



**National Open University of Nigeria**  
**Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja**  
**Faculty of Sciences**  
**2021 EXAMINATIONS**

**COURSE CODE:** ESM 322

**COURSE TITLE:** Water and Waste Water Management

**CREDIT:** 2 Units

**TIME ALLOWED:** 2 Hours

**Instruction:** Attempt question number ONE (1) and any other THREE (3) questions. Question number one (1) is compulsory and carries 25 marks, while the other questions carry equal marks (15) each

- 1a). State Four causes of freshwater pollution? (4 marks)
  - b) In what ways can the concentration of heavy metals increased and in turn degrade water quality? (4 marks)
  - c) What is the effect of arsenic as a contaminant of water on man? (3 marks)
  - d) Highlight five sources of wastewater. (5 marks)
  - e) What is the role of synthetic organic compound as class of water pollutant? (4 marks)
  - f) Discuss how agriculture is a source of water pollutants in a drainage basin. (5 marks)
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- 2a) Discuss the influence of the occurrence of trace metals and mercury on water quality (5 marks)
    - b) Explain the principle of industrial water reuse (5)
    - c) Discuss the principle of waste sludge reuse (5 marks)
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- 3a) Explain sediment filtration treatment technology as a unique water conservation tool (5 marks)
  - b) Discuss water softening as a unique technology in water quality treatment and conservation (6 marks)
  - c) Highlight on the process of distillation in water quality treatment (4 marks)
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- 4a) What is the difference between portable water and potable? (5 marks)
  - b) Explain aeration and sedimentation as a process in water quality (4 marks)
  - c) Highlight on Ultraviolet (UV) radiation and ozonization as an advance process in water quality treatment (6 marks)
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- 5a). State five (5) biological systems available for treating biodegradable wastewater from crudest to the most modern (5 marks)
  - b) Highlight on the merit and demerit of primary treatment process in regards to application and efficiency in wastewater treatments (8 marks)
  - c) State the application of anaerobic and aerobic digestions on sludge treatment as a process in wastewater treatment (2 marks)