

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2023-24 & thereafter)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2024
BRANCH IV- CHEMISTRY
FIRST SEMESTER

COURSE : ELECTIVE
PAPER : ANALYTICAL INSTRUMENTATION
SUBJECT CODE : 23CH/PE/AI15
TIME : 3 HOURS

MAX.MARKS :100

Q. No	SECTION A	Answer all Questions (10x 1=10)	CO	KL
1.	The following region of IR spectra appears between (1400 -600) cm ⁻¹	(a) Functional group region (b) Finger print region (c) low frequency region (d) None of the mentioned	CO1	K1
2.	Mössbauer spectroscopy involves nuclear transitions resulting from the absorption of _____ by the sample.	(a) alpha rays (b) beta rays (c) gamma rays (d) x-rays	CO1	K1
3.	XPS works on the principle of	(a) cotton effect (b) photovoltaic effect (c) photoelectric effect (d) b and c	CO1	K1
4.	The transducers in the AFM are made of which of the following?	(a) Quartz (b) Piezoelectric material (c) Tungsten (d) Aluminum	CO1	K1
5.	Cyclic voltammetry is used for	(a) Qualitative analysis (b) Spectral analysis (c) Study the mechanism of redox process (d) Structural analysis	CO1	K1
6.	Working electrode in anodic stripping voltammetry	(a) The classical hanging mercury-drop electrode (b) The thin-film mercury electrode (c) Solid electrodes (d) all of the above	CO1	K1
7.	The fundamental principle of amperometric titration is	(a) measurement of current change (b) measurement of voltage change (c) measurement of resistance change (d) measurement of conductivity change	CO1	K1

8	Impedance diagram plotted between (a) Z vs Z' (b) Z' vs Z'' (c) Z' vs $-Z''$ (d) $\log Z$ vs Z'	CO1	K1
9.	Thermometric titrations are carried out using (a) amperometer (b) voltammeter (c) calorimeter (d) thermistor	CO1	K1
10.	The DSC thermogram is recorded using the parameters (a) Change in mass vs Time (b) Temperature vs Heat flow (c) Mass vs Time (d) Temperature vs Weight	CO1	K1
SECTION B Answer all Questions (10x 1=10)		CO	KL
Fill in the blanks:			
11.	The differential absorption of circularly polarized light is referred as _____.	CO2	K2
12.	AES measures the kinetic energy of an electron to determine it's _____.	CO2	K2
13.	Controlled current coulometry is also known as _____ .	CO2	K2
14.	Cottrell equation is the most useful equation in _____.	CO2	K2
15.	In radiochemical analysis, 1 Curie is equal to _____ Bq.	CO2	K2
Answer in one or two sentences:			
16.	What is ICPAES?	CO2	K2
17.	State the modes of operation in STM.	CO2	K2
18.	State Ilkovic equation.	CO2	K2
19.	What is complex dielectric in EIS?	CO2	K2
20.	List out the radiochemical methods.	CO2	K2
SECTION C Answer any four (4x6=24)		CO	KL
21.	Give a comparative account of atomic absorption and emission spectroscopy.	CO3	K3
22.	Explain the working principle of AFM with a corresponding block diagram.	CO3	K3
23.	Apply the principle of cyclic voltammetry in detailing the significant behavior of the working electrodes employed in it.	CO3	K3

