



UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA
SECOND SEMESTER EXAMINATIONS, MAY 2019

COURSE NO: ES 472

COURSE NAME: Water and Wastewater Treatment

CLASS: ES IV

TIME: 3 HOURS

Name: _____ Index Number: _____

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

Question One [Total of 20 Marks]

- a) Your ability to float a paper clip is due to surface tension. List and explain 2 properties of water which play an important role in surface tension. Give one real life example where surface tension is important. **(5 marks)**
- b) To remove a wet glassware stuck in another is quite difficult. However, this is not experienced when both glassware are dry. Explain why this is so. **(2 marks)**
- c) A lake has a surface area of 70.8 ha. For the month of June, the inflow was $1.5 \text{ m}^3/\text{s}$. The dam regulated the outflow (discharge) from the lake to be $1.25 \text{ m}^3/\text{s}$. If the precipitation recorded for the month was 7.6 cm and the storage volume increased by an estimated $650,000 \text{ m}^3$. What is the estimated evaporation in m^3 and cm? **(5 marks)**
- d) Explain the following:
- i. Lentic water
 - ii. Euphotic zone
 - iii. Benthic zone
 - iv. Limnetic zone
- (8 marks)**

Question Two [Total of 20 Marks]

- a) Differentiate between the following;
- i. Sewage and sewerage
 - ii. Influent and effluent

- iii. Pollutant and contaminant
 - iv. Coagulation and flocculation **(6 marks)**
- b) Adsorption is a popular water treatment method;
- i. Define adsorption **(1 mark)**
 - ii. List and briefly explain two factors that affect adsorption efficiency **(4 marks)**
 - iii. Describe how adsorption is used in water treatment **(3 marks)**
- c) List four pathogens commonly found in water and waste water **(2 marks)**
- d) Compare the quality of surface and underground water based on the following water quality parameters;
- i. Microbial quality
 - ii. Chemical quality **(4 marks)**

Question Three [Total of 20 Marks]

- a) Define the following and give one example under each;
- i. Macrophyte
 - ii. Deposit feeder
 - iii. Nekton
 - iv. Neuston **(6 marks)**
- b) Disinfection is a method used in the treatment of water;
- i. What is a disinfectant? **(1 mark)**
 - ii. Give three properties of disinfectants necessary for water treatment **(3 marks)**
 - iii. List two disinfectants commonly used in water treatment and state one advantage and one disadvantage of each **(4 marks)**
- c) List three water borne diseases caused by viruses and give one effect of each **(3 marks)**
- d) Distinguish between suspended particles, colloidal particles and dissolved particles and state one way by which they can be removed from water **(3 marks)**

Question Four [Total of 20 Marks]

- a) What are the three categories of contaminants in drinking water? Give one example under each group **(3 marks)**
- b) Describe how the principle of softening and ion exchange can be used in water treatment **(5 marks)**
- c) Give two sources, two negative effects and the unit processes that could be employed to remove the following physico-chemical parameters in water
- i. Turbidity
 - ii. Odour and taste
 - iii. Organic compounds **(9 marks)**
- d) What are indicator organisms? Give two properties of indicator organisms **(3 marks)**