

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UCHVAC1	Value Added Course-I	30	-	-	100	100
Course Title							
Thin Layer Chromatography and Separation Techniques							

SYLLABUS		
Unit	Contents	Hours
I	Thin Layer Chromatography 1.1 Thin Layer Chromatography-Principle, techniques of thin layer chromatography- preparation of chromatoplates, application of sample on the chromatoplates, 1.2 Choice of adsorbents, selection of solvents, locating the reagents, developing chamber, development, types, location of compounds. 1.3 R _f value, factors affecting R _f value, detection, estimation and identification.	6
II	Distillation Techniques Principles, applications and experimental procedures of distillation, fractional distillation and reduced pressure distillation	6
III	Thin Layer Chromatography-Practical-I 3.1 Preparation of TLC plates 3.2 Separation of commercial inks	6
IV	Thin Layer Chromatography-Practical-II Separation of dyes: 4.1 Malachite green, 4.2 Fluorescein, 4.3 Rhodamin-B	6
V	Separation Techniques – Practical 5.1 Purification of aniline by distillation. 5.2 Separation of organic liquid mixture by fractional distillation. 5.3 Removal of solvent from a reaction mixture by reduced pressure distillation.	6

Text Book(s):
1. V. K. Srivastava, K. Kishore, Introduction to Chromatography: Theory and Practice, S. Chand, New Delhi, 3 rd Edition (Reprint), 1987
Reference Book(s):
1. H. Kaur, Instrumental Methods of Chemical Analysis, Pragati Prakashan, Meerut, 12 th Edition, 2016.
Web Resource(s):
1. https://www.youtube.com/watch?v=gaBXQW9rCDA

Course Coordinator: Dr. M. Anwar Sathiq

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCHVAC2	Value Added Course -II	30	-	-	100	100
Course Title		Molecular Structure Drawing by Chemdraw and Chems sketch					

SYLLABUS		
Unit	Contents	Hours
I	Molecular Structure Drawing Tool ChemDraw-Introduction, Installation, Main tool bars – Drawing molecular structures, drawing the frame work of a structure, Drawing Bonds of Different Types/Changing Bond Types, Introducing Atom Labels – special characters.	6
II	Manipulations with selected Objects Manipulations with selected objects- Select Objects, Move Objects, Copy Objects, Rotate and Mirror Objects, Stretch / Shrink / Scale Objects, Structure Perspective, Join Objects. Chems sketch - Draw chemical structures, organic compounds – benzene, aniline, naphthalene, biphenyl, anthracene and butadiene, organometallics compounds-Ni(Co) ₄ , Fe(Co) ₅ , polymers- PVC, Nylon -6,6 and calculation of their molecular properties.	6
III	ChemDraw- Practical-I <ul style="list-style-type: none"> Drawing of molecules-acyclic, cyclic, heterocyclic and bicyclic systems Analysis of molecules -formula, exact mass and elemental analysis Graphical representation of reaction scheme 	6
IV	ChemDraw-Practical-II <ul style="list-style-type: none"> Chemical structures to IUPAC names IUPAC naming to chemical structures 2D structures into 3D structures Prediction of boiling point, melting point, critical temperature, critical pressure, critical volume and heat of formation 	6
V	ChemDraw Practical -III Prediction of ¹ H NMR & ¹³ C NMR of following compounds: Methanol, Acetophenone, Benzene, Pyrrole and Naphthalene	6
Text Book(s):		
1. Dr. Stefan Bienz, Short Manual to the Chemical Drawing Program ChemDraw, University of Zurich.		
Reference Book(s):		
1. Jake Woods, Chemdraw Professional: Biologist and Chemists scientific drawings Tool (Tutorial User Guide), Create Space Independent Publishing Platform, 2017.		
Web Resource(s):		
1. https://www.acdlabs.com/resources/free-chemistry-software-apps/Chems sketch-freeware/ 2. https://library.columbia.edu/content/dam/libraryweb/locations/dsc/Software%20Subpages/ChemDraw_17_manual.pdf		

Course Coordinator: Dr. M. Yaseen Mowlana

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23PCHVAC1	Value Added Course	30	-	-	100	100
Course Title		Column Chromatographic Techniques					

SYLLABUS		
Unit	Contents	Hours
I	Definition-Principle-Adsorbents-types-Silica, Alumina, Calcium carbonate, Calcium Phosphate and Starch-Criteria for selecting good adsorbent-Selection of stationary phase-Adsorbent for compounds containing less polar and polar functional groups.	6
II	Stationary phase and mobile phase-Selection of stationary and mobile phase for the effective separation- selection of mobile phase in the increasing order of polarity.	6
III	Column characteristics-preparation of the column-packing techniques-dry and wet packing.	6
IV	Development technique-Isocratic elution-Gradient elution-Detection of the components-Factors affecting column efficiency-Advantages and disadvantages	6
V	Practical-Separation of non-polar binary mixtures (at least two samples)	6

Text Book(s):
1. Dhruva Charan Dash, Analytical Chemistry, PHI Learning Pvt Ltd, 2 nd Edition, 2017.
Reference Book(s):
1. E. Hywel Evans and Mike E.S, Analytical Chemistry a Practical Approach, Oxford University Press, 1 st Edition, 2019.
Web Resource(s):
https://www.oup.com.au/_data/assets/pdf_file/0019/135073/Chemistry-for-QLD_9780190313395_sample-chapter-13_secure.pdf

Course Coordinator: Dr. M. Syed Ali Padusha