation:

There should be no percolation losses from water courses.

(vii) Pumping of Tubewells:

* Canal irrigation may be substituted by Tubewell irrigation.
* Lift irrigation should be introduced To use ground water.

QN.O# 1 Part :b:

Differentiate between saline and alkaline soils

	Saline Soil	Alkaline Soil:
1:	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. * Salin soil apearance is as a black crusty core over	If the salt efforescence continue for a longer period, a base exchange reaction with clay takes place Thus sodiumizing the clay making it impermeable, illaerated and highly unproductive such soil are called alkalin soils.

Cover over the surface of earth	⊛ It is white in appearance as white patches appear over earth's surface.

Q NO(1) part(c) Following are the major aspects To ~~re~~reclaim reclaim salt effected land:

⊛ Maintain the water Table sufficiently below the roots.

⊛ An efficient drainage (surface and subsurface) must be provided To lower the water Table in Saline soils.

⊛ The practice of crop reversal is necessary To reduce the establishment of salt or efforescene.

⊛ Land should be flooded with water so that alkaline salts will be dissolved in water.

(*) High salt resistant crops like rice are grown on leached land for 1 or 2 seasons.

Q.NO # 02: Part (1) (A)

ANS: Following are the steps required for designing of an irrigation Canal using Kennedy's theory:-

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

$$V_o = 0.54\, m\, D^{0.64}$$

Step 02: An Equation (1) is $Q = AV$

Thus $A = Q/V$

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

$$P = B + D^{5^{1/2}}$$

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; If the velocity worked out from cuter's and chazy'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

QN.O # 02 Part (B)

Solution: $D = 2.3$ $Q = 30$ cumec C.V.R = m=1

$N = 0.0225$ $\delta = 1/5000 = 0.0002$

As we know that.

$$Q = AV$$

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

Thus using formula to compute "V".

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

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

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

Put the value in Equation (1)

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

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

$$32.01 = B(2.3)^2 + \frac{2.3^2}{2} \Rightarrow \boxed{B = 12.77m}$$

Put the value in Below Equation.

$$P = B + D\sqrt{5} \Rightarrow P = 12.77 + 2.3\sqrt{5} \Rightarrow \boxed{P = 17.9\ m}$$

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

Substituting the value of R in Kutter's and chazy's equation.

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

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

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

$$= 49.526$$

Put the values in equation (a)

$$V = 49.526 (1.76 \times 0.0002)^{1/2}$$

$$\boxed{V = 0.93 \text{ m/s}}$$

This is equal To V_o Thus no more trials Required.

Q NO # 03: Part (A)

Difference:-

Following are the Difference b/w initial regime and final Regime.

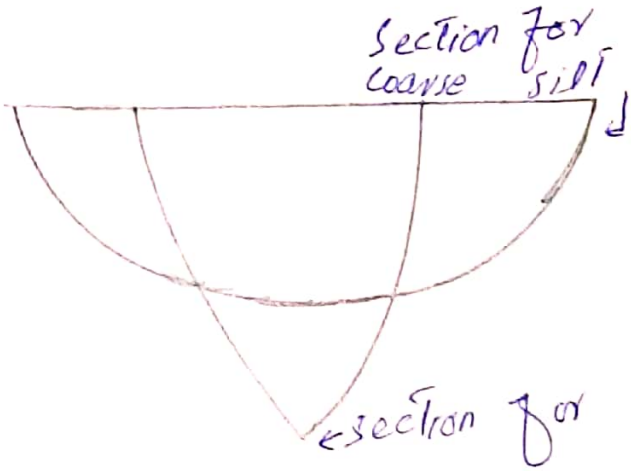
Initial Regime	Final Regime
✱ When only bed slope of channel changes but the cross-section remain same then there will be no silting and scouring	✱ If all the parameters (parameters, depth and slope,) have equally free To vary and adjust according To discharge and silt grades then the
✱ Cross-section or wetted perimeter	

remain unaffected.

