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Subject # irregation engineering.

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Program # BSc (civil)

(1) Ans (a)

water logging measure:-
Quantity of water into Soil below is reduced
inflow into underground reservoir is reduced and out flow should be increased.

Method of control of water logging.

(1) Linning of cannals and water courses.
It reduce seepage of water

(2) Reducing intensity of irrigation:-
(*) only Small portion of land should receive cannal water in one Particular season.
(*) Remaining areas can receive water in next season by rotation.

(3) By introducing crop rotation:-
Higher water requiring crop should be followed by one requiring less water and then by one requiring almost no water.

(4) improving natural drainages of area:-
(*) water should not be allowed to stay in one area.
(*) Natural flow is Providing by bush and Jungle cutting.

(5) Pumping or Tubewell or vertical Drainage lift irrigation should be introduced to use GW canal irrigation may be subsititutated by tube well irrigation.

(b)

Saline Soil	Alkaline Soil
(1) Saline soil may be defined as a soil having a conductivity of the saturation extract greater than 4ds/m and abn 0.4s/m and exchangable sodium percentage less than 1.5. The pH is usually less than 8.5.	(*) Alkali or sodic soil is define as a soil having a conductivity of the saturation extract less than 4ds/m and exchangeable sodium persentage greater than 15. The pH is usually b/w 8.5 – 10.0.
(*) less than 8.5	(*) Most of the Na is in extangeable form
(*) The electricity conductivity of saturated extract of the soil is more than 4ds.	(*) greater than 8.5
(*) ESP is less than 15 and pH is less than 8.5	(*) EC of saturated extract is less than 4ds/m.
(*) These soil have a white crust of salt on their surface.	(*) Such soil if ploughed when wet turn into slick furrow slice refered to as slick spots.

(c)
Ans Reclamation of Salt affected lands:-

(*) By maintaining the water table Sufficiently below the roots.

(*) Hence all the measure which were suggested for preventing water logging hold good for preventing salinity of lands.

(*) An efficient drainage (Surface of land Subsurface) must be provided to lower the water table in saline soil

leaching.

in this process

(1) Land is flooded with water

(2) Alkaline Salt will be dissolved in water

(3) percolation to the ground water.

(4) Drained by sub surface drains.

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(2) Ans (a) Part

Kennedy Procedure for cannal design

Step # 1

Assume the trial value of D and put in equation 1

$$V_0 = 0.54 m D^{0.64}$$

Step # 2

in equation 1 $Q = AV$

$$A = Q/V$$

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

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

Step # 3

Substitute the value of R in equation 2 Kutters and chazys equation to obtain v which will be the actual velocity for assumed dimensions.

Step # 4

If the velocity worked out from equation 2 agrees with that of obtained with Equation 3 kennedeys equation Then the assumed depth is correct other wise repeat the procedure with changed value of D.

Q2 (b) Part

Given data :-

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

(UR (m) = 1

N = 0.025

Bed slope = 1 in 5000

Depth (D) = 2.3 m.

Solution :-

finding the velocity

By formula.

$V_K = 0.546 m D^{0.64}$

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

$V_K = 0.930 m$

Now calculating Area of canal

By formula.

$Q = AV.$ $A = Q/V$

$A = 30/0.930$

$Area = 32.25 m^2$

Now we find we have to find B by using formula

$A = BD + \frac{D^2}{2} \Rightarrow BD + 0.5D^2$

By putting value

$A = BD + 0.5D^2$

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

$32.25 - 2.645 = 2.5B$

$29.605 = 2.3(B)$

$B = 12.87m$

Now we have to calculate wetted perimeter. So by formula,

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

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

$P = 18.01m$

Now we have to calculate hydraulic Radius

$R = A/P$

$= 32.25/18.01$

$R = 1.79m$

Now calculating mean velocity from chezy equation

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

where

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

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

$$C = \frac{75.19}{1.517}$$

$$C = 49.56.$$

$$VC = 49.56\left(1.79\left(1/5000\right)\right)^{1/2}$$

$$\Rightarrow \quad VC = 0.93\,m$$

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(3) (1) Part a)

Initial Regime :-

when only bed slope of channel changes but the cross section remain same then also no silting or scouring take place. But this is rare.

Final Regime :-

in 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.

