

# GUJARAT TECHNOLOGICAL UNIVERSITY

3<sup>rd</sup> Semester Civil Engineering – PDDC

**Subject Code & Name :** X30604 - Advanced Fluid Mechanics

## Assignment - 3 (Open Channel Flow - Part-1)

**Theory :**

**Date : 08-08-2014**

1. Classify various types of channels.
2. Explain various types of flow in open Channel.
3. Derive an expression for most economical Section for
  - i. Rectangular Section
  - ii. Trapezoidal Section
4. Discuss the specific energy Curve with a neat Sketch.
5. Explain Critical, Sub-Critical & Super Critical flow in an open.
6. Explain application of specific energy diagram.
7. Derive differential equation for gradually varied flow.
8. Define Hydraulic Jump with Sketch & describe types of Hydraulic Jump.

**Examples :**

1. A rectangular channel conveys a discharge of 12 m<sup>3</sup> / S at a bottom width 3.0 m. Find the bed slope required to carry above discharge if depth of flow is 1.0 m. Take Chezy's  $C = 50$ .
2. A circular channel having diameter 0.5 carries water at rate of 0.14 m<sup>3</sup>/s. Find the bed slope of channel for maximum velocity. Take  $C=55$ .
3. A 10m wide trapezoidal channel has a side slope of 1.5:1(H: V). The channel is carrying a uniform flow of 100 cumec at the bed slope of 0.0003. Compute the normal depth of flow if Manning's  $n = 0.012$ . Also compute mean velocity of flow.
4. A trapezoidal channel is having a bottom width of 2.5 and side slope 1.5:1(H: V). It is carrying a discharge of 18m<sup>3</sup>/s at a depth of 1.5m. Calculate the specific energy and critical depth.
5. The discharge of water through a rectangular channel with 6m width and 2m depth of flow is 17cumecs. Calculate (1) specific energy of flowing water (2) critical depth (3) critical velocity (4) minimum specific energy.
6. A rectangular channel 4.0m wide was laid at a slope of 0.0004. The incoming uniform flow depth is 2.5. Find the maximum Height of hump can be provided in channel section without causing afflux. Take Manning's  $n=0.014$ .
7. In order to find discharge in a rectangular channel its width is reduced gradually from 2m to 1m and the floor is raised by 0.2m at the reduced section. The approaching flow depth is 1.2m. Calculate the rate of flow in channel if there is a drop of 0.2m in water surface elevation at contracted section.