* It is a quick process and occurs with in short spane of time.

then the channel is said To have final regime

* In final regime the cross-section assumes semi-ellipse shape.



QNO# 3 part B.

GIVEN DATA:

$Q = 30$ comec, $d = 0.56$ mm (m)

By formula Silt factor $= f = 1.76 \times 0.5$

$= 1.76(0.56)$.

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

$\Rightarrow V_m = 0.844 \text{ m/s}$.

$\Rightarrow Q = VA$; $A = Q/V = \frac{30}{0.844} \Rightarrow A = 35.54 \text{ m}^2$

$P = 4.75\sqrt{Q} = 4.75\sqrt{30} \Rightarrow P = 26.01$

$R = S/2 \times V^2/6 \Rightarrow S/2 \times \frac{0.844^2}{1.3}$ $R = 1.36$ m.

As we know.

$\rightarrow A = BD + D^2/2$; $35.54 = BD + D^2/2 \rightarrow (1)$.

$\rightarrow P = B + D\sqrt{5}$; $26.01 = B + 2.236D \rightarrow (2)$.

Thus $B = 26.01 - 2.236D \rightarrow (3)$.

put eq (3) in eq (1).

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

$35.54 = 26.01D - 0.36D^2 + D^2/2$

$35.54 = 26.01D - 1.736D^2$

$1.736D = 26.01D + 35.54 = 0$

Using quadratic formula.

$$x = \frac{-b \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(26.01) \sqrt{(26.01)^2 - 4(1.736)(35.56)}}{2(1.736)}$$

$D = 1.52$ put in eq 3

$$B = 26.01 - 2.236\ (.52)$$

$$B = 22.611\ mm.$$

Now

$$\frac{f^{5/3}}{3340 Q^{1/6}}$$

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

$$\Rightarrow S = 0.00029.$$

QNO # 04 PART (A):

ANS: Following are the component of headworks with neat diagram.

1. Weir or Barrage
2. Undersluices
3. Divide Wall
4. Fish ladder.
5. Canal head regulator

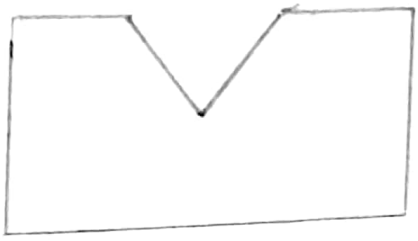
(*) Silt Excluders / silt prevention devices.
(*) River Training works.

1 WEIR AND BARRAGE:

Normally the water level of any perennial river is such that it cannot be diverted to the irrigation canal. The bed level of canal may be higher then the existing water level of the river. In such cases weir is constructed across the river to rise the water level. Surplus water pass over the crest of ~~river~~ weir. Adjustable shutters are provided on the crest to raise the water level to some required height.

- When the water level on the upstream side of the weir is required to be raised to different levels at different time, barrage is constructed.

Barrage is an arrangement of adjustable gates at different tires over the weir.



Weir

② UNDER SLUICES:-

It is also known as scouring sluices. The under sluices are the openings provided at the base of the weir or barrage. These openings are provided with adjustable gates. Normally, the gates are kept closed. The suspended silt goes on depositing in front of the canal head regulator.

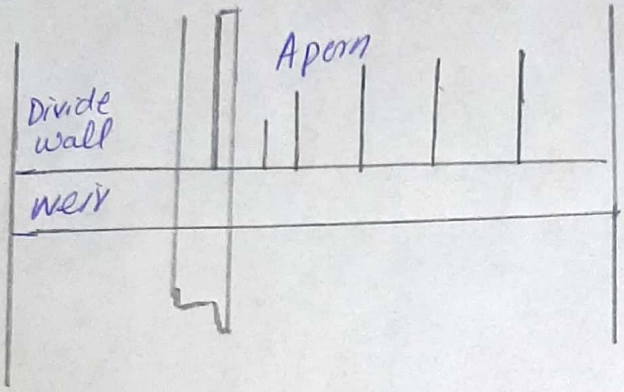
* When the silt deposition becomes appreciable ~~becomes~~ the gates are

then closed., But at the period of flood, the gates are kept opened.

