

Department: Electronics and Instrumentation Engineering				Programme: B.Tech. (EI)				
Semester : Seven				Category : TA				
Subject Code	Subject	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
EI123	Analytical Instrumentation	4	-	-	4	40	60	100
Prerequisite	-							
Objectives	<ul style="list-style-type: none"> To provide a solid background in the fundamental concepts and methods of spectroscopy, chromatography & environmental pollution and an appreciation of issues in each of these fields in current research. 							
Outcome	<ul style="list-style-type: none"> Acquire knowledge about the interaction of electromagnetic radiations with matter and apply analytical techniques to accurately determine the elements present in the given sample. Select Instrument for a particular analysis with come idea of its merits, demerits and limitations Learn specific technique employed for monitoring different pollutants in air and water. They can understand the applications and usage of chromatography in real time industrial environments. 							
UNIT – I	Spectroscopy						Hours: 12	
<p>Electromagnetic radiation - Electromagnetic spectrum - Spectral methods of analysis. Absorption spectroscopy – Emission Spectroscopy – Beer Lamberts Law.</p> <p>UV – Visible spectrophotometers – Single beam and double beam instruments – Sources and detectors.</p> <p>IR spectrophotometers –Sources and detectors – Sample handling techniques – FTIR spectrometers – Raman Spectrometers</p>								
UNIT – II	Flame, NMR & Microwave Spectroscopy						Hours: 12	
<p>Flame emission spectrometry – Atomic absorption spectrometry - NMR, ESR / EPR spectroscopy – basic principles – instrumentation techniques and applications.</p>								
UNIT – III	Mass Spectrometers & Radiation Measurement						Hours: 12	
<p>Ion sources – Types: Magnetic Deflection – Time of Flight – Quadrupole Mass Spectrometers - single focusing and double focusing mass spectrometers – principles and application</p> <p>Ionization chamber - Proportional counter – GM counter - scintillation counter - solid state detector - Gamma ray spectrometers - isotope dilution and tracer techniques for quantitative estimation and analysis</p>								
UNIT – IV	Chromotography						Hours: 12	
<p>Gas chromatography – Methods of analysis in gas chromatography - Column details</p> <p>Detectors: Thermal conductivity detectors- Flame ionization detectors - Flame photometric detectors - Electron capture detectors - Effect of temperature.</p> <p>Liquid chromatography – Pre column - Separation column - Detectors - HPLC.</p>								
UNIT – V	Environmental Pollution Monitoring Instruments						Hours: 12	
<p>Introduction to air and water pollution – Review of primary and secondary pollutants - Conductivity and water purity meters – Carbon Monoxide, Sulphur dioxide, Hydrogen Sulphide & NO monitors – oxygen analyzers.</p>								
Total contact Hours: 60			Total Tutorials: -			Total Practical Classes: -		Total Hours: 60
Text Books:								
<ol style="list-style-type: none"> R.S.Khandpur, Handbook of Analytical Instruments, Tata McGraw Hill Publishing, 9th Reprint, 2011 Bela.G.Liptak, Analytical Instrumentation, CRC Press, 1994. 								
Reference Books:								
<ol style="list-style-type: none"> Pooja Bhagwan, A Handbook of Chemical Analysis, International Scientific Publishing Academy, 2009. Gallen Wood Ewing,, Analytical Instrumentation Hand book, Second Edition,, CRC Press 1997. 								