



**National Open University of Nigeria**  
**Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja**  
**Faculty of Science**  
**POP EXAMINATION 2022\_2**

**COURSE CODE: ESM341**

**COURSE TITLE: Introduction to Instrumentation Measurement and Field Methods in Environmental Science**

**CREDIT: 2Units**

**TIME ALLOWED: 2 Hours**

**Instruction:** Attempt question number ONE (1) and any other TWO (2) questions. Question number one (1) carries 30marks, while the other questions carry (20) marks each.

- 1a Discuss the instrumentation for laboratory analyses; a method of data acquisition (4 marks)
- 1b Explain the attributes of remote sensing techniques (4 marks)
- 1c Describe the remote sensing technique (2 marks)
- 1d What is a spectrometer and its functions? (5 marks)
- 1e Draw and label a typical colorimeter (10 marks)
- 1f Write short notes on Global Positioning Systems (GPS) receiver (5 marks)
  
- 2a Succinctly define a Quadrat and its different approaches to sampling unit (5marks)
- 2b Describe the principles of adopting random sampling technique using Quadrat frame (4 marks)
- 2c Explain the interval to be used in Quadrat survey (8 marks)
- 2d Explain the term; electrical conductivity of a body (3 marks)
  
- 3a How are pH of a body measured? (5 marks)
- 3b Describe any two protocols of measuring pH of a liquid using pH Meter (5 marks)
- 3c Discuss the result analysis of pH and electrical conductivity (5 marks)
- 3d Explain the technique of Atomic Absorption Spectrophotometry (5 marks)
  
- 4a Draw and label a typical colorimeter (5 marks)
- 4b Define and explain chromatography (5 marks)
- 4c Write short notes on: (5 marks)
  - i. Grab (instantaneous or short term) air sampling instrumentation
  - ii. Integrated (average or long term) air sampling instrumentation
- 4d Describe the purpose of sampling (5 marks)

- 5a Briefly explain what sampling error means (6 marks)
- 5b Describe any of the two principles of direct reading instrumentation (3 marks)
- 5c Write short note on multiple samplers (5 marks)
- 5d Discuss the constituents of fixed meteorological station? (6 marks)