(3) DIVIDE WALL :-

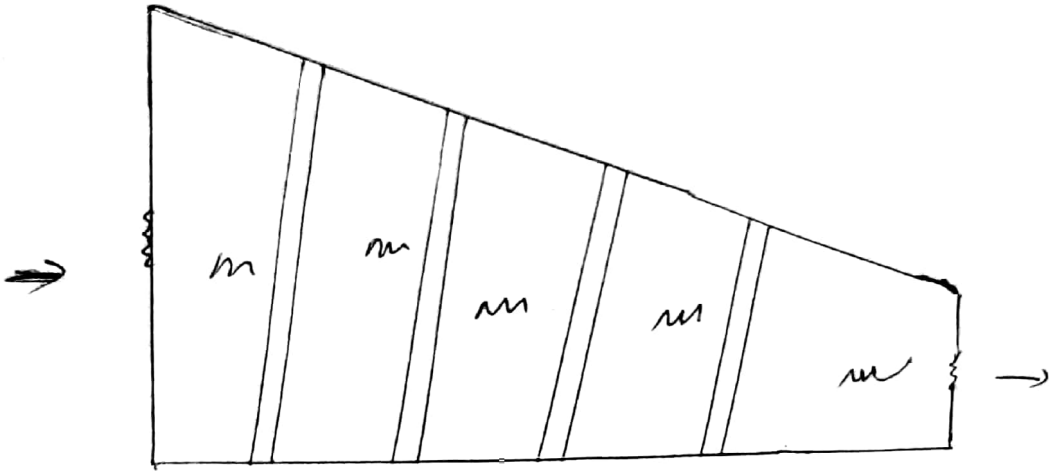
The divide wall is a long wall constructed at right angles in the weir or barrage, it may be constructed with stone massonary or cement concrete. On the upstream side the wall is extended just To cover the Canal head regulator

and on the downstream side, it is extended upto the launching apron.



(4) Fish Ladder: The fish ladder is provided just by the side of divide wall for the free moment of fishes. Riverse are the important sources of fishes. The Tendency of fishes is to move from upstream to downstream in winter and from downward to upstream in moonsoons. This moment is essential for their survival. The construction of weir

and barrages. This moment gets obstructed and is detrimental To the fishes.

