

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. What is an emerging contaminant? Please try to define it. List 3 emerging contaminants. (10%)
2. Given a diprotic acid, H_2A , and its dissociation reactions as follows. (10%)
 $H_2A \leftrightarrow HA^- + H^+ \quad pK_{a1} = 3$
 $HA^- \leftrightarrow A^{2-} + H^+ \quad pK_{a2} = 7$
What is the dominant species (i.e., H_2A , HA^- , or A^{2-}) when $pH = 5$ and why? What is the $[H^+]$ when $[HA^-]/[A^{2-}] = 0.5$?
3. Describe the processes and their functions involved in a typical water treatment plant. (10%)
4. What is an oxygen sag curve (OSC)? What information does an OSC tell you? (10%)
5. Describe in detail the four major components in "Risk Assessment". (10%)
6. Biochemical oxygen demand (BOD) is an important water quality parameter. Briefly describe how BOD is measured and its significance. Is BOD a suitable water quality indicator for industrial wastewaters and why? (10%)
7. What is "Pollution Standards Index (PSI)" and its classification? Please indicate the air pollutants that PSI considers. (10%)
8. List 3 common groundwater pollutants. List 3 physical, chemical, and biological processes that can determine the fate and transport of pollutants in groundwater systems. What is the Darcy's law? (10%)
9. Describe the structure of a typical hazardous waste landfill. Please also indicate the function of each component. (10%)
10. What is the cause(s) of water shortage that often occurs in late spring to early summer in Taiwan? As a prospective environmental engineer, please come up with 3 potential approaches toward solving this problem. (10%)