HIGHER TECHNOLOGICAL INSTITUTE

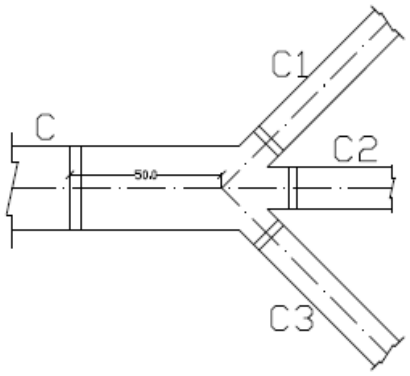
Department of Civil Engineering
Irrigation Works Design 2
Code : CT 265

Assignment 1
Introduction and Hydraulic Design of Weirs

1- Classify the main hydraulic structures based on their functions.
2- Define the Heading-up structures and their influences upstream and downstream the structure.
3- Mention the different types of weirs and their functions.
4- Derive formulas for the statical design of a weir including the uplift pressure and without it.

5- Calculate the distance between two stepped weirs to minimize the water slope in a canal from 50 c/k to 20 c/k. Explain your answer with a neat sketch.

6- A Nasbah is to be constructed to distribute irrigation water through three branches. The discharge of the main canal (Q_T) is 24.30 m^3/s, while Q1:Q2:Q3 = 1:2:1.5. Clear overfall weirs are constructed at the beginnings of each branch. The crest level of all weirs is (10.00). If the width of the first weir B1 = 3m, determine the widths of the other weirs and the water level in the main canal. Assuming that the weirs equation is $Q = 1.8\ B\ H^{1.5}$.



7- Design and draw complete views of a weir using the following data:
- Canal side slope 1:1
- Water slope = 12 c/k
- C_B/C_L = 15/7
- $Q = 2BH^{1.5}$ or $1.87BH^{1.5}$
- Bed level = (3.90) and bed width = 4 m
- U.S.H.W.L/D.S.H.W.L = (6.30)/(5.90)
- U.S.L.W.L/D.S.L.W.L = (5.90)/(5.50)
- Bank or road level and width = (8.80) and 4 m

8- A standing wave weir is proposed to be constructed D.S. the head regulator of a canal for the purpose of reducing head and discharge measurements. Design the weir and its floor using both Bligh and Lane methods and find L.W.L U.S/D.S weir given the following data:

- Area served by canal = 32400 fed.
- Water duty (max/min) = 50/30 m^3/fed./day
- Bed width of canal = 10 m
- Side slopes = 1:1
- H.W.L U.S/D.S weir = (11.00)/(10.70)
- H.W.L submergence ratio = 0.75
- L.W.L submergence ratio = 0.60
- Bed level U.S/D.S weir = (8.50)/(8.20)
- C_B/C_L for fine silt = 18/8.5
- Land level at site = (11.10)
- Discharge equation of weir: $Q = 2.03\ B\ H^{1.5}$ m^3/s

Draw a plan H.E.R and a section elevation to your design with a scale 1:200.

9- A clear overfall weir is going to be built on a lined branch canal running in a sandy soil at a drop of 1 m in land levels according to the following data:

- Area served by canal = 21600 fed.
- Water duty = 60 m^3/fed./day
- Water level downstream weir is (10.00)
- Water slope = 8 c/k
- Weir's equation: $Q = 1.875\ BH^{1.5}$ m^3/s
- A foot-path is required.
- C_B/C_L = 12/5

It is required to:

1- Design the cross section of the canal.
2- If the average velocity = 0.6 m/s and the bed width = 3.5 water depth, find the water slope.
3- Design the weir with its floor.
4- Draw a plan H.E.R., a section elevation and 2 side views.