



UNIVERSITY OF SWAZILAND  
Faculty of Health Sciences  
Department of Environmental Health Science

DEGREE IN ENVIRONMENTAL HEALTH SCIENCES

RE-SIT EXAMINATION PAPER JULY 2019

TITLE OF PAPER : FUNDAMENTALS OF SEWAGE TREATMENT

COURSE CODE : EHS 212

DURATION : 2 HOURS

MARKS : 100

INSTRUCTIONS :

- : READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
- : ANSWER **ANY FOUR** QUESTIONS
- : EACH QUESTION **CARRIES 25** MARKS.
- : WRITE NEATLY & CLEARLY
- : NO PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM.
- : BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

**QUESTION ONE**

- a) What is the importance of the following with regards waste water treatment? [4]
  - 1. Dissolved oxygen
  - 2. Oxygen demand
  - 3. Biochemical oxygen demand
  - 4. Chemical oxygen demand
- b) What are the characteristics of waste water? Give examples for each characteristic as conceptualized by Metcalf and Eddy. [16]
- c) What is the major concern with eutrophication in a waste water treatment plant [2]
- d) Describe the biological processes in a facultative pond [3]

**QUESTION TWO**

- a) Specify the functions of the following in a stabilization pond;
  - i. Primary treatment [2]
  - ii. Secondary treatment [2]
  - iii. Tertiary treatment [2]
- b) Give three attributes of a maturation pond [6]
- c) The table below represents examples of organic and inorganic chemical constituents of waste water. Copy the table as is and complete filling up the spaces under sources of each of the constituents mentioned. [11]

Inorganic constituents	Source	Organic constituents	Source
Alkalinity		Carbohydrates	
Chlorides		Fats, oils and greases	
Heavy metals		Pesticides	
Nitrogen		proteins	
Phosphorus			
Priority pollutants			
Sulfur			

- d) Differentiate between the following eubacteria and archaebacteria [2]

**QUESTION THREE**

- a) State four advantages of stabilization ponds as a means of waste water treatment [8]
- b) If you were asked to introduce the facility called trickling filter to an audience that has never heard about trickling filters. What would you say is a trickling filter? [6]
- c) Chlorination is typically a final stage of treatment and disinfection before discharge of final effluent. Discuss five problems associated with chlorination. [5]
- d) What is the function of the primary sedimentation tank in trickling filter waste treatment facility [2]
- e) Give at least four qualities associated with a good filter medium in a trickling filter facility [4]

**QUESTION FOUR**

- a) There are three components of a trickling filter namely the rotary distributor, the filter medium and the underdrain system. What are the functions of each of these components? [15]
- b) In terms of the water pollution regulations of 2010, what are the effluent standards for Total Coliforms and Faecal Coliforms respectively [4]
- c) The Activated Sludge facility consist essentially of three major components.
  - i. Name the components [3]
  - ii. State function of each component [3]

**QUESTION FIVE**

- a) Using your knowledge on trickling filter layout configuration, give at least five by-products in a Trickling Filters waste water treatment process including where they emanate from. [10]
- b) What are the five key differences between stabilization ponds and trickling filters [10]
- c) Sewage collection and treatment is typically subject to local and state regulations and standards. Specify the regulations [3]
- d) Differentiate between the terms re-purification and recycling in waste water treatment processes [2]