

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2019 – 20)

SUBJECT CODE: 19CH/PE/AI15

M.Sc. DEGREE EXAMINATION, NOVEMBER 2022
BRANCH IV- CHEMISTRY
FIRST SEMESTER

COURSE : MAJOR ELECTIVE

PAPER : ANALYTICAL INSTRUMENTATION

TIME : 3 HOURS

MAX.MARKS :100

Section – A

Answer all the Questions:

(20 x 1 =20 marks)

Choose the correct answer:

1. The unit for the molar extinction coefficient is
(a) $\text{Lmol}^{-1}\text{cm}^{-1}$ (b) $\text{Lg}^{-1}\text{cm}^{-1}$ (c) $\text{LKg}^{-1}\text{cm}^{-1}$ (d) no units
2. Which of the following is used in electron microscope?
(a) Electron beams (b) Magnetic fields
(c) light waves (d) Electron beams and magnetic fields
3. Cyclic voltammetry is used for
(a) Qualitative analysis (b) Qualitative analysis
(c) Study and mechanism of redox process (d) Structural analysis
4. The element which imparts beautiful colour in ruby crystal is
(a) Ti (b) Cr (c) Mn (d) Sb
5. The stationary phase in paper chromatography is
(a) Water (b) Paper (c) Buffer (d) HCl

Fill in the blanks:

6. The sample holder for UV-Vis spectroscopy is made up of _____.
7. _____ material is used for making AFM probe.
8. In polarography method of analysis, individual ion from a mixture of ions is detected by measuring their _____ current.
9. Arsenic poisoning can be determined by _____ method.
10. The binder used in stationary phase in TLC is _____.

Match the following:

- | | |
|----------------------------|----------------------|
| 11. ICP-AES | a. Diffusion current |
| 12. TEM | b. Partition |
| 13. Amperometric titration | c. Kinetics |
| 14. Paper chromatography | d. Argon |
| 15. DTA | e. LaB_6 |

Answer in a line or two:

16. Give the possible electronic transitions in $\text{CH}_2=\text{CH}-\text{CHO}$.
17. What are stokes and anti-stokes lines?
18. Give the mathematical Ilkovic equation.
19. Give the expression for the recoil energy of the nucleus.
20. List the carrier gas used in Gas chromatography.

SECTION –B

Answer any five questions:

(5 x 8 = 40 marks)

21. Explain the instrumentation of AAS with a block diagram.
22. Differentiate between scanning and transmission electron microscopy.
23. Write the advantages and disadvantages of dropping mercury electrode.
24. Illustrate the principle and instrumentation of DTA.
25. Discuss the different types of detectors used in HPLC.
26. Explain various currents involved in polarography.
27. Sketch the block diagram of a photoelectron spectrometer and explain how an ultraviolet photoelectron spectrum is recorded?

SECTION –C

Answer any two questions:

(2 x20 = 40 marks)

28. (a) Discuss in detail the instrumentation of infrared spectroscopy. (10)
(b) Elaborate on the principle and working of Scanning electron microscope. (10)
29. (a) Explain the different types of titrations curve in biamperometry. (10)
(b) Discuss the principle and application of NAA. (10)
30. (a) Explain the principle and instrumentation of Gas Chromatography. (10)
(b) Describe about (i) Polarographic maxima (ii) dissolved oxygen. (5+5)
