1. A grit chamber is designed for a hydraulic loading of 1800 m3/m2d. A grit particle with Ss = 2.65 falls through water having kinematic viscosity of 1.1306x10-6 m2/s. The diameter of the particle is 0.21 mm. Calculate the grit removal efficiency (%) in the grit chamber.
2. A grit chamber is designed for a hydraulic loading (overflow rate) of 1730 m3/m2d. A sieve analysis was performed on a sample of dried grit. The average settling velocity of each fraction in the column test was experimentally determined. The results of the sieve analysis and column test are given below. Calculate the theoretical removal efficiency (%) of the grit chamber.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Fraction retained on sieve | 0.40 | 0.20 | 0.10 | 0.10 | 0.10 | 0.10 |
| Average velocity from column test, m/min | 3.05 | 1.25 | 0.55 | 0.41 | 0.30 | 0.10 |

1. The peak and average flowrates for a velocity controlled grit chamber are 1.321 and 0.44 m3/s, respectively. Detention time is 1 min. and maximum velocity through the channel is 0.34 m/s. If channel width is 1.83 m, calculate the water depth in the channel, and design proportional weirthe procedure given in bar rack design. The weir crest is 15 cm above the channel floor.
2. Design an aerated grit chamber for a municipal wastewater treatment plant. The average flow is 0.44 m3/s and peaking factor is 2.5. The detention time in the chamber is at peak flow is 3.5 min. The width to depth ratio is 1.2:1 and depth is 3.2 m. The air supply is 10 L/s per m length of the chamber. Also, estimate the average quantity of the grit that must be handled at the facility. Use typical values given in Sec.11-6 of your text book.
3. A weir through is 10 m long and 1.2 m wide. The weir crest is on one side of the trough and covers the entire length of the trough. Calculate the depth of the trough if discharge through the basin is 0.3 m3/s. Depth of flow at the lower end of the trough is 0.9 m. Assume friction loss is 16 percent of the depth of water at the upper end, and a freefall allowance is 6 cm. Use Eq. 11-17 in your text book.