

DEPARTMENT OF CHEMISTRY

VALUE ADDED COURSE

Semester	Course Code	Course Title	Hours
III	21UCHVAC1	SOIL AND WATER CHEMISTRY	30

Course Outcomes:

- At the end of the course students will be able to
- CO1: Understand the composition of soils
 - CO2: Infer the optimal growth conditions for plants
 - CO3: Analyze the soil quality
 - CO4: Categorize the types of water and sources of water pollution
 - CO5: Interpret the quality of water

UNIT-I

6 hrs

Properties of Soil

Soil- definition, composition, types. Soil pH- importance of soil pH on plant growth, saline, alkaline and acidic soils, reclamation of acidic and alkaline soils. Fertilizer – definition, classification, role of fertilizers on plant growth, adverse effects. Soil for banana, cotton, ground nut, sugar cane, paddy and maize cultivation.

UNIT-II

6 hrs

Properties of Water

Water: types of water- hard and soft water, types of hardness-temporary and permanent, softening of water, water pollution-causes and remedial measures. Water quality parameters-hardness, pH of water, electrical conductivity, turbidity, TDS, DO, BOD, COD- standards and limits (WHO and BIS)

UNIT-III

6 hrs

Soil Testing Practical -I

Determination of soil pH, electrical conductance and turbidity by soil analyzer kit

UNIT-IV

6 hrs

Soil Testing Practical -II

Determination of Na, K and Ca in soil by flame photometer

UNIT-V

6 hrs

Water Quality Analysis -Practical

Determination of water pH, electrical conductivity, turbidity, TDS and DO. Preparation of a comparative report of standard values (WHO & BIS) and experimental values.

Text Books:

S. No	Author	Book	Edition	Publisher Details	Year	Units Covered
1.	L. Bhattacharya	Text Book of Soil Chemistry	1 th Edition	Discovery Publishing House, New Delhi	2019	I, III & IV
2.	R L Arya And Khalil Khan	Fundamentals of Soil Science	1 th Edition	Scientific Publishers, Jodhpur	2020	I, III & IV
3.	James Edzwald	Water Quality and Treatment	4 th Edition	McGraw Hill Inc, New York	1990	II & V

Semester	Course Code	Course Title	Hours
V	21UCHVAC2	CRYSTALLISATION AND CHROMATOGRAPHY TECHNIQUES	30

Course Outcomes:

At the end of the course, students will be able to

CO1: Understand the methods of crystallisation

CO2: Explain the principles and techniques of column and thin-layer chromatography techniques.

CO3: Purify the compounds by crystallisation technique.

CO4: Analyse and detect the sample by thin layer chromatography

CO5: Separate the isomers of a compound by column chromatography technique

Unit – I 6 hrs

Crystallisation

Principle, Methods of crystallisation – Melt crystallisation, Suspension crystallisation; solvents for recrystallization, Precipitation, Nucleation, Supersaturation, Common challenges in crystallisation. Processes involved in crystallisation, applications.

Unit-II 6 hrs

Chromatography Techniques

Chromatography – Adsorption, Partition chromatography. Column Chromatography - Principle, Adsorbents, developers, solvents, columns, packing of the columns, elution, eluting solvent selection-polar and non-polar; Applications. Thin Layer chromatography – Principle, R_f , preparation of chromatoplates, application of sample on the chromatoplates, choice of adsorbents, selection of solvent, locating reagents, developing chamber, development of chromatogram and Applications.

Unit-III Practical 6 hrs

Crystallisation of simple compounds

Zinc oxide, Copper sulphate, Sodium acetate, Sodium Chloride, Potash alum, Phthalic acid, Benzoic acid, Acetyl salicylic acid, Urea and Sugar.

Unit – IV Practical 6 hrs

Thin Layer Chromatography

Separation of Mixture of benzophenone and naphthalene

Separation of Mixture of 2-nitrophenol and 4-nitrophenol

Separation of Mixture of Diphenylamine, Benzophenone and Naphthalene

Separation of Mixture of Azobenzene, Hydroxyazobenzene and p-aminoazobenzene

Unit – V Practical 6 hrs

Column Chromatography

Separation of $KMnO_4$ and $K_2Cr_2O_7$

Isolation of 2-nitrophenol and 4-nitrophenol

Text Books:

S. No.	Author Name	Book Name	Edition	Publisher detail	Year	Units Covered
1.	P.S. Subramanian R.Gopalan, K Rangarajan.	Elements of Analytical Chemistry	-	S. Chand & company Ltd, New Delhi.	2003	I & III
2	V. K. Srivastava and K. Kishore	Introduction to chromatography- Theory and practice	3 rd edition	S. Chand & company Ltd, New Delhi.	1991	I & III
3	Brian S. Furniss, Antony J. Hannaford, Peter W. G. Smith and Austin R. Tatchell	Vogel's Text Book of Practical Organic Chemistry	5 th Edition	Longman Group	1989	I - V