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Section: A

Q. No. 2

Part A:- Explain the anti water logging measures?

Answer:- Anti-water logging measures:-

Some of the measure use to control water logging are:

Control of (canal) Seepage:-

Canal seepage is a major source of water losses and water logging in regulated area by it can be controlled by:

→ lining of canal with impervious material like clay, concrete to control seepage.

→ concrete water system from canal to pipe system.

Reducing intensity of Irrigation:-

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

→ Applying only the request 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 means that we should plant crops in such a way that it prevent the land from water logging.

→ Crops which use large amount of water should be followed by those which use less water or no water.

Q. No. 1

part B:-

Saline Soil	Alkaline Soil
1- Soluble salt concentration is equal to or more than 1%.	1- Soluble salt concentration is less than 1%.
2- Exchangable sodium percentage is less than 15%	2- Exchangable sodium percentage is greater than 15%.
3. pH < 8.5	3- pH > 8.5
4. White / light colour hence called white alkali	4- Black colour and hence called black alkali.
5. Flocculated soil therefore soil aeration & permeability is normal.	5. Dispersed & compact soil aeration & permeability is low.

Q.No.2

Part (C):- Reclaimation of salt affected lands:

By maintainin

the water table sufficiently below the roots.

→ Hence all the measures which are suggested for preventing water logging hold good for preventing salinity of lands.

→ An efficient drainage (surface & sub surface) must be provided to lower the water in saline soils.

→ Create good surface & internal drainage.

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

Q. No. 2

Part (A):- Kennedy procedure for canal design.

Answer:

Step 1:-

Assume the trial value of D & put in eq 2 & determine.

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

Step 2:-

in eq (1) ; $Q = AV$

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

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

For assumed to determine B

Find $R = A/P$

Step 3:-

Substitute the value of R in eq (2) (Kutters & Chezys Eq) to obtain V which will be actual velocity for assumed dimension.

Step 4:- If the velocity worked out from eq (2) agrees with that of obtained with eq (3) (Kennedy's Eq) Then the assumed depth is correct. Otherwise repeat the procedure with changed value of D.

Q.No 2

Part B:

Given:

$Q = 30\ m^3/sec$

$(v_r/m) = 1$

$N = 0.0225$

Bed slope = 1 in 5000

Depth = 2.3 m

Solution:

Finding velocity by formula.

$V_k = 0.546\ m\ D^{0.64}$

$0.546(1)(2.3)^{0.64} \Rightarrow$

$\boxed{V_k = 0.930\ m}$

Now calculating area of canal,

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

$\boxed{A = 32.25\ m^2}$

Now we have to calculate B by using formula,

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

$A = BD + 0.5D^2$

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

$\Rightarrow \boxed{B = 12.87\ m}$

Now we have to calculate Wetted parameter

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

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

$$\boxed{P = 18.01\ m}$$

Now we have to calculate Hydraulic radius

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

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

Now calculating mean velocity from chezzy eq.

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

where,

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

$$\Rightarrow C = \frac{1/0.025 + (23 + \frac{0.00155}{S})}{1 + (23 + \frac{0.00155}{(1/5000)}) \times (\frac{0.025}{\sqrt{1.79}})}$$

$$\boxed{C = 49.56}$$

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

$$V_c = 0.93$$

$$\boxed{V_c = 0.9\ m}$$

Q.No.3

Part(A): Difference between initial regime and final regime in accordance to Lacey's theory:-

Initial regime:- When only bed slope of channel changes but the cross section remain same then also no silting or sourcing take place.

Final Regime:- If all the parameter (parameter, depth & slope) have equally free to vary & adjust according to discharge & silt grade) then the channel is said to have final regime.

Q.No.3 part(B):-

Given:

$Q = 30 \ m^3/sec$

$m = 0.56 \ mm$

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

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

$f = 1.3$

$V_m = \left(\frac{Qf^2}{140}\right)^{1/6}$

$V_m = 0.844$

$Q = AV \quad , \quad A = Q/V = 30/0.844$

$$\boxed{A = 35.54}$$

$P = 4.75\sqrt{Q}$

$P = 4.75\sqrt{30}$

$$\boxed{P = 26.01}$$

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

$$\boxed{R = 1.36}$$

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

$$35.54 = BD + \frac{D^2}{2} \quad \text{--- (1)}$$

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

$$26.01 = B + 2.236D$$

$$B = 26.01 - 2.236D \quad \text{--- (2)}$$

Put eq 2) in eq 1)

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

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

$$\Rightarrow 1.736D^2 + 26.01D - 35.54 = 0$$

By quadratic formula,

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

$D = 1.52$

Put in eq(2)

$B = 26.01 - 2.23(1.52)$

$B = 22.611$

$S = \frac{nQ^{5/3}}{3340\varphi^{1/6}}$

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

$S = 0.00026$

Q.No 4

Part (A):

Head work:

Any hydraulic structure which ~~is~~ supplies water to the off taking canal is called headwork.

It can be divided into two parts.

1. Storage head work
2. Division head work

Component of Division headwork.

1. Weir or Barrage. Normally the water level

any perennial river is such that it cannot be ~~divided~~ diverted to irrigation canal. The bed level of canal may be higher than the existing water level of the river.

Barrage:

When the water level on the ~~top~~ up stream side of the weir is required to be raised to different levels at different time, barrage is constructed.

Divide Level:

The divide level is a long wall constructed at right angles in the weir or barrage, it may be constructed with stone masonry or cement concrete.

Q.No. 4

Part b:

Head Regulator:

Regulator constructed at the off taking point are called head regulator. When it is constructed at the head of main canal it is known as canal 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.