國立屏東科技大學　九十九 學年度　碩士班甄試　招生考試

環境工程與科學系　碩士班(甲組)　環境工程概論 試題（*99N102012*）

一、　解釋名詞(每小題 5%，共 25%)

1. Cometabolism.
2. Renewable energy.
3. Cross connection.
4. Lower heating value.
5. NPDES.

二、　問答與計算(60%)

1. 某一水樣鹼度(Alkalinity)為 $4x10^{-4}$ M，其pH=9，請利用下式求其[HCO_3^-]與[CO_3^{2-}]之濃度(M)。(10%)

   $HCO_3^- \leftrightarrow CO_3^{2-} + H^+$　　$Ka = 4.69 \times 10^{-11}$

2. 請簡述土壤在生態環境中有那些功能？(10%)

3. 厭氧消化分為哪三個階段？請以英文表示三階段之名稱。各階段之主要分工為何？產生甲烷之兩條主要路徑為何？單位質量之COD去除可獲得多少甲烷的產出(L CH_4/g COD removal @STP)?(15%)

4. 試計算含有 200 mg/L下列水樣之理論需氧量： (1) VSS (biomass) ($C_5H_7O_2N$)；(2) Phenol (C_6H_5OH)；(3) Alanine：$CH_3CH(NH_2)COOH$。(10%)

5. 一污水處理場，進流量Q=3000 m^3/day，曝氣池體積為 2500m^3，曝氣池污泥濃度X= 3500 mg/L，迴流污泥比 = 0.25，迴流污泥濃度X^r = 8500 mg/L，廢棄污泥量Q^W = 80 m^3/day，進流BOD_5濃度 2000 mg/L，放流水污泥濃度X^e=20 mg/L，圓型沉澱池之直徑為 15 公尺。試計算(i)曝氣池的Hydraulic Retention Time；(ii) F/M；(iii) Solids Retention Time (θc)；(iv) 沉澱池之Surface loading rate。(15%)

三、　英文期刊閱讀心得(15%)

試根據下面摘要闡述其重點內容並提出閱讀心得。

In a quest to improve air quality, many experts are supportive of using hydrogen as the fuel of the future. More recently, two other key objectives of several nations have been instrumental in accelerating development for an alternative fuel, independence from foreign oil and securing renewable, affordable energy sources. Most experts suggest that hydrogen as an alternative fuel has the elements to address all three of these concerns. In its purest form there are zero emissions, the supply is endless and production may use a variety of energy sources, including renewable.

The purpose of this paper is to explore and understand the challenges related to moving to a hydrogen-fueled economy. The efforts of some countries and leaders in the automotive sector are reviewed as they strive to develop the technology and find possible answers to production, storage and distribution challenges. There are many opinions on how best to proceed. Some favor moving directly to a hydrogen infrastructure, while others advocate transitioning by using hydrogen fuel cell technology. While the problems of migrating to hydrogen are complex, there is no doubt that hydrogen is the energy source for the 21st century.

(from Brenda Johnston, Michael C. Mayo, Anshuman Khare: Hydrogen: the energy source for the 21st century, Technovation 25 (2005) 569–585.)