

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

END Term Examination-II, May, 2019
B. Tech. in Civil Engineering, Semester IV

Roll No.....

Course Code : Hydraulic Engineering (CE403)

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1 When canals passes over a river it is known as aqueduct? The velocity in the rectangular canal in upstream of aqueduct is 2.5 m/sec, flow depth 4 m and the width is 10 m. The reduced level of canal is 100 m. The bed level of canal at aqueduct is 101.5 m. Find the elevation of water surface on the center of aqueduct. (i) When width is not contracted (ii) width is reduced to 8 m. Neglect the friction loss in canal and aqueduct.

20 (LO 1,2)

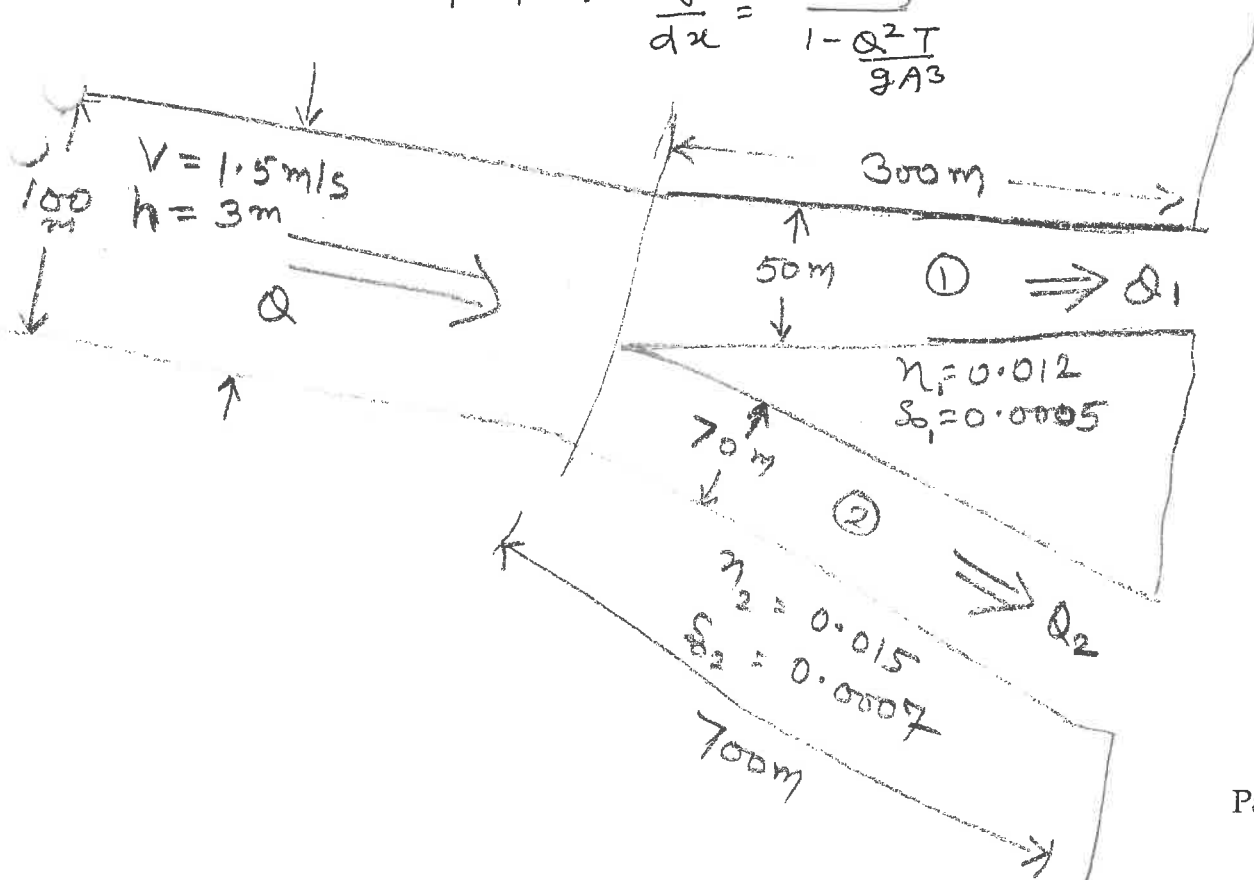
Q.2 To irrigate the fields a rectangular cross section canal is provided. The Total water requirement during 3 months of winter (90days) is $145.8 \times 10^6 \text{ m}^3$. The bottom width of channel is 5 m and permissible velocity is 1.5 m/s. Find the flow depth and slope for the most efficient section. The friction coefficient is 0.012.

10 (LO 3)

Q. 3. A river bifurcated in two channels as shown in Fig. below. Find the discharge in both the channels.

30 (LO 4)

use equation $\frac{dy}{dx} = \frac{S_0 - S_f}{1 - \frac{Q^2 T}{g A^3}}$

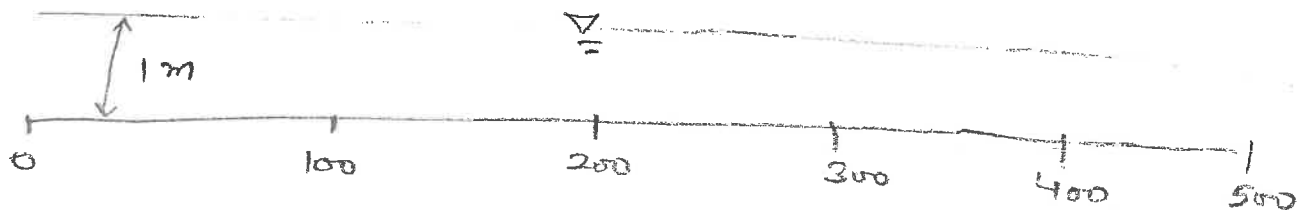


4. The governing equation for gradually varied unsteady flow is given as below. Find the flow depth and velocity after Δt time (say 30 min) at various locations in the channel with Δx (say 100 m). The initial discharge and flow depth is $10 \text{ m}^3/\text{s}$ and 1 m , respectively. The channel roughness coefficient is 0.012 and bed slope is 0.0005 . The inflow discharge in the channel after 30, 60 and 90 min is 30, 55, and $80 \text{ m}^3/\text{s}$. The corresponding flow depth is 3, 6 and 7.5 m at the upstream. Channel is rectangular channel with 20 m width. 25 (LO 7)

$$\frac{\partial Q}{\partial x} + T \frac{\partial y}{\partial t} = 0$$

$$\frac{\partial y}{\partial x} + \frac{V}{g} \frac{\partial V}{\partial x} + \frac{1}{g} \frac{\partial V}{\partial t} = (S_0 - S_f)$$

Final depths after 30, 60 and 90 min for these locations.



Q. 5 Explain the following

- What is importance of different type (specific energy, normal, GVF and unsteady flow) of open channel flows? 3 (LO 2)
- Why there is less chance for occurring hydraulic jump in natural rivers? 3 (LO 6)
- When River travels from its source to ocean its width increases. What are the two basic reasons behind it? 3 (LO 9)
- What are the various source of water in a perennial river during a year? 3 (LO 10)
- Why there is more sediments in canal in UP and Bihar in comparison to Rajasthan or other states? 3 (LO 8)