Enclosure - XIC

SHRI MANIBHAI VIRANI & SMT. NAVALBEN VIRANI SCIENCE COLLEGE (AUTONOMOUS), RAJKOT

Department of Industrial Chemistry

Semester - I		
Course Code	**Course Title**	**Course Credit**
19PICCE01	**CEC-1: Scientific Writing**	**2 Credits**

Short Term Course (STC)

Course Description:
Literature survey and problem finding is required for research work. The course contains literature search using various tools like NLIST, NPTEL science direct and other e-sources. Knowledge about articles, communications, review and patent is important for writing research papers. The course consisting topics about the chemistry structure drawing tools.

Course Purpose:

1. To understand the significance of Science direct search for data searching and mining.
2. To understand the NPTEL, NLIST search engine tools for scientific interest.
3. To be able to draw chemistry structures using chemdraw tools.
4. To be able to read and understand the patents.

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	Investigate literature search using NLIST, NPTEL, Science Direct and various E-resources.	K1, K2
CO_2	Understand variance between various Full paper, article, patent, communication and review article.	K1, K2
CO_3	Understand the IPR policy, patent filling, significance and Intellectual patent applications.	K1, K2
CO_4	Competent to draw various chemical structure, various assembly, chrial compounds, laboratory apparatus using ChemBioDraw, Chem Sketch.	K3, K4
CO_5	Understand the application of chembiodraw and chemsketch for drawing reactions in various scientific journals.	K3, K4

Course Content	Hours
Module-I : N-List & Science Direct search	3 hrs
• Introduction of NLIST website, available e-resources. • Access of e-books and research articles. • E-learning through NPTEL. • Introduction to publishing house, various journals formats. • Various search option, recent publication. • Citation index, impact factor, h index.	
Module-II : Articles Review & Scientific writing	3 hrs
• Difference between Full article, letters, note, communication, mini review and review with case study. • Writing research article: Introduction, result & discussion, chemistry, Experimental section, acknowledgement & references.	
Module-III : Patent	2 hrs
• Introduction to IPR (Intellectual property rights), Patent searching, downloading, reading and filling. • Difference between patent and provisional patent. • Significance of Patent.	
Module-IV : Chemdraw Software-1	2 hrs
• Introduction of ChemDraw, Chem Sketch, Drawing chemical reaction, Structure drawing using templates, Structure to name and name to structure, Drawing mechanism of reaction, • Diagram of Distillation Assembly, Chiral Structure Draw. Drawing apparatus used in laboratory. Reproducing reaction scheme from given research paper. • Introduction of 3 D Chemdraw ultra, export chemical structure from 2D to 3D, run energy minimization of given molecule & other physicochemical parameters for given set of molecules.	
Module-V : Chembiodraw Software-2	2 hrs
• Introduction of 3 D Chemdraw ultra, export chemical structure from 2D to 3D, run energy minimization of given molecule, predicting logp value & other physicochemical parameters for given set of molecules.	

Suggested laboratory experiments:
• Not applicable

Pedagogic tools:
• Chalk and Board
• LCD and Videos.
• Hands on training
• PPT presentation

Text books
1. F. J. Waller, Writing chemistry patents and intellectual property: A practical Guide, Wiley, 2002.
Laboratory Manual/ Book
1. American Chemical Society. Division of Chemical Information, American Chemical Society. Meeting, (1989), Chemical structure information systems: interfaces, communication, and standards *Volume 400 of ACS symposium series Chemical structure information systems: interfaces, communication, and standards*, American Chemical Society.

Suggested reading / E-resources
• NList • NPTEL • Science Direct journals

Suggested MOOCs
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Methods of assessing the Course Outcomes The COs of the course will be assessed through
• CIE • Assignment • Seminar

Semester - I		
Course Code	**Course Title**	**Course Credit**
19PICCE02	**CEC-2: Advance Instrumentation Techniques IR, HPLC, GCMS, AES, AAS**	**2 Credits**

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

Course Purpose: Able to handle the instruments like IR, HPLC, GCMS, MPAES, AAS 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	6 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	6 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	6 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 & Absorption Spectroscopy	6 hrs
• Introduction, explanation and working phenomena of each part of MPAES & AAS 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, AAS 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
• Not applicable

Suggested MOOCs
• Not applicable

Methods of assessing the Course Outcomes The COs of the course will be assessed through
• Assignments • Practical's • Seminar

Evaluation Norms & Guidelines for the Courses unique to

M.Sc. Industrial Chemistry Program (Sem.: I to IV)

Semester - I

	Scientific Writing	**1 hrs./wk**	**2 Credit 100 marks**

The course will be evaluated through continuous internal evaluation only, all the following components are compulsory for the evaluation of the course.

Components	**Detail**	**Marks**
Assignment- 1	Drawing of Reaction scheme and mechanism using templates with nomenclature.	15
	Drawing of Experimental assemblies	10
	Study of 3D structure and prediction of physicochemical properties	10
Assignment- 2	Information retrieval (e-books, research articles& reviews) using NLIST & ScienceDirect/SciFinder	15
Seminar	Review article, Patent & Research paper presentation	20
Test	Computer Based Test	30
	Total	**100**

Guideline for Scientific Writing:

1) There is no passing minimum for CIA.
2) There is no provision for reappearance or improvement of marks in CIA.
3) All the components of CIA evaluation are compulsory.
4) After completion of the course students will get remarks.

	STC/Online Courses/ Professional Certification Courses	**1 hrs./wk**	**2 Credit**

The course will be evaluated through continuous internal assessment only, all the following components are compulsory for the evaluation of the course.

STC	
Component	**Marks**
Active Participation/Attendance	10
Assignments (Task/Seminar)	10
Practical performance	10
Objective Test	20
Total	**50**

At the end of the semester no marks be given, only remarks will be given as follows:

Range of Marks	**Remarks**
45-50	Excellent
40-44	Very good
30-39	Good
20-29	Fair
Below 20	Not completed

Online Courses/ Professional Certification Courses
On submission of **Online Courses/ Professional Certification Courses** passing certificate students will earn 2 credits.

Guideline for STC/Online Courses/ Professional Certification Courses:
1) There is no passing minimum for CIA.
2) All the components of CIA evaluation are compulsory.
3) The candidate is permitted to appear for Objective test for STC only if he/she has minimum of 80% attendance.
4) After submission of the online / professional certification course passing certificate, the students will earn 2 credits.
5) After completion of the STC students will get remarks and earn 2 credits.