ASSIGNMENT NO: 2
Environmental Engineering

28th March 2013

Note: Assume suitable missing data, if any.
Last date for submission of this assignment is 2nd April 2013.

Q.1 A filter unit is 4.5 m by 9 m. After filtering 10000 cubic meter per day in 24 hour period, the filter is backwashed at a rate of 10 l/sq.m/sec, for 15 min. compute the average filtration rate, quantity and percentage of treated water used in washing and the rate of wash water flow in each trough. Assume 4 troughs.

Q.2 A water treatment plant is to process 19000 m³/d. A settling basin for type 2 suspension is to operate at 0.75 m/h. Determine the dimensions of the basin for (a) a long rectangular unit and (b) a circular unit. Check detention times, horizontal velocities and weir overflow rates.

Q.3 Determine the appropriate number of units and dimensions for settling basins to treat 75000 m³/d, at an overflow rate of 0.8 m/h.

Q.4 A bed of filter sand 0.75m deep is composed of uniform particles with diameter 0.5mm, specific gravity 2.64 and shape factor 0.9. The porosity of the packed bed is 0.45. Plot a curve for head loss vs. filtering velocity over the filter velocity range of 2 to 7 m/h at a water temperature of 13°C.

Q.5 A filter plant is to be constructed to process 757000 m³/d. pilot plant analysis of media indicates that a filtration rate of 15 m/h will be acceptable. Assuming a surface configuration of approximately 5 X 8m, how many filter units will be required? Allow one unit out of service for backwashing.

Q.6 50 mg/l of alum is added to 50,000 m³/d of suspended solids. (a) Assuming that sufficient natural alkalinity is present how many kilograms of sludge is produced per day? (b) Assuming that the specific gravity of the sludge is 1.04, how many cubic meters of sludge is produced per day? Assume that the removal efficiency of the settling basin is 65%.