(3) Q (B) Part

Given data:-

$Q = 30 m^3/sec$

$m = 0.56 mm$

Solution:-

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

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

$f = 1.3$

$$Vm = \left[\frac{Qf^2}{140}\right]^{1/6}$$

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

$Vm = 0.844$

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

$A = 30/0.844$

$A = 35.54$

$P = 4.75\sqrt{Q}$

$P = 4.75\sqrt{30}$

$P = 26.0$

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

$R = 1.36$

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$A = BD + D^2/2$

$35.54 = BD + \frac{D^2}{2}$

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

$26.01 = B + 2.236D$

$B = 26.01 - 2.236D$ → (2)

Put eq (2) and eq 1

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

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

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

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

$35.54 = 26.01D - 17.36D^2$

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

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

By Quardatic eq

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

$D = 1.52$

Put in eq (2)

$B = 26.01 - 2.236(1.52)$

$B = 22.611$

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

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

$$S = 0.00026$$

(4) (i) (a) Part Ans

component of a head work.

(*) weir or barrages.
(*) under sluices.
(*) Divide wall
(*) fish ladder
(*) cannal head regulator
(*) silt excluders / silt prevention devices.
(*) River training work (Marginal bunds and guide banks).

(1) weir :- Normally the water level of any perennial river is such that it cannot be diverted to the irrigation cannal.

(*) Barrage :- when the water level on the up stream side of the weir is required to be raised to different level at different time barrage is constructed.

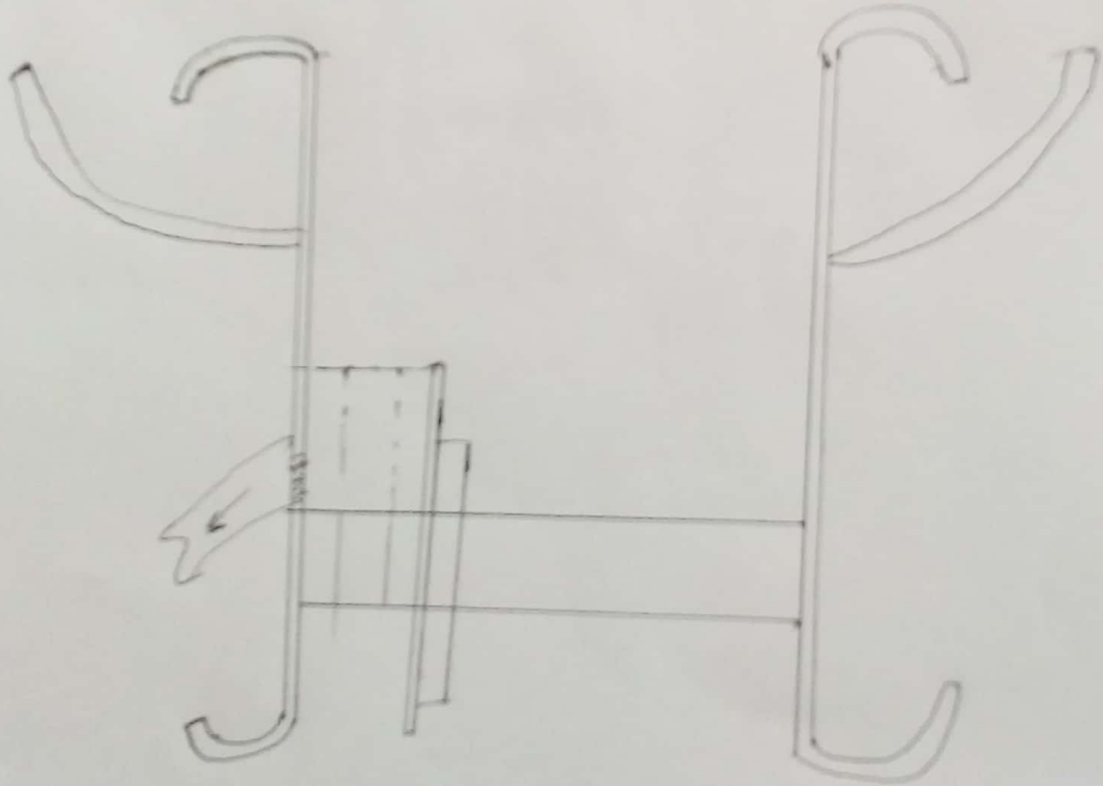
(*) under sluices :- Also known as scouring sluices. The under sluices are the openings provided at the base of the weir or barrage.

(*) fish ladder:-

The fish ladder provided Just by the side of the divided wall by the side 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 regulator.



Q^4 B Part

funtion of head regulator:-

The function of canal head regulator are to regulate the supplies into the canal. To indicate the discharge passed into the canal from design discharge formula and observed head of water on the crest. To control the silt entry into the canal.