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FOURTH SEMESTER B.Tech. [Civil]

MID SEMESTER EXAMINATION

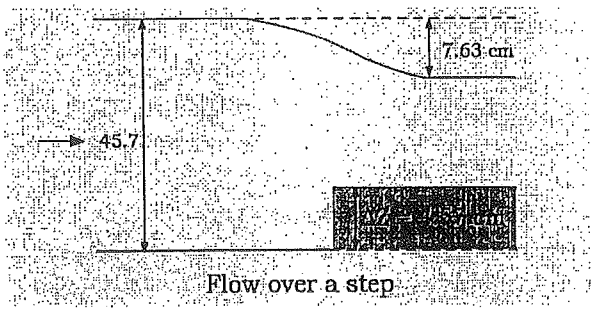
March-2019

CE-208 Hydraulics & Hydraulic Machines

Time: 1hour 30 mins *Max. Marks : 30*

1. A lined channel of trapezoidal section carries a discharge of 10 cumecs, at a depth of 1.2m, with bottom width 2m and side slope of 1.5 Horizontal to 1 Vertical. Consider uniform flow and calculate:
   a. The longitudinal slope of the channel.
   b. The average shear stress over the wetted perimeter
   c. The value of equivalent Darcy's f.
   d. The Froude number of flow. Assume, Manning's n= 0.010.

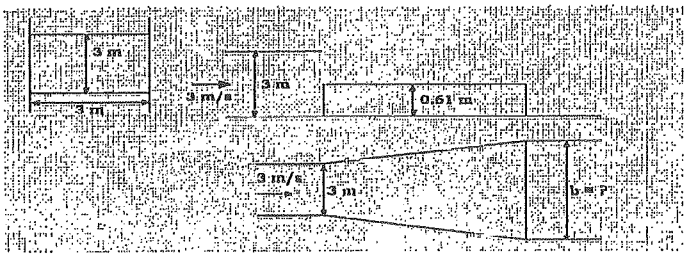
2. The flow is taking part a section shown in Figure. The step height is 4.57 cm. The upstream depth 45.7 cm. The water surface drops by 7.63 cm from its original level on the step. Determine the discharge.



Flow over a step

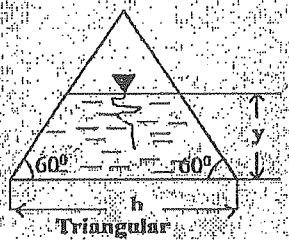
P.T.O.

3. Water flows in a rectangular channel 3 m wide at a velocity of 3 m/s at a depth of 3 m. There is an upward step of 0.61 m. What expansion in width must take place simultaneously for this critical flow to be possible?



4.

In partially full channel having an equilateral triangular cross section, the rate of discharge is Q = KAR2/3 in which K is a constant, A flow area, R is the hydraulic mean radius. Determine the depth at which the discharge is maximum, for a triangular channel. $A = (b - y/\sqrt{3}) * y$ and $P = (b + 4y/\sqrt{3})$



5. A jet of water of diameter 55 mm, having velocity of 18 m/s strikes a curved vane, which is moving with a velocity of 9 m/s in the direction of jet. The jet leaves the vane at an angle of 65° to the direction of motion of vane at outlet. Calculate, the force exerted by the jet on vane in the direction of motion . Also, determine the work done per second by the jet.