

Summer Final Assignment/Quiz



Name	Abdullah Aziz
ID	7671
Subject	Irrigation Engineering
Program	BS(C)
Semester	Final Summer
Date	29/9/2020

IQRA NATIONAL UNIVERSITY
PESHAWAR

No. (01)

a) Define water logging. What are the causes of water logging?

ANS:

Land is said to be water logged when its productivity is affected by high water Table(WT).

- High WT causes saturation of root zone.
- It leads ill aeration which causes the decay of nitrifying bacteria.
- This reduces the crop yield.

Causes of water logging

1. **Intensive Irrigation:** If max. area of land is irrigated, percolation of water takes place. This causes the rise of WT.

Extensive irrigation (irrigation spread over wider regions) to be followed to avoid water logging.

2. **Seepage of water from adjoining high lands.**

3. **Seepage of water through canal reservoirs.**

4. **Impervious obstruction:** water seeping below the soil moves horizontally. It may find obstruction & WT may rise.

5. **Inadequate surface Drainage:**

Storm water & excess of irrigation water should be removed. If proper drainage is not provided water percolates to rise water table.

6. **Excessive Rains:**

- Causes temporary water logging.
- No drainage causes permanent.

7. Submergence due to floods:

Continued floods causes the growth of water-loving plants which obstruct natural surface drainage & increase the water-logging.

8. Irregular & flat topography: In depressions, the drainage is poor, water detention is more. The percolation increases the water table.

PART (b) What is efflorescence? Define leaching process.

ANS:

❖ Efflorescence:

The phenomena of salts coming up in solution and forming a thin crust (5-7.5cm) on the surface after evaporation of water is called Efflorescence.

- Land affected by efflorescence is called saline soil Salts surrounding the roots reduce the osmotic activity of plants

❖ LEACHING

leaching is the loss of water-soluble plant nutrients from the soil, due to rain and irrigation

In this process;

- 1) Land is flooded with water
- 2) Alkaline salts will be dissolved in water
- 3) Percolation to the ground water
- 4) Drained by sub surface drains

Q2:(a) Explain the procedure of designing irrigation canals by Kennedy's theory.

ANS: PART A

KENNEDYS THEORY

• R.G. Kennedy studied straight reaches of upper Bari Doab 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.

Kennedy Procedure for canal design

Step 1. Assume the trial value of D and put in Eqn. 1 and determine

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

Step 2. In Eqn. 1: $Q = AV$

$$A = Q/V$$

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

$$P = B + D \sqrt{5} / 2$$

For assumed D determine B

Find $R = A/P$

Step 3. Substitute the value of R in eqn. 2 (Kutters and Chazys Eqn.) to obtain V which will be the actual velocity for assumed dimensions.

Step 4. If the velocity worked out from Eqn.2 agrees with that of obtained with the Eqn. 3 (Kennedeys Eqn.). Then the assumed depth is correct. Other wise repeat the procedure with changed value of D .

PART(b) Differentiate between initial regime and final regime according to lacey's theory.

LACEY'S THEORY

- ✓ • According to Kennedy, a channel is regime (No silting, No scouring) but according to Lacey even though channel with no silting or scouring may actually be not in regime.
- ✓ • He differentiated between initial regime and final regime but this theory is applicable to final regime.

1) INITIAL REGIME

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

2) 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(a) Differentiate between storage head works and diversion head works.

ANS: PART A

❖ Storage head works

1. Dam is constructed across a river valley to form storage reservoir,
2. known as storage head works.
3. Water is supplied to the canal from this reservoir through canal regulator.
4. These serves for multipurpose function like hydro- electric power generation, flood control, fishery.

❖ Diversion head works

1. Weir or barrage is constructed across a perennial river to raise water level and to divert the water to canal, is known as diversion head work.
2. Flow of water in the canal is controlled by canal head regulator.

PART(b) What are the objectives of diversion head works. Briefly describe the points necessary for site selection of diversion head work.

ANS:

Objective of diversion head work

- 1) It raises the water level on its upstream side.
- 2) It regulates the supply of water into canals.
- 3) It controls the entry of silt into canals
- 4) It creates a small pond (not reservoir) on its upstream and provides some pond age.
- 5) It helps in controlling the fluctuation of water level in river during different seasons.

Site selection for diversion head work

1. The river section at the site should be narrow and well-defined.
2. The river should have high, well-defined, in erodible and non-submersible banks so that the cost of river training works is minimum.
3. The canals taking off from the diversion head works should be quite economical and Should have a large commanded area.

Q4:Write notes on the following:

- a) Canal head regulator**
- b) Silt excluders**
- c) Under sluices**
- d) Balancing depth**

ANS:

1).Canal head regulator:

- A structure which is constructed at the head of the canal to regulate flow of water is known as canal head regulator.
- It consists of a number of piers which divide the total width of the canal into a number of spans which are known as bays.
- The piers consist of number tiers 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.

2). 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 regulator and silted water enters the silt excluder.
- In this type of works, the silt is, therefore,, removed from the water before it enters the canal.

3).Under sluices:

- 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 the gates are opened and the deposited silt is loosened with an agitator mounting on a boat. The muddy water flows towards the downstream through the scouring sluices.
- The gates are then closed. But, at the period of flood, the gates are kept opened.

4). Balancing depth:

Balancing canal depth comes when the canal is in partially embankment and partially in cutting. It is the depth of the canal(H) which gives equal amount of filling (i.e earth required for formation of Banks) and cutting (i.e earth from digging). For a given cross-section of a canal, it has only one balancing depth.

THE END