KATIHAR ENGINEERING COLLEGE, KATIHAR
CIVIL ENGINEERING, 2nd Year (Semester-IV)

Subject: Hydraulics & OCF **Instructor: Rashid Mustafa**

Assignment 3

Q.1 At what depths of flow of 1 m^3/s occur in a rectangular channel 2 m wide if the specific energy is 0.05 m? What would be the corresponding channel bed slope required to sustain uniform flow if Manning's roughness n= 0.015? Also find the minimum specific energy required to carry this discharge.

Q.2 Show that for wide rectangular channel the bed slope S_0 is mild or steep according to S_0 being less than or greater than $\frac{n^2 g^{10/9}}{q^{2/9}}$

Q.3 Draw the following GVF profiles

(a) Horizontal to Steep (b) Steep to Mild (c) Adverse to Mild (d) Mild, Horizontal, Steep

(e) Mild Steeper Steep (f) Mild to Milder (g) Steep to Steeper

Q.4 A rectangular channel with bottom width of 4.0 m and a bottom slope of 0.0008 has a discharge of 1.5 m^3/s. In a gradually varied flow in this channel the depth at a certain location is found to be 0.30 m. Assuming n= 0.016, determine the type of GVF profile.

Q.5 A sluice gate discharge a stream of depth 0.15 m at the vena contracta 1.40 $m^3/s/m$. The channel can be taken as wide rectangular horizontal channel and discharge intensity is 1.40 $m^3/s/m$. If a hydraulic jump is formed at a depth of 0.25 m, estimate the distance from the toe of the jump to the vena contracta. Take two steps and use Direct step method. (n= 0.015)

Q.6 If the energy loss in a hydraulic jump in a rectabgular channel is found to be 6 m and pre jump Froude,s number of flow is 6, determine y_1 and y_2.

Q.7 A hydraulic jump occurs in a 90^0 triangular channel derives an equation for discharge and the conjugate depths. If the depth before and after the jump in the channel above are 0.6 m and 1.5 m respectively. Find the Froude number before and after the jump.

Q.8 Given that unit discharge in a rectangular channel is 18 $m^3/s/m$ and the head loss across a hydraulic jump that forms in this channel is 1.1 m, estimate the pre jump and post jump depths.