M.Sc. Semester I
CHE404 Analytical Chemistry

UNIT-1
Analytical Objectives, Data Handling and Good Laboratory Practice (GLP)
Scope of analytical science and its literature, qualitative and quantitative analysis, ways to express accuracy and precision, types of errors and their causes; significant figures, control charts, confidence limit, test of significance, rejection of a result- the Q-test. GLP- standard operating procedures, quality assurance and quality control, validation of analytical methods.

UNIT-2
Sampling and Calibration Methods
Sampling and sample preparation, general steps in chemical analysis, calibration of glass wares. Finding the best straight line-least square regression, correlation coefficient; Calibration curves, standard addition technique and internal standards. Chemical concentrations.

UNIT-3
Fundamentals of Spectrophotometry

UNIT-4
Applications of Spectrophotometry
Analysis of mixture-resolved and unresolved spectra, measurement of equilibrium constant: Scatchard Plot; Stoichiometry-method of continuous variation- the Jobs plot. Photometric titrations.

M.Sc. Semester I
CHE404 Analytical Chemistry- Theory

Reference Books
M.Sc. Semester I
Analytical Chemistry-CHE406PR -Practicals

2. Calibration of pH meter, conductometer and potentiometer.
3. Determination of nicotine in tobacco (non-aqueous titration).
4. Determination of available chlorine in bleaching powder.
5. Determination of vitamin C in orange juice/amla.
6. Determination of acetic acid in vinegar.
7. Determination of sodium carbonate and sodium bicarbonate in washing soda.
8. Determination of ascorbic acid in vitamin C tablets.
10. Determination of total dissolved solids in water samples.
11. Determination of sulphate in water sample.
12. Determination of chloride in water sample.

References:
UNIT-1
Sample Preparation Techniques
Liquid-liquid extraction/solvent extraction-partition coefficient, distribution ratio and percent extraction. Solvent extraction of metal ions-ion association complexes and metal chelates, multiple batch extraction, Craig’s counter-current distribution. Accelerated and Microwave assisted extraction, protein precipitation and solid phase extraction (SPE).

UNIT-2
Chromatographic Methods
Principles of chromatography, classification of chromatographic techniques based on mechanism of retention, configuration, mobile and stationary phase. Efficiency of separation- plate theory (theoretical plate concept) and rate theory (Van Deemter equation). Principles and applications of Paper chromatography, thin layer chromatography, HPTLC and Ion exchange chromatography. Counter-current chromatography for isolation of natural products.

UNIT-3
pH metry and Conductometry
pH measurement with glass electrode, working of glass electrode, mechanism of pH measurement, calibration of glass electrode, errors in pH measurement. Electrical conductance in solutions of electrolytes, measurement of conductance, conductometric titrations- acid-base, precipitation and complex formation titrations.

UNIT-4
Potentiometry and Ion-selective electrodes
M.Sc. Semester II
CHE410 Analytical Chemistry-Theory

Reference Books

M.Sc. Semester II- Practicals
Analytical Chemistry- CHE412PR

1. Determination of saponification value of oil.
2. Determination of iodine value of oil.
3. Determination of acid value of oil.
4. Determination of dissolved oxygen.
5. Determination of chemical oxygen demand.
6. Determination of iron in iron tablets.
7. Simultaneous estimation of chromium (III) and iron (III) by EDTA titration.
8. Simultaneous estimation of calcium (II) and zinc (II) by EDTA titration.
9. Simultaneous estimation of lead (II) and magnesium (II) by EDTA titration.
10. Separation of amino acids by TLC.
11. Separation of drugs by TLC.
12. Separation of dyes by TLC.

References