科目：水處理工程　適用：土木所環管

編號：473

考生注意：
1.依次序作答，只要標明題號，不必抄題。
2.答案必須寫在答案卷上，否則不予計分。
3.限用藍、黑色筆作答；試題須隨卷繳回。

本試題共 / 頁
第 / 頁

一、 Distinguish between dissolved substances, suspended solids, and colloidal substances based on their size and the mechanism by which they can be removed from water. (15 points)

二、 Define the following kinetic parameters (including their mathematical models, units, definitions and importance) popularly used in the growth and substrate utility of microorganisms. (1) specific growth rate, $\mu$; (2) yield coefficient, $Y$; (3) specific substrate utilization rate, $q$; (4) decay coefficient, $k_d$. (20 points, each 5 points)

三、 Sketch and label a rapid sand filter identifying the following pertinent features: inlet main, outlet main, washwater outlet, collection laterals, support media (graded gravel), graded filter sand, and backwash troughs. (15 points)

四、 The water treatment plant for the town of Gettysburg, PA, was built 20 years ago. Over the last few years, there has been difficulty in maintaining water pressure in the system over the 4$^{th}$ of July weekend. In some parts of town only a trickle of water flows from the tap during early morning and late evening hours. There are no problems during the remainder of the year. Explain why the town may be having water pressure problems. (15 points)

五、 Draw and describe the profiles of a batch process biomass growth phases with changes in substrate and biomass versus time. (15 points)

六、 Please list and discuss the methods of removing phosphate from wastewater. Describe the phosphorus accumulating organisms how to achieve the functions of bio-phosphorus release and uptake by altering anaerobic and aerobic processes. (20 points)