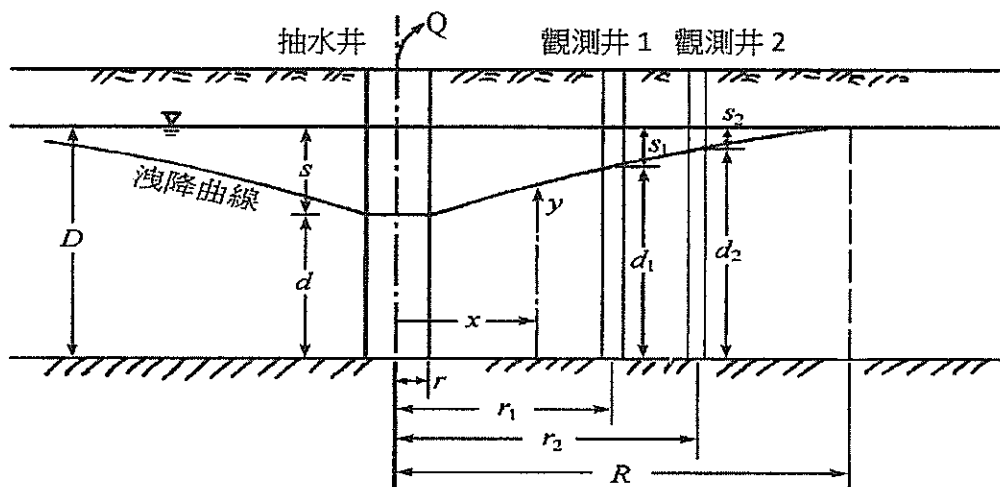


1. 簡述二級污水處理廠之處理程序，及各處理單元之去除標的物 (15 points)
2. 以累積需水曲線及累積流量圖法，說明如何決定一水庫的蓄水容量 (10 points)
3. 一抽水井位於一非拘限含水層，抽水後之洩降曲線如下所示。此抽水井之半徑為 r ，距離抽水井中央 r_1 及 r_2 位置分別開鑿觀測井，觀測所得之洩降分別為 S_1 及 S_2 ，距離抽水井中央 R 處，無洩降且其地下水位為 D
 - (a) 何謂達西定律？ (10 points)
 - (b) 根據下圖及達西定律，推導該抽水井之抽水量 Q (15 points)



4. Explain the following terms and their environmental implication:
 - (a) sedimentation theory (5 points)
 - (b) jar test (5 points)
 - (c) sludge age (5 points)
 - (d) oxygen sag curve (5 points)
5. (a) Please describe a flow diagram for sludge handling process in wastewater treatment plants. (5 points)
 (b) Please introduce a technology for reducing sludge production in wastewater treatment plants. (5 points)
6. Please describe the advantages and disadvantages of a membrane bioreactor (MBR) as compared to conventional activated sludge process in the treatment of domestic wastewater. (10 points)
7. (a) What is the terminal settling velocity of a discrete (sand) particle in water at 22 °C. The particle has a density of 2650 Kg/m³ and diameter of 0.2 mm. (5 points)

$$\text{Stokes' Law (laminar flow): } v_s = \frac{g(\rho_p - \rho_w)d_p^2}{18\mu}$$

where $g = 9.81 \text{ m}^2/\text{s}$; $\rho_w = 1000 \text{ Kg}/\text{m}^3$; $\mu = 9.55 \times 10^{-4} \text{ Pa} \cdot \text{s}$

- (b) A horizontal-flow rectangular sedimentation tank has a flow rate of 2000 m³/d, a depth of 2.0 m and 80% removal of the sand particle above. Calculate the overflow rate and volume of the sedimentation tank, corresponding to the setting velocity of the sand particle. (5 points)

試題隨卷繳回