N.B.: (1) All questions are compulsory.
(2) Use of log table or nonprogrammable calculator is permitted.

Q.1 A Attempt any **Two** of the following 8

i What is sampling? Give the criteria for the acceptance or rejection of sample.

ii What are the reference materials? How are they different from laboratory chemicals?

iii What are the method related factors responsible for the incorrect analytical results?

iv What is calibration of measurements? How is it important for good laboratory?

B What are control charts? How is reporting of results carried out in the analytical laboratories? 4

OR

B What do you mean by record Management? Why is it Necessary? How is it done? 4

Q.2 A Attempt any **Two** of the following 8

i How the results of measurement are interpreted to improve the quality of results? Explain with suitable examples.

ii Explain the terms: LOD and LQD

iii Describe the hardware devices for noise reduction.

iv What is the importance of GMP in pharmaceutical manufacturing process? What are the factors included in GMP?

B Three measurements and their uncertainties are as follows: 4
Measurement: $a = 12.39$, $b = 9.38$, $c = 10.17$
uncertainties: $a = 0.015$, $b = 0.012$ $c = 0.009$
If the final measurement is of type $Y = a + b + c$, calculate the combined uncertainty in the measurement of Y.

OR

B A noisy pH meter shows the following values for a solution on repetitive measurement: 4
5.85, 5.82, 5.88, 5.79, 5.92, 5.90, 5.86 and 5.88
Assuming that the noise is random, calculate the signal to noise ratio for the pH meter.

[TURNOVER

Q.3	A	Attempt any **Two** of the following	8
	i	Explain the synthetic ion exchangers, with suitable examples.	
	ii	What do you understand by the terms, ion exchange equilibria and break through capacity of resin?	
	iii	Explain the principle of ion chromatography with the help of instrumentation diagram.	
	iv	Discuss the applications of supercritical fluid extraction method in food analysis.	
	B	200 cm^3 solution of the sodium ion containing 10 g / dm^3 NaCl is allowed to pass through a cation exchange column with 5.4 m mol / g exchange capacity of dry resin. What is the minimum weight of resin required to remove sodium ions completely from the solution?	4
		OR	
	B	Describe the role of suppressor column in ion chromatography. Give the applications of ion chromatography.	4
Q.4	A	Attempt any **Two** of the following	8
	i	What is exclusion chromatography? How is it used for determination of molecular weight of polymers.	
	ii	What are the types of columns and detectors used in supercritical fluid chromatography?	
	iii	Discuss the applications of inverse gas chromatography.	
	iv	Describe briefly the different modes of elution in affinity chromatography.	
	B	Explain the applications of supercritical fluid chromatography.	4
		OR	
	B	Give detailed account of gel permeation chromatography.	4
Q.5		Attempt any **Four** of the following	12
	i	What is the difference between quality control and quality assurance?	
	ii	How is the analytical method validated? What is its importance?	
	iii	What is uncertainty? How is it evaluated?	
	iv	What is the role of FDA in pharma and food industry?	
	v	Give an account of non aqueous ion exchangers.	
	vi	What are the various supercritical fluids used in supercritical fluid chromatography? Which is the most preferred supercritical fluid? Why	
	vii	Explain chelating resins with suitable example.	
	viii	How the inverse gas chromatography differs from other chromatographic techniques?	