

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11.	a) Illustrate how flame emission photometry can be used for the estimation of sodium and potassium ions in biological samples.	13	K2	CO1
	(OR)			
	b) Compare FTIR spectrophotometers with dispersive IR spectrophotometers in terms of working principle, resolution, and applications.	13	K2	CO1
12.	a) Explain the principle, instrumentation, and applications of High-Performance Liquid Chromatography.	13	K2	CO2
	(OR)			
	b) Describe the principle and working of gas chromatography with a neat diagram.	13	K2	CO2
13.	a) Analyze the role of gas analyzers in ensuring safe monitoring of H ₂ S and NO ₂ in industrial workplaces.	13	K3	CO3
	(OR)			
	b) Evaluate the effectiveness of dust and smoke measurement methods in assessing air quality in urban vs. industrial regions.	13	K3	CO3
14.	a) Apply the concept of selective ion electrodes to measure sodium concentration in clinical samples.	13	K3	CO4
	(OR)			
	b) Explain the principle of cyclic voltametry and its importance in electrochemical research.	13	K3	CO4
15.	a) Apply the principles of SEM and TEM to suggest suitable microscopy techniques for studying nanoparticles and biological specimens.	13	K3	CO5
	(OR)			
	b) Describe how mass spectrometry can be applied to analyze environmental pollutants and pharmaceutical compound, with suitable examples.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	<p>Case:</p> <p>A pharmaceutical laboratory is tasked with determining the concentration of an unknown solution of paracetamol in a tablet. The lab has a UV-Visible spectrophotometer available for analysis. The absorption maximum (λ_{max}) of paracetamol in the solvent used is known to be 243 nm. During analysis, the absorbance of standard solutions of known concentrations is measured to prepare a calibration curve.</p> <p>Questions:</p> <p>i. Explain the principle of UV-Visible spectrophotometry and how it is applied to determine the concentration of paracetamol.</p> <p>ii. Describe the steps involved in using a UV-Visible spectrophotometer for this analysis. Include the role of single and double beam instruments.</p> <p>iii. Discuss the importance of selecting the correct wavelength (λ_{max}) for the measurement.</p>	5	K2	CO1
	(OR)			
b)	<p>Case:</p> <p>A hospital laboratory is monitoring the pH of patients' blood samples to assess acid-base balance. The lab uses a pH meter with a glass electrode and a reference electrode. During the analysis, some readings appear inconsistent, raising concerns about the accuracy of critical patient data.</p> <p>Questions:</p> <p>i. Explain the principle of pH measurement and how it applies to blood analysis.</p> <p>ii. Describe the construction and working of a glass electrode and a hydrogen electrode in this context.</p> <p>iii. Explain the importance of a reference electrode in ensuring accurate blood pH measurement.</p>	5	K3	CO4