

國立成功大學

115學年度碩士班招生考試試題

編 號：102

系 所：環境工程學系

科 目：環境工程概論

日 期：0203

節 次：第 1 節

注 意：1. 可使用計算機
2. 請於答案卷(卡)作答，於
試題上作答，不予計分。

Total Score: 100 points

1. Glossaries/abbreviations. (3 points for each, 15 points total)

- (1) Colloid's electric double layer
- (2) Reverse osmosis
- (3) Leachate
- (4) Bioremediation
- (5) PM_{10}

2. Water supply engineering

- (1) Please list the drinking water quality standards in Taiwan, categorized into the three main groups. For each group, include at least two specific sub-items along with their units. (5 points)
- (2) Please provide a flow chart of the water purification process when the raw water turbidity is 900 NTU. (10 points)

3. Wastewater treatment

- (1) How to treat wastewater containing both hexavalent chromium (Cr^{6+}) and cyanide (CN^-)? *Hint: staged treatment* (10 points)
- (2) Explain the purpose of coagulation and flocculation and the four mechanisms involved in the process. (10 points)

4. Air quality and climate change

- (1) Illustrate the formation pathways of tropospheric O_3 and discuss the environmental conditions and precursor requirements that lead to ground-level O_3 accumulation and pollution events. (10 points)
- (2) What are the three scopes of Carbon Footprint Verification, categorized by the GHG Protocol? (10 points)

5. Air pollution control

- (1) What are the five mechanisms of particulate filtration? (5 points)
- (2) Which particle size is more challenging to capture using conventional treatment methods, 0.3 μm or 50 nm? Provide the reasoning. (10 points)

6. Waste management to circular economy

A hazardous industrial waste incinerator processes waste with the elemental analysis results (wet basis, weight %) shown in the table below. Assume the incinerator operating conditions are: 40% excess air, complete combustion is achieved, and the air consists only of N_2 and O_2 .

C	H	O	N	S	Cl	Ash	Moisture
50%	6%	20%	1%	2%	1%	5%	15%

Please calculate:

- (1) Theoretical air required to burn 1 kg of waste (Nm^3/kg -waste). (5 points)
- (2) Corrected SO_2 concentration in the flue gas after being corrected to 11% oxygen content. (10 points)