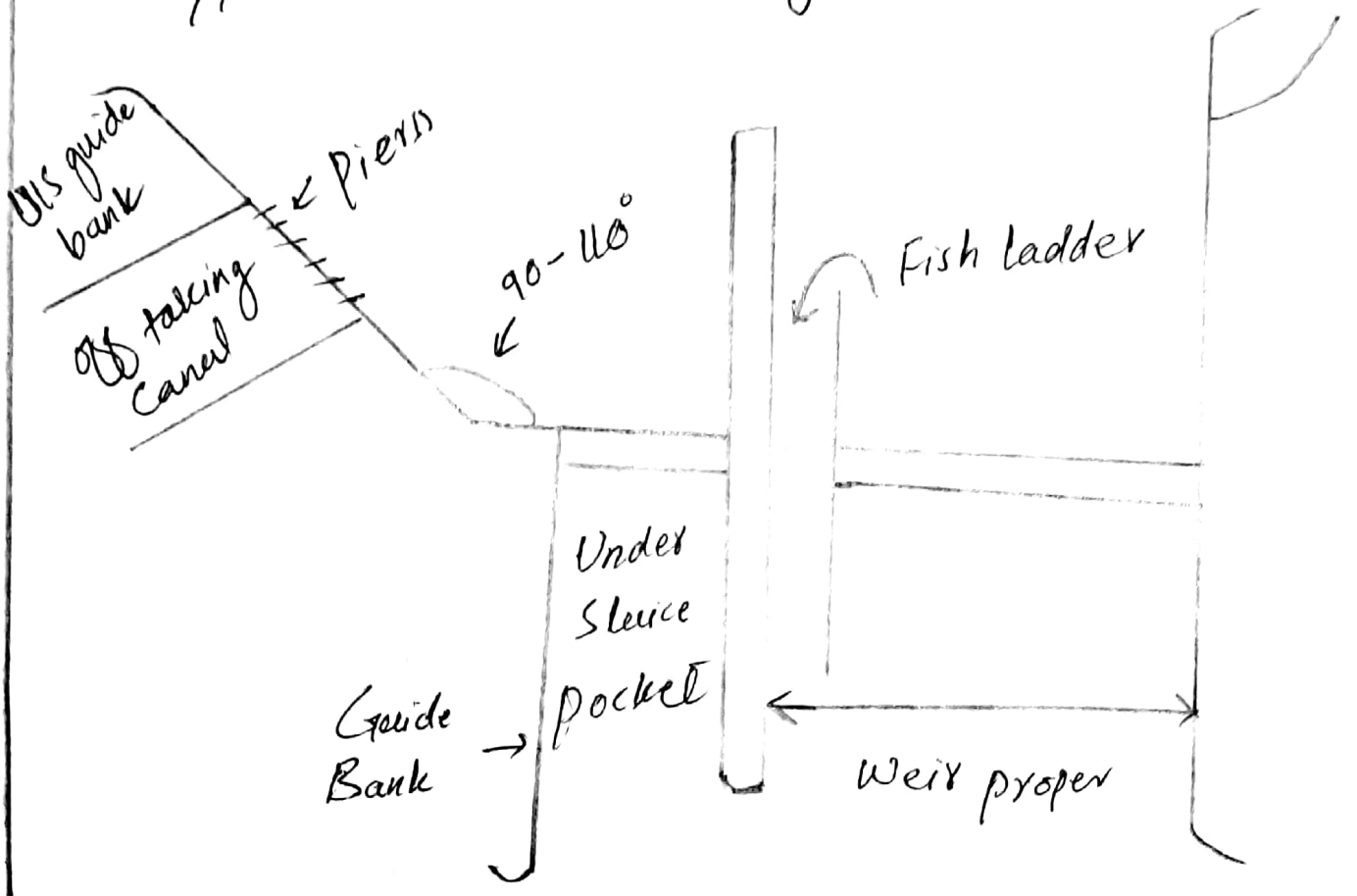


Fish Ladder.

(5) Channel head Regulator:-

A structed which is consted at the head of the canal head. It consist of number of peirs which divide the Total width of the canal into number of span which are known as bays. The peirs consist of number of Tires on which the adjustable gates are placed.

The gates are operated from the top by suitable mechanical device. A platform is provided on the top of the piers for the facility of operating the gates. Again some piers are constructed on the down-stream side of the canal head to support the roadway.



P.T.O

⑥ Silt Regulation Works:

