

Reg. No .....

Name .....

23P153

**M. Sc. DEGREE END SEMESTER EXAMINATION : NOVEMBER 2023**

**SEMESTER 1 : ENVIRONMENTAL SCIENCE**

**COURSE : 21P1EVST04 : TECHNIQUES IN RESEARCH**

*(For Regular -2023 Admission and Improvement / Supplementary 2022/ 2021 Admission)*

Duration : Three Hours

Max. Weights: 30

**PART A**

**Answer any 8 questions**

**Weight: 1**

1. Define electrophoretic mobility. (U, CO 3)
2. What is rate zonal centrifugation? (R, CO 3)
3. What is indirect ELISA? (U, CO 4)
4. Explain on the principle of Geiger Muller counter. (U, CO 3)
5. Comment on the calibration of pH meter. (An, CO 5)
6. What is magnification? (R, CO 1)
7. Comment on the applications of spectrophotometer. (R, CO 3)
8. What are the advantages of using graded series of alcohol in dehydration? (U, CO 5, CO 6)
9. Define retention time. (U, CO 2, CO 3)
10. What is electronic spectroscopy? (R, CO 3)  
**(1 x 8 = 8)**

**PART B**

**Answer any 6 questions**

**Weights: 2**

11. Write down the applications of nanosensors (A, CO 2, CO 3)
12. Differentiate between SDS and non-SDS PAGE. (An, CO 3)
13. Differentiate between freeze fracturing and freeze etching (An, CO 5, CO 6)
14. Explain the principle and application of SEM. (Cr)
15. Discuss the principle of electrophoresis. (R, CO 3)
16. Explain the principle and applications of gas chromatography (U, CO 2, CO 3)
17. Write a note on scanning tunnelling microscope. (R, CO 1)
18. Distinguish between atomic absorption spectroscopy and flame emission spectroscopy. (An, CO 3)  
**(2 x 6 = 12)**

**PART C**

**Answer any 2 questions**

**Weights: 5**

19. Give an account on the principles, types and applications of different chromatographical techniques. (U, CO 2, CO 3)
20. Explain the process of fixation and staining in histochemistry. Discuss the significance of fixation and staining. (An, CO 5, CO 6)

21. Explain the working and principle of ionization chamber with a neat diagram. (U, CO 3)
22. Explain the principle and working of TEM. (U, CO 1)  
(5 x 2 = 10)

OBE: Questions to Course Outcome Mapping

CO	Course Outcome Description	CL	Questions	Total Wt.
CO 1	Understand the basic concepts of various research techniques and its applications	U	6, 17, 22	8
CO 2	Interpret the working and use of the laboratory equipment.	An	9, 11, 16, 19	10
CO 3	Demonstrate the theory and principle of laboratory equipment.	A	1, 2, 4, 7, 9, 10, 11, 12, 15, 16, 18, 19, 21	26
CO 4	Apply and use the laboratory equipment for research.	An	3	1
CO 5	Compare the equipment and select the appropriate one for research.	An	5, 8, 13, 20	9
CO 6	Maximize acquaintance with state of art laboratory methods in research.	Cr	8, 13, 20	8

Cognitive Level (CL): Cr - CREATE; E - EVALUATE; An - ANALYZE; A - APPLY; U - UNDERSTAND; R - REMEMBER;