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

DEGREE IN ENVIRONMENTAL HEALTH SCIENCES

MAIN EXAMINATION PAPER MAY 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

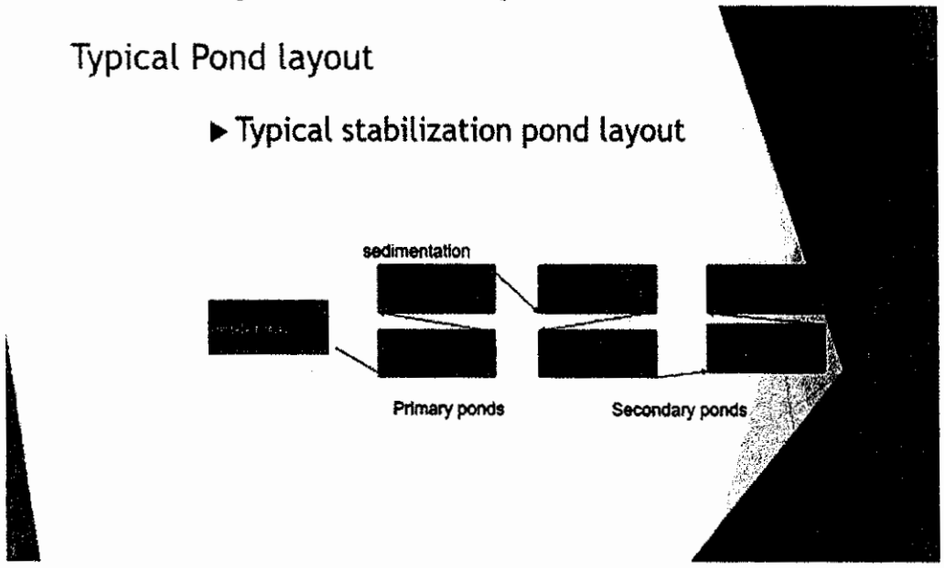
a) You are employed as an assistant to a waste water treatment facility design engineer. Your job is to collect data that can feed to the whole design of the project. Indicate and justify eight data requirements that make it possible for your boss to design a proper waste water treatment facility **[16]**

b) Waste Water Treatment and Waste Water Engineering as a field has evolved rapidly. As a result, new significant changes have now taken place. A typical example is the notion of taking waste water as a source of energy, nutrients and potable water. Write short notes giving examples of waste water as a source for;

i. energy [3]
ii. nutrients [3]
iii. potable water [3]

QUESTION TWO

a) Below is a typical layout for an ordinary maturation ponds. Indicate the bye products from each of the stages of treatment at this ponds. **[10]**



b) Define the term 'sewage treatment' [1]

c) What are the two key objectives of 'sewage treatment' [4]

d) Screening involves the use of various screen sizes during primary treatment. Give the three normal screen names and their corresponding sizes **[6]**

e) Give two reasons why there is a need for pretreatment when carrying out waste water treatment **[2]**

f) In an Activated Sludge process the following abbreviations are given. What do they stand for:

   i. RAS **[1]**

   ii. SAS **[1]**

QUESTION THREE

a) Concerning primary treatment methods like Cesspools and Septic tanks are there differences in configurations. Raise four points in trying to explain your answers. **[4]**

b) Why is sewage purification through the use of biological waste treatment plants necessary? [6]

c) There are at least four critical factors that are important in the design and operation of an Activated Sludge process for waste water treatment. Which are those? **[8]**