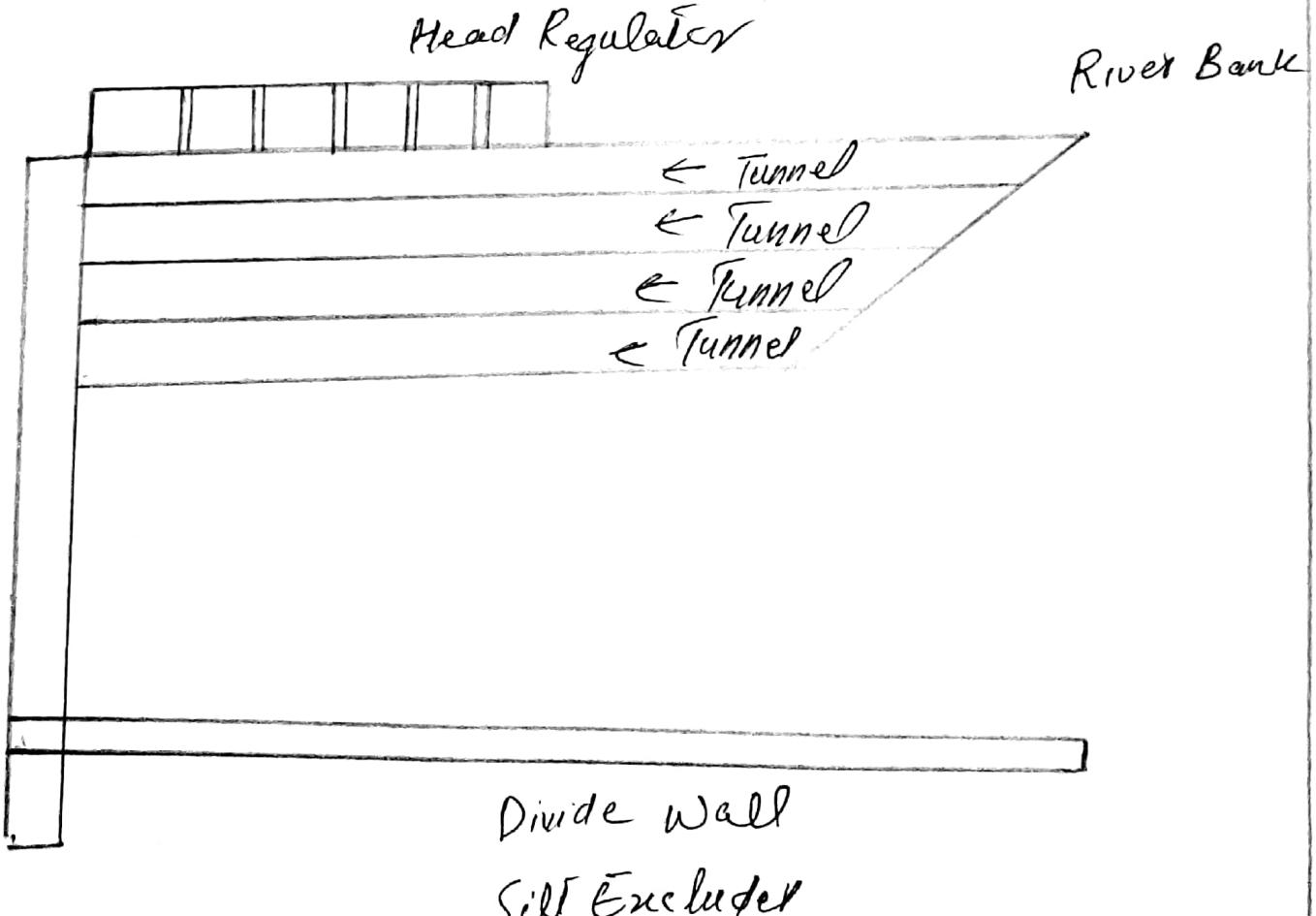
The entry of silt into canal which take place off from a head works can be reduced by construc- ted certain special works, called silt control works. These work may be classified into the following two types: ⓐ Silt Excluders ⓑ Silt Ejectors.

ⓐ Silt Excluders:- Silt Excluders are those works which are constructed on the bed of the river, upstream of the head regulator. The clearer water enters the head regulators and silted water enters the silt excluders. In this type of works the silt is therefore removed from the water before it enters the canal

P.T.O

(b) Silt Ejectors:

Silt Ejector are also called Silt Extractors, are those devices which extract the silt from the canal water after the silted water has travelled a certain distance in the off take canal, and little distance downstream from the head regulator.



P.T.O

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