題號： 267
科目：衛生工程
節次： 8

國立臺灣大學 104 學年度碩士班招生考試試題

題號： 267
共 1 頁之第 1 頁

1. Explain the following terms:

   (a) Cross connection (5 points)

   (b) Specific speed (5 points)

   (c) Darcy's law (5 points)

   (d) Net positive suction head (5 points)

2. Free chlorine (HOCl) is commonly used as a disinfectant for drinking water treatment.

   (a) If free chlorine is added into a water containing ammonia (NH_3). Describe all reactions when free chlorine is in excess. (5 points)

   (b) Draw an ideal diagram of "total chlorine concentration" as a function of "free chlorine added". Describe important characteristics of the diagram. (10 points)

3. Coagulation is used to remove particles that cause turbidity in surface water. Particles are negatively charged in the water.

   (a) Draw a figure to show the "electric double layer" of the negatively charged particle in the water. (10 points)

   (b) The river water travels downstream and enters the sea. It is found that the turbidity of the water is reduced. What is the possible reason causing the reduction? (5 points)

4. (1)假設家庭污水中 first-stage ultimate BOD remaining 之變化速率 dL/dt 可用 $dL/dt = -k_1L$ 表示，試導演 BOD 公式，並繪圖表示之。(2)如果 $k_1 = 0.25$ day^{-1} (base e)，而 5-day BOD 為 180 mg/L，試求其 first-stage ultimate BOD。 (10 points)

5. 為何埋設下水道時，管溝不宜過寬？試以公式說明之。再者，說明在管溝敷設下水道時，是否下水管上之覆土載重可比下水管上之回填土壤重量為小？如為是，試說明其理由。 (10 points)

6. 何謂合理公式法(Rational method)？並試說明採用該法推算暴雨逕流量時之基本假設及應用限制。再者，試定義「集中時間」(time of concentration)及進入時間(inlet time)。 (10 points)

7. 試繪圖說明低率(low rate)及高率(high rate)滴濾池污水處理廠之流程圖(flow diagram)，並說明滴濾池之空氣供給原理及相關設計 (10 points)

8. 何謂下水道之自淨速度？一般下水道設計時，自淨速度之設計規範常定為若干(以 cm/sec 表示)？再者，試說明下水道設計時為何需有最小及最大流速之限制？再者，最小流速設計須考慮水流中沉積物顆粒之那些性質？ (10 points)

試題隨卷繳回