



**NATIONAL OPEN UNIVERSITY OF NIGERIA**  
**Plot 91, Cadastral Zone, Nnamdi Azikwe Expressway, Jabi, Abuja**  
**FACULTY OF SCIENCES**  
**DEPARTMENT OF ENVIRONMENTAL SCIENCE AND RESOURCE MANAGEMENT**  
**2025\_1 EXAMINATION...**

**COURSE CODE: ESM 341**

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

**CREDIT: 2 Units**

**TIME ALLOWED: 2 Hours**

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

- 1a). Enumerate three steps by which a liquid sample can be turned into an atomic gas. (6 marks)
- 1b i). What is a total station? (2 marks)
  - ii). List five (5) applications of a total station. (5 marks)
- 1c). What is the implication of using small interval in quadrant survey? (4 marks)
- 1d). List four (4) uses of gas chromatography. (4 marks)
- 1e.) What are the particular metadata of radiation measurement? (4 marks)
- 1f). Give five (5) types of measurements using a lysimeter? (5 marks)
- 2a). Define pH and Electrical Conductivity. (6 marks)
- 2b). Mention four (4) environmental factors that affect pH and electrical conductivity. (4 marks)
- 2c). Give three (3) cogent reasons why belt transect is more desirable than line transect? (6 marks)
- 2d). State four (4) criteria that are needed in selecting a particular instrument for laboratory analysis. (4 marks)
- 3a). Explain what a microphone is. (4 marks)
- 3b). List the four (4) types of microphones. (4 marks)
- 3c) Describe the types of Microphones. (12 marks)
- 4a). Explain how to measure dissolved oxygen. (12 marks)
- 4b). Briefly discuss how a stratified sample can be obtained. (6 marks)
- 4c). Identify the two (2) types of meteorological stations. (2 marks)
- 5a). Mention three (3) important reasons for using integrated sampling procedure for air borne gaseous agents. (7 marks)
- 5b). List five (5) instruments that are needed for field survey. (5 marks)
- 5c). State two (2) reasons why quality assurance is essential in a thorough scientific investigation. (4 marks)
- 5d). Explain two functions of the neutron probe among radioactive methods? (4 marks)