GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. SEMESTER : 3
ENVIRONMENTAL SCIENCE & TECHNOLOGY

Subject Code: 133502

Subject Name : **ANALYTICAL TECHNIQUES**

Sr. No.	Course contents
01.	Fundamentals of Analytical Chemistry: Concept of quality: Definition of quality, Quality control & assurance, TQM. Correlation between quality & analysis, steps & types of chemical analysis, Stoichiometry & expression of concentration.
02.	Theory of errors: Sources & classification of errors. Statistical treatment of analytical data & presentation of result. Sampling of solids, liquids & gases. Evaluation & validation of analytical methods. Good laboratory practices.
03.	Volumetric analysis: Acid base titrations: Indicators; Oxidation-reduction titrations; Complexation using ligands, complexometric titration with EDTA, metal ion indicators; simple calculations; analysis of Na_2CO_3,Fe_2O_3 , Brass, Solder etc.
04.	Quantitative analysis. Precipitation, types of precipitates, impurities, co precipitation , post-precipitation, conditions for precipitation, precipitation from homogeneous solution. Gravimetric determination of Fe, Ni & Cu, calculations.TGA
05.	Chromatographic methods: Introduction & classification of chromatography. Theory, instrumentation & applications of the following chromatographic techniques: (i) Column chromatography (ii) TLC (iii) Paper chromatography (iv) GC (v) HPLC
06.	UV-Visible Spectroscopy: Introduction , Theory of UV-Visible Spectroscopy & colourimetry, Beer Lambert law, Deviation from Beer Lambert law Infrared Spectroscopy: Introduction, Infrared radiation & its interaction with organic molecules, vibrational mode of bonds, instrumentation & applications, interpretation of IR spectra. Nuclear magnetic resonance spectroscopy: Introduction, Theory & Instrumentation, chemical shift concept, spin spin coupling ,isotopic nuclei, reference standards & solvents, applications. Mass spectrometry: Basic principles & brief outline of instrumentation. Ion formation, molecular ion, meta stable ion, fragmentation process in relation to molecular structure & functional groups. Relative abundance of isotopes, chemical ionization, applications

Reference Books:

1. Instrumental Methods of Chemical Analysis, E. W. Ewing, McGraw Hill, NewYork. 4th Ed, 1975
2. Instrumental Methods of Analysis, H.H.Willard, L.L.Merrit, J.A.Dean, & F.A.Settle, Jr., CBS Publishers & Distributors, New Delhi, 6th Ed,1998
3. Principles of Instrumental methods of analysis, Skoog, D.A., Holler F.J. & Nieman T.R.,Indian reprint ,2006
4. Inorganic quantitative analysis, A.I.Vogel, Longman, ELBS,7th Ed, 1998

APPROPRIATE NUMBER OF PRACTICALS WILL BE CONDUCTED AS PER THE THEORY SYLLABUS