

**B.Sc. (NEP) SEMESTER-II  
MINOR (VOC): THEORY**

<b>Programme:</b>	<b>Year: I</b>	<b>Semester-II</b>
<b>Course Code:</b> CHE(N)-121		
<b>Course Name:</b> Analytical Chemistry		
<b>Credit:</b> 3		
<b>Max. Marks:</b> 70+30 =100		

**Course Objective and Outcomes:**

The purpose of the course is to develop skill for handling analytical equipment/glassware, sampling and analysis of the samples, data analysis and presentation of the results in scientific format.

**Syllabus Details**

**Block-1: Qualitative and quantitative aspects of analysis**

**Unit 1: Analytical approaches**

Types of errors, precision & accuracy, Significant figures; significant figures in Arithmetics-addition, subtraction, multiplication and division. Mean and standard deviation.

**Unit 2: Laboratory apparatus and measuring equipment**

Laboratory Apparatus: Laboratory burner; Bunsen burner, obtaining warm gentle flame with the burner, hottest flame of the burner. Cutting and bending of glass tubing/glass rod, Measuring Equipment: Pipette, burette, chemical balance, least count

**Unit 3: Chemical Concentration**

Normality, molarity, preparation of solution of defined normality/molarity of a given compound and from a given solution of different strength, percent composition, part per million (ppm), part per billion (ppb), calculations.

**Unit 4: Titration:**

Types of titrations, end point, equivalence point, Indicators-types and theory.

**Unit 5: Solubility and Extraction**

Solubility-Definition, predicting solubility behaviour, water as a solvent, organic solvents. Extraction-Theory, distribution coefficient, separation and drying agents.

**Unit 6: Physical Constants**

Melting points, melting point theory, mixture melting point, packing of melting point tube, Determination of melting point; decomposition, discoloration, softening, shrinking and sublimation. Boiling point, determination of boiling point.

## **Unit 7: Distillation**

Simple distillation, distillation theory, fractional distillation, difference between simple and fractional distillation, vapour-liquid composition diagram, Raoult's Law, types of fractionating columns, column efficiency, azeotropes.

## **Block-2: Separation techniques**

### **Unit 8: General Aspects of Chromatography**

Introduction, Classification of chromatographic methods, Efficiency of techniques, Mechanism of Separation, Development of Chromatograms

### **Unit 9: Adsorption Chromatography**

Introduction, classification, Principle, Efficiency of techniques, Mechanism of Separation, Development of Chromatograms

### **Unit 10: Ion Exchange Chromatography**

Introduction, Principle, Ion exchange materials, Mechanism of Separation, Ion exchange capacity

## **Block 3: Spectroscopic Methods of Analysis**

### **Unit 11: UV-Visible Spectrometry**

Properties, absorption of light, transmittance, absorbance and Beer's Law. Basic principles, instrumentation for single and double beam instrument and its application.

### **Unit 12: Infrared Spectrometry**

Basic principles, instrumentation for single and double beam instrument and its application.

**B.Sc. (NEP) SEMESTER-II**  
**MINOR (VOC): (LABORATORY WORK/PRACTICAL)**

<b>Programme:</b>	<b>Year: I</b>	<b>Semester-II</b>
<b>Course Code:</b> CHE(N)-121L		
<b>Course Name:</b> Laboratory Course-IX		
<b>Credit:</b> 1		
<b>Max. Marks:</b> 50		

**Course Objective and Outcomes:**

After completing this course, the learners will be able to purify the compounds by distillation and crystallization methods. Learners able to determine the melting/boiling point of the pure compound and separate and identify the sugars by chromatographic techniques.

**Syllabus Details**

**Block-1: Laboratory hazards and safety**

Unit 1: Laboratory hazards and safety precautions

**Block -2: Experiment**

**Unit 2: Criteria of Purity**

1. Determination of melting point
2. Determination of boiling point
3. Purification of organic compounds by crystallization (from water and alcohol) and distillation.

**Unit 3: Titrations and chromatography**

1. Acid base titration
2. Identify and separate the sugars present in the given mixture by chromatography

**Distribution of marks shall be as given below:**

- |  |   |    |
|--|---|----|
| 1. Melting /Boiling point and purification of compounds          | : | 12 |
| 2. Titration   | : | 12 |
| 3. Chromatography exercise                                       | : | 11 |
| 4. Viva  | : | 05 |
| 5. Home assignment/internal assessment,lab record and attendance | : | 10 |