National Open University of Nigeria
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja
Faculty of Science
OCTOBER, 2019_2 EXAMINATIONS

COURSE CODE: ESM 322
COURSE TITLE: Water and Wastewater Management .
CREDIT: 2 Units
TIME ALLOWED: 2 Hours
Instruction: Attempt question number ONE (1) and any other THREE (3) questions. Question number one (1) carries 25 marks, while the other questions carry (15) marks each.

1a) Define fresh water **(1mk)**
1b) What is On-site disposal and treatment system? **(1mk)**
1c) Highlight the concept of Wastewater **(3mks)**
1d) List the causes of Freshwater Pollution **(5 marks)**
1e) State the basic objectives of wastewater treatment **(4mks)**
1f) List the methods that wastewater treatment can be classified into **(3mks)**
1g) Draw a schematic diagram for Aerobic systems with surface application **(8mks)**

2a) What are the constituents of freshwater **(2mks)**
2b) State the ways in which domestic wastewaters can disposed? **(3mks)**
2c) Complete the table by stating the objectives against the stated levels **(10mks)**

Level	Objective
Pre-treatment	
Primary	
Secondary	
Tertiary	
Disinfection	

3a) Define the following phrases **(2mks)**
(i) Primary Treatment
(ii) Secondary Treatment.
3b) List the activities that are involved in primary treatment **(3mks)**
3c) Discuss the following types of secondary treatment systems available for use **(10mks)**

i. **Subsurface Absorption Fields**
ii. **ETA Systems**
iii. **Lagoons**
iv. **Aerobic Systems**
v. **Constructed Wetlands.**

4a) Elucidate on the History of Water Treatment **(11mks)**
4b) Within the context of waste water treatment and management differentiate between influent and effluent **(4mks)**

5a) Name the techniques in which wastewater can be classified **(1mk)**
5b) All sewage is waste water but not all wastewater is sewage discuss? **(4mks)**
5c) In the aerobic system, relate how the septic tank and the equalization tank are employed for primary treatment of sewage **(4mks)**
5d) Explain the three sedimentation options available for sewage treatment in the Secondary stage **(6mks)**