1. (10 p) A 40-m diameter sedimentation basin receiving a flow of 0.35 m3/s wastewater has V-notch weirs installed 0.6 m away from the tank side. Compute the weir loading rate (m3/m.d) .
2. (10 p) A rectangular sedimentation basin has a surface loading rate of 40 m3/m2.d with a hydraulic retention time of 1.5 h. Calculate the water depth (m) in the basin.
3. (20 p) If a 1.0 m3/s flow wastewater treatment plant uses 4 parallel sedimentation basins with an overflow rate of 36 m3 /m2.d, what should be the surface area of each tank (m2)?
4. (20 p.) A rectangular sedimentation basin is to be designed for a secondary wastewater treatment plant. The average flow is 30 000 m3/d, the surface loading rate is 24 m3/m2-d, and the retention time is 6 h. Two sludge scrapper mechanisms for square tanks are to be used in tandem to give a rectangular tank with a length to width ratio of 2:1. Determine the dimensions of the basin.
5. (20 p) A primary clarifier for a municipal wastewater treatment plant is to be designed for an average flow of 7570 m3/d. the regulatory agency criteria for primary clarifiers are as follows: peak overflow rate = 89.6 m3/m2.d, average overflow rate = 36.7 m3/m2d, minimum side water depth = 3 m, and peak weir loading rate = 389 m3/m.d. The ratio of peak flow to average flow = 2.75. Determine:
6. Diameter of the sedimentation basin
7. The length of the peripheral weir. Assume that the weir launder has a width of 50 cm (from the tank side), and the weirs are installed on one side of the launder.
8. (20 p) A primary sedimentation basin is designed for an average flow of 0.35 m3/s. the TSS concentration in the influent is 220 mg/L. The average solids removal efficiency of the basin is 60 percent. The sludge has an average solids concentration of 4.5 % and a specific gravity of 1.03. Calculate (a) the quantity and volume of sludge produced, (b) the pump cycle time if the pumping rate is 570 L/min.