PROPOSED SYLLABUS

For the Certificate Course

UNIT 1- **2 Credits**

Basic Aspects of Analytical Chemistry- Classification of different techniques, Criteria for evaluating the utility of Analytical Techniques. Emerging needs and recent trends.

UNIT 2- **4 Credits**

Evaluation of Analytical Data- Errors. Determinant, constant and indeterminate. Accuracy and precession, distribution of random errors. Average deviation and Standard deviation. Variance and confidence limit. Significant figures and computation rules. Least Square method, Methods for sampling, samples size. Techniques of sampling of gases, fluids, solids and particulates.

UNIT 3- **7 Credits**

Chromatographic Methods- General principle, classification of chromatographic methods, nature of partition forces. Theoretical aspects of chromatographic separations. Paper chromatography. Development and detection applications. Thin layer Chromatography, Stationary supports applications. Chromatographic behaviour of solutes. Coloumn efficiency, Liquid coloumn chromatography. Solid liquid chromatography,liquid liquid chromatography. Development techniques.

Gas chromatography- Theory of gas chromatography, Instrumentation, sampling methods; applications. HPLC-basic concepts of HPLC, applications.

Ion exchange chromatography-Ion exchange resins and their characteristics. Inorganic ion exchangers and chelating reagents.

UNIT 4- **7 Credits**

Laboratory Experiments:

- Caliberation of volumetric apparatus and weights, and stastical treatment of data.
- Determination of percentage of tin in brass sample gravimetrically
- Determination of Ni(ll) in steel gravimetrically using Dimethyl Glyoxime
- Determination of total alkalinity of a water sample
- Determination of Ascorbic acid in Vitamin C tablet iodimetrically.
- Determination of Hardness of water
- Determination of Available chlorine in bleaching powder sample iodometrically
- Separation of Cations by paper chromatography.
- Separation of Amino Acids by paper chromatography
- Separation of Fatty Acids by Thin Layer Chromatography
- Separation of Chlorophyll pigments by coloumn chromatography
- Solvent extraction separation of Felll) with ethyl acetate in HCI medium.
- Separation of Co(ll) and Ni(ll) by ion exchange.
- Separation of Cl^- Br^- and I^- from their mixture.
- Visit to an Industry/Research Lab

SYLLABUS

For Diploma Course

Syllabus of certificate course and in addition/the following is the syllabus

UNIT 1- **3 Credits**

Electro Analytical Methods-Classification of electro analytical methods, Electrode potential, Nernst equation, Cell potential,

UNIT 2- **5 Credits**

Potentiometry- Concept of pH, pH meter, Measurement of pH, pH titrations

Conductometry- Electrolytic conductance, Strong and Weak electrolytes, Measurement of conductance, Conductometric titrations

UNIT 3 **5 Credits**

Thermal methods- Theory instrumentation and applications of Thermo gravimetric method of analysis(TGA),Differential thermal methods of analysis(DTA) and Differential scanning calorimetry(DSA). Applications

UNIT 4 **7 Credits**

LAB EXPERIMENTS

- pH titration of stong acid(Battery acid)
- pH titration of a .weak acid-determination of pKa.
- Potentiometric titration of strong acid with strong base using Quinhydrone electrode
- Potentiometric determination of Cl'content in common salt using $AgNO_3$
- Potentiometric titration of Fe(ll) with $K_2Cr_2O_7$
- Conductometric titration of strong acid with stong base
- Conductometric determination of acetic acid content in Vinegar
- Conductometric titration of a mixture of strong acid and weak acid with a base.
- Demonstration of TGA and DTA and DSF.
- Visit to an Industry/ Research lab

SYLLABUS

For Advance Diploma

In addition to the syllabus of Certificate and Diploma course the following is the syllabus.

SPECTRAL METHODS:

UNIT 1- 2 Credits

Properties of Electromagnetic radiation- Electromagnetic radiation, Quantisation of energy electromagnetic spectrum, interaction of radiation with matter

UN IT-2 2 Credits

UV -visible Spectroscopy- Principle and Instrumentation, Beer Lamberts law, Nature of absorbing species- organic and inorganic, sampling techniques, Photometric Titrations, Application in Real Sample Analysis eg-in soil, alloys, minerals etc

UNIT -3 2 Credits

Infra red Spectroscopy- Principle, origin of Infra Red spectra, instrumentation, Dispersive and FT IR, Applications.

UN1T-4 1Credit

Flame photometry and Atomic Fluorescence- Principle, Instrumentation, Quantitative Analysis, Applications

UNIT-5 3 Credits

Atomic Absorption and Emission Spectroscopy- Principle, Instrumentation, Quantitative and Qualitative Analysis, Applications in Real Sample Analysis eg soil ,water, minerals, biological sample etc

UNIT-6 3 Credits

NMR spectroscopy- Principle, Instrumentation, Application

UNIT-7 7 Credits

LAB EXPERIMENTS:

- Spectrophotometric determination of Fe(ll) using ortho phenanthroline
- Spectrophotometric determination of Ni(ll) using DMG
- Spectrophotometric determination of Cr and Mn in a mixture
- Characterisation of functional group in organic compounds using IR spectroscopy
- Characterisation of functional group in organic compounds using NMR spectroscopy
- Flame photometric determination of Na and K or Ca and Mg
- UV spectroscopy determination of ethyl methl ketone
- Visit to Industry/Research Lab