



National Open University of Nigeria  
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja  
Faculty of Science  
2023\_1 POP 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 THREE (3) questions. Question number one (1) carries 25 marks, while the other questions carry (15) marks each.**

- 1a) Of what relevance is the shape of a quadrant in data gathering? (2mark)  
1b) What are spiral type absorbers? (2marks)  
1c) What is the importance of hot disk anemometer? (1mark)  
1d) In quadrant survey, what is the implication of using small interval? (4 marks)  
1e) List three applications of solar radiation measurement. (3 marks)  
1f) Identify two causes of sampling error and explain each one of them. (7marks)  
1g) State three important reasons for using integrated sampling procedure for air borne gaseous agents. (6 marks)
- 2a) Explain how to measure dissolved oxygen. (5 marks)  
2b) What are direct reading instruments? (3marks)  
2c) Complete the table below by indicating the investigation each sensor can be used for (3marks)  
2d) List four uses of gas chromatography (4marks)
- 3a) What are the particular metadata of radiation measurement? (4 marks)  
3b). Briefly explain Time Domain Reflectometry (TDR) (7marks)  
3c). Explain what a total station is? (4 marks)
- 4a). Explain the use of a lysimeter? (6 marks)  
4b)What are the parameters needed for the selection of a technique for instrumentation for laboratory analyses? (5marks)
- 4c). Name any five satellites for investigating evapotranspiration (4marks)
- 5 a). Explain line and belt transects (10marks)  
5b). Define preponderance Hydrogen (pH) and Electrical Conductivity (EC) (3marks)  
5c). What is Atomic Absorption Spectrophotometer (AAS)? (2marks)