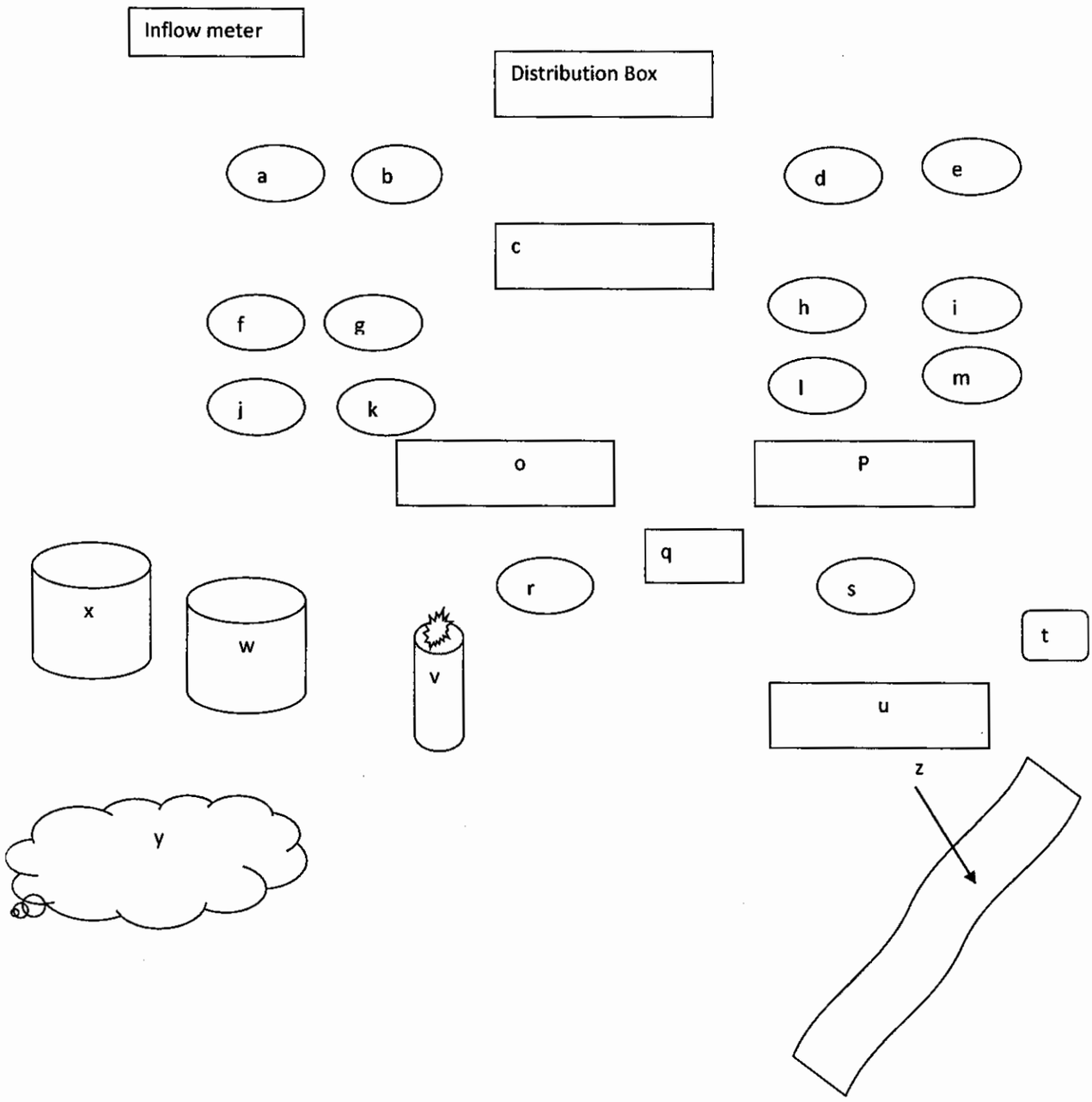
d) Evaluate waste water sources for Ezulwini and Matsapha town respectively and suggest possible waste water characteristics of the respective areas mentioned **[7]**

QUESTION FOUR

a) Indicate the various daily operational observations that a waste water treatment supervisor must make in order for a treatment plant to operate efficiently. [5]

b) Discuss five usual problems associated with trickling filter processes and how you can go about solving those problems. **[5]**

c) Consider the following diagram overleaf as the configuration of a biological trickling filter plant. Label the layout from l – Z accordingly. **[15]**


Inflow meter
Distribution Box
a
b
c
d
e
f
g
h
i
j
k
l
m
o
P
q
r
s
t
u
v
w
x
y
z

QUESTION FIVE

a) There are three component parts of trickling filter tanks. These are the Rotary distributors, filter medium and the underdrain system. State the functions of each. **[6]**

b) The Activated Sludge is consider a superior treatment system compared to the other treatment system. Give at least two reasons why this is so. **[2]**

c) The following are certain parameters of concern for human and environmental health in waste water namely; suspended solids, biodegradable organics, pathogens, nutrients, priority pollutants, heavy metals and dissolved inorganics. Give reasons for the said concern under each parameter. [7]

d) Waste water management is a complex exercise involving a number of management aspects. Discus at least seven. [7]

e) BOD in sewage treatment is good and bad. Discuss this statement with regards to BOD as an important parameter in sewage treatment. [3]