Enclosure – VI

Shree Manibhai Virani & Smt. Navalben Virani Science College (Autonomous)

Affiliated to Saurashtra University, Rajkot

Department of Industrial Chemistry

Semester - I		
Course Code	Course Title	Course Credit
18PICCE02	CEC-2: Advance Instrumentation Techniques IR, HPLC, GCMS, AES	3 Credits

Short Term Course (STC)

Course Description: The course comprises of theoretical and practical knowledge of IR, GCMS, HPLC & AES and hands on training.

Course Purpose: Able to handle the instruments like IR, HPLC, GCMS, MPAES and can analyses the spectra.

Course Outcomes: Upon completion of this course, the learner will be able to		
CO No.	CO Statement	Blooms taxonomy Level (K_1 to K_6)
CO_1	Prepare samples for IR analysis using different cells and functional group identification by analysis of spectra.	K5, K5

CO_2	Knowledge about working & characteristic of each part of Gas chromatography and able to handle the instruments and can separate the mixtures of multi compounds.	K4, K5
CO_3	Able to handle the Mass spectrophotometer and knowledge of working phenomena of each part of instrument.	K4, K5
CO_4	Analyses the sample quantitatively to find out the % by different methods and calculations and identify it qualitatively. Preparation of sample solution of different concentrations.	K4, K5
CO_5	Able to handle the instrument and identify the various elements in sample applying knowledge.	K4, K5

Course Content	Hours
Module-I : Analysis by Fourier Transform Infrared spectroscopy	5 hrs
• Introduction, construction, working and difference between FTIR & Dispersive IR. Advantages of FTIR over dispersive IR. • Explanation of SOP & Demonstration of working of instrument on the basis of SOP. • Analysis of solid and liquid sample preparation using KBr pellet method and study of spectrum obtained. • Few case studies.	
Module-II : Analysis by Gas chromatography	5 hrs
• Introduction, Explanation, demonstration of each part of GC and it's working setting of parameters on the basis of SOP. • Actual practice of injection and handling of instrument. • Sample preparation and calculation. • Separation of mixture to determine the composition quantitatively by standard method. • Few case studies.	
Module-III : Analysis by Mass spectrometry	5 hrs
• Principle, Introduction, explanation and demonstration of each part of MS on the basis of SOP. • Sample preparation and analysis of solid and liquid samples. • Interpretation of spectra based on fragmentation pattern.	
Module-IV : Analysis by High Performance Liquid Chromatography	6 hrs
• Introduction to liquid chromatography and types of chromatography. Construction and working of the instrument, as per the SOP basis. • Explanation and preparation of solution, calculation and quantitative	

determination. • Preparation of solution, practicing of injecting the sample individually. • Calculation using graph and formula, conclusion by result. • Few case studies.	
Module-V : Analysis by Atomic Emission Spectroscopy	6 hrs
• Introduction, explanation and working phenomena of each part of MPAES basis on SOP. • Sample and standard solution preparation and calibration. • Identification of elements present in samples using spectra. • Few case studies.	

Suggested laboratory experiments:
• Experiments/Demonstration based on IR, HPLC, GCMS, MPAES instruments.

Pedagogic tools:
• Lectures
• Group exercise or projects
• Demonstrations • Practice sessions

Text books
• Pavia, D. L., Lampman, G. M., et al 2015. Introduction to spectroscopy. India: Cengage Learning India Private Limited. • Snyder, L. R., Kirkland, J. J. 2010. Practical HPLC Method development 2nd edition. Wiley-Interscience. • Moore, G. L. 1988. Introduction to Inductively Coupled Plasma Atomic Emission Spectrometry. Elsevier Science.
Laboratory Manual/ Book
• Lab Manual of Industrial Chemistry Department, Shree M. & N. Virani Science College, Rajkot.

Suggested reading / E-resources
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Suggested MOOCs
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Methods of assessing the Course Outcomes The COs of the course will be assessed through
• Assignments • Practical's • Seminar