

SUBJECTCODE:1SC2030204	TITLEOF PAPER: ANALYTICALCHEMISTRY-II
COURSETYPE: CORECOURSE	

Course Objective: To impart knowledge and training in chemistry at advanced level, make aware with recent analytical technique, use of reagent sand reactions in laboratory, synthesis and study of materials, the exploration of their properties and development of ways to use the mineral life.

Teaching scheme (hours) per week		Credit			Theory Marks		Practical Marks		Total
Theory	Practical	Theory	Practical	Total	Uni. Assessment	Cont. Assessment	Uni. Assessment	Cont. Assessment	
4	2	4	2	6	60	40	30	20	150

UNIT	DISCRIPTION IN DETAIL	WEIGHTAGE
I	Fundamentals of Spectrophotometry and UV-Visible Spectroscopy Various electronic transition(185-800nm),Beer-lambert law effect of solvent on electronic transition, Ultraviolet bands of carboyl compounds, unsaturated carbonyl compounds, dienes, conjuagatedpolyenes, Fiesher- Woodwards rule for conjugated dienes,and carbonyl compounds, UV spectra of aromatic and heterocyclic compounds, Steric effects in biphenyls. Example based on UV spectra	25%
II	(A)Fundamental of NMR & CMR Spectroscopy: 1H NMR Nuclear spin, nuclear resonance, saturation, shielding of magnetic nuclei, chemical shift and its measurements, factors influencing chemical shift, deshielding, spin spin interactions, factors influencing coupling constant 'j'. Classification (ABX, AMX, ABC, A2B2 etc.) spin decoupling; basic ideas about instrument. Advantages of FT NMR use of NMR in medical diagnostics. Principal, basic of NMR (Peak height, Peak signal, Chemical shift,) instrumentation and applications of NMR, Criteria for a compound to be NMR active. Basic components of instrumentation of PMR and CMR. Shielding-deshielding, splitting, Example based on NMR Spectra 1H and 13C (B)Electron Spin Resonance Spectroscopy Hyperfine coupling,Spin polarization for atoms and transition metals ions, spin-orbital coupling and significance of g-tensors, application to transition metal complexes (Having one paired electron), including biological system and to inorganic free radical such as PH4, F2- and [BH3]-	25%
III	MASS Spectroscopy Introduction ion production,EI,CI,FD and FAB factors affecting fragmentation,ion analysis ion abundance,Mass spectral fragmentation of organic compounds, common functional group, molecular ion peak, Mclafferty rearrangement, Nitrogen rule, High resolution mass spectrometry, Example of mass spectral fragmentation of organic compound with respect to their determination. Example based on Mass Spectra	25%
IV	Infrared Spectroscopy	25%

	Instrumentation and sampling, Characteristic vibration frequencies of alkanes, alkenes, alkynes, compounds, alcohols, ethers, phenol and amines. Detailed studies of frequencies of carbonyl compounds. (ketones, aldehydes, esters, acids, amides, anhydrides, lactones, lactams and conjugated carbonyl compounds) effect of hydrogen bonding and effect of solvent on vibrational frequencies, overtones, combinations bands and Fermi resonance, FTIR, IR of gaseous, solids and polymeric materials. Example Based on IR Spectra **Example based on above all the spectra	
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Learning Outcome

To provide the basic knowledge of very important concepts of the analytical chemistry (Sampling and Calibration Methods, Volumetric Method of Analysis, Gravimetric Analysis). To provide overview of the applications of these concepts in applied field to the student so as an objective. Students can learn the basic analytical and technical skills to work effectively in the various fields of chemistry. To know and understand the issues of safety regulations in the use of chemicals in their laboratory work.

PRACTICALS

1. Estimation of lead and Cadmium using solvent extraction method.
2. Determination of Ca by flame-photometric method.
3. Determination of Na by flame-photometric method.
4. Determination of K by flame-photometric method.
5. Determination of Li by flame-photometric method.
6. Estimation of paracetamol by UV-visible spectrophotometry (colourimetry).
7. Estimation of Ibuprofen by UV-visible spectrophotometry (colourimetry).
8. Water analysis part-2 (D.O., C.O.D.).
9. Estimation of binary mixture by EDTA (Ca²⁺ and Mg²⁺).
10. Estimation of binary mixture by EDTA (Pb²⁺ and Mg²⁺).
11. Graphical interpretation of IR and NMR spectra.
12. To determine the acid value of an oil sample.
13. To determine ester value of an oil sample

LIST OF BOOKS:

1. Quantitative Chemical Analysis" by Daniel C. Harris, 5th Edition, W.H. Freeman and Company, New York.
2. Analytical Chemistry" by Gary D. Christian, 6th Edition, John Wiley and Sons Inc. New Jersey.
3. Principles of Instrumental Analysis" by Douglas A. Skoog, 3rd Edition, Holt-Saunders International Edition.
4. Instrumental Methods of Chemical Analysis" by Galen W. Ewing, 4th Edition, International Student Edition
5. Handbook of instrumental techniques for analytical chemistry, F. Settle, Prentice Hall
6. Spectroscopy of organic compounds by Silverstein
7. Spectroscopy of organic compounds by P.S. Kalsi