Question 1

Find the terminal settling velocity of a spherical discrete particle with diameter 0,5 mm and spesific gravity of 2,65 settling through water at 20^0C $\rho_w = 998.2 kg/m^3$

$$\mu = 1.002.10^{-3} Ns/m^2$$

Question 2

Particle Type	Weight Fraction W_i	Settling Velocity, V_i
1	0.1	0.2 m/sec
2	0.3	0.1 m/sec
3	0.2	0.3 m/sec
4	0.4	0.15 m/sec

If V_c=0.16 m/sec for a given settling tank, what is the % of all solids removed?

Question 3

A settling analysis is run on a Type 1 suspension in a laboratory column with a port 1.8m below the suspension surface. The data obtained are shown below.

Time (min)	TSS (conc, mg/L)
0	220
3	116
5	98
10	75
20	35
40	10
60	2

What will be the theoretical removal efficiency in a settling basin for an overflow of 432 m^2/m.day?

Question 4

A settling basin is designed to have a surface overflowrate of 32.6m/d. Determine the overall removal obtained for a suspension with the size distribution given in the table below. The specific gravity of the particles is 1.2 and water temperature is 20°C .

(μ =1.0087x10^{-3} Ns/m2, ρ =998.23 kg/m3)

Particle Size , mm	Weight Fraction Greater Than Size , %
0.1	10
0.08	15
0.07	40
0.06	70
0.04	93
0.02	99
0.01	100

Question 5

A column analysis of a flocculating suspension is run in the apparatus shown below. The initial solids concentration is 250 mg/L. The resulting matrix is shown below. What will be the overall removal efficiency of a settling basin which is 3 m deep with a detention time of 1 h and 45 min.

Depth	Time of sampling, min					
m	30	60	90	120	150	180
0.5	133	83	50	38	30	23
1	180	125	93	65	55	43
1.5	203	150	118	93	70	58
2	213	168	135	110	90	70
2.5	220	180	145	123	103	80
3	225	188	155	133	113	95

Question 6

A city must treat about 15000 m^3/day of water. Flocculation particles are produced by coagulation and a column analysis indicates that an overflowrate of 20 m/day will produce satisfactory removal at a depth of 3.5m.Determine the size of

    a) the required rectangular settling tanks

    b) the required circular settling tanks

Question 7

Design circular primary sedimentation tanks for a domestic wastewater treatment plant having Q_{avg}=70000m^3/d and Q_{peak} = 105000m^3/day.