

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2022
(First Semester)

Branch – ENVIRONMENTAL SCIENCE

INSTRUMENTATION METHODS FOR ENVIRONMENTAL SAMPLES

Time: Three Hours

Maximum: 50 Marks

SECTION – A (5 Marks)

Answer ALL Questions

ALL Questions carry EQUAL marks (5 x 1 = 5)

1. The secondary electrons radiated back in scanning microscope is collected by?
(i) specimen (ii) anode (iii) vacuum chamber (iv) cathode
2. Polarographic cells type of electrochemical method uses which of the following concepts?
(i) Cyclic reactions (ii) Exothermic reactions
(iii) Reversible reactions (iv) Redox reactions
3. Which of the following has to be computed to determine transmittance and absorbance at various frequencies?
(i) Ratio of signal and noise (ii) Ratio of sample and reference spectra
(iii) Sample spectra (iv) Reference spectra
4. The ions are passed into the high vacuum analyser through which of the following?
(i) Orifice (ii) Nozzle (iii) Nebulizer (iv) Venturi tube
5. Which of the following acts as quenching gas in Geiger Muller counter?
(i) Krypton (ii) Argon gas (iii) Alcohol (iv) Hydrogen

SECTION – B (15 Marks)

Answer ALL Questions

ALL Questions carry EQUAL marks (5 x 3 = 15)

6. a. What is liquid-solid extraction? What solvents are used in the process of liquid-solid extraction?
OR
b. Explain the various ways to minimize the errors.
7. a. Illustrate the potentiometric titration principle and their applications.
OR
b. State the use of grab samplers for sampling of benthic organisms.
8. a. How does Electron Paramagnetic Resonance work?
OR
b. Explain the instrumentation of fluorescent analyzer for detecting SO₂.
9. a. State the basic operating principles of the TOC analyzer.
OR
b. Discuss the strengths and limitations of GC-MS.
10. a. What are the types of nuclear radiation? Explain.
OR
b. Evaluate the various applications of stable isotopes in environmental studies.

Cont...

SECTION – C (30 Marks)

Answer ALL Questions

ALL Questions carry EQUAL marks (5 x 6 = 30)

11. a. Classify the different kinds of measurement errors and their instances during instrumentation.
- OR
- b. Illustrate the principle and working mechanism of Scanning Electron Microscopy (SEM) with neat sketch.
12. a. Explain the principle and applications of cyclic voltammetry.
- OR
- b. Elucidate the procedure for water sampling using auto-samplers.
13. a. Enumerate the principle and working mechanism of FTIR with diagram.
- OR
- b. Explain the working principle and instrumentation of ICP-MS for detecting metals.
14. a. Differentiate the gradient elution and isocratic elution in HPLC separation.
- OR
- b. Analyze the significance of Artificial Intelligence (AI) in the mapping and measurement of soil pollution.
15. a. How is carbon dating used to determine the age of animal and plant fossils? Explain.
- OR
- b. Differentiate between Geiger Muller Counters and Scintillation Counters.

Z-Z-Z

END