Sohag University **curse : Hydraulic (2)**
Faculty of Eng. **Exercise sheet (6)**

Q1

A rectangular flume 9 ft wide is built of planed timber (n = 0.012) on a bed slope of 0.3 ft per 1000 ft, ending in a free overfall (Fig. P10.49). If the measured depth at the fall is 1.67 ft, find (a) the rate of flow; (b) the distance upstream from the fall to where the depth is 3.6 ft. [Note: Assume that critical depth occurs at a distance of $4y_c$ upstream from the fall, and use reaches with end depths of 2.5, 2.8, 3.2, and 3.6 ft].

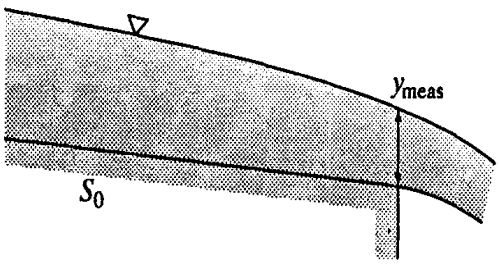

Figure P10.49

Q2

A trapezoidal canal dredged in smooth earth (n = 0.030) has a bottom width of 15 ft, side slopes of 1:1, and a bed slope S_0 = 0.0003. With a flow of 800 cfs, y_c = 4.05 ft, and y_0 = 10.8 ft. Find the distance (along an M_2 curve) from a free overfall back to where the depth is 10 ft. Use reaches with end depths of 6, 8, and 10 ft.

Q3

The slope of a stream of rectangular cross section is S_0 = 0.0003, the width is 170 ft, and the value of the Chézy C is 78.3 $ft^{1/2}/s$. (a) Find the depth for a uniform flow of 101.54 cfs per foot of width of the stream. (b) If a dam raises the water level so that at a certain distance upstream the increase is 5 ft, how far from this latter section will the increase by only 1 ft? Use reaches with 1-ft depth increments.

Q4

A wide and shallow rectangular channel dredged in earth (n = 0.035) is laid on a slope of 9 ft/mi and carries a flow of 90 cfs/ft of width. (a) Find the water depth 2 miles upstream from a section where the depth is 26.1 ft, using a single reach. (b) Compare the result with that obtained using three reaches of equal length.

Q5

A long rectangular channel 8 m wide, bed slope 1 : 5000 and Manning's roughness 0·015 conveys a steady discharge of 40 m^3/s. A sluice gate raises the depth immediately upstream to 5·0 m. Taking the Coriolis coefficient α to be 1·1 determine the uniform flow depth and the distance from the gate at which this depth is exceeded by 10 per cent. What is the depth 5000 m from the gate?