Enclosure-VIII

Sarvodaya Kelavani Samaj managed,

Shri Manibhai Virani and Smt. Navalben Virani Science College

(Autonomous)

(Affiliated to Saurashtra University, Rajkot)

Re-Accredited at 'A' Level by NAAC

STAR college Scheme & Status by MST-DBT

UGC- College with Potential for Excellence (CPE)

UGC-DDU KAUSHAL Kendra

GAAA –Grade A-1 by KCG, Government of Gujarat

GPCB-Government of Gujarat approved Environment Audit Center

Nodal Center for capacity building by GSBTM

DEPARTMENT OF CHEMISTRY

Syllabi, Evaluation Norms & Guidelines for the courses unique to the Department

M.Sc. Chemistry Program

Semester - I			
Course Code	**Course Title**	**Instruction hrs**	**Course Credit**
19PCECE01	**CEC-I: Scientific Writing (Chem Draw Tools)**	**1 hrs / wk**	**2 Credits Evaluation at the End of SEM-2**

Course Description:
Literature survey and problem finding is required for research work. The course various tools like Chem Draw, Chem Sketch and other e-sources. The course consisting topics about the chemistry structure drawing tools.

Course Purpose:
1. To understand the significance of Chem Draw software.
2. To understand the NPTEL, NLIST search engine tools for scientific interest.
3. To be able to draw chemistry structures using chemdraw tools.

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	Understand the application of chembiodraw and chemsketch for drawing reactions in various scientific journals.	K1, K2
CO_2	Generate IUPAC nomenclature from structures & vice versa	K2, K3
CO_3	Predict and correlate physicochemical & spectral properties and characteristics of chemical / materials	K2, K3
CO_4	Study spatial arrangement of molecules and energy minimization.	K1, K2
CO_5	Search & retrieve authenticated scientific reference materials.	K2, K3,K4

Course Content **Hours**

Module-I : Chem Draw Software: 08 hrs

Introduction of ChemDraw Ultra, 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 3D 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.

Module-II : NLIST: 04 hrs

Introduction of NLIST website, available e-resources, access of e-books and research articles, e-learning through NPTEL

Suggested laboratory experiments:

- Computer based experiments

Pedagogic tools:

- Computer, Power point presentation, Access of e-books and research articles.

Text books

- F. J. Waller, Writing chemistry patents and intellectual property: A practical Guide, Wiley, 2002.

Reference Books:

- Not applicable

Laboratory Manual/ Book

- Not applicable

Suggested reading / E-resources

- E-journals

Suggested MOOCs

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Methods of assessing the Course Outcomes The COs of the course will be assessed through
• Assignment-1

Semester - II			
Course Code	**Course Title**	**Instruction hrs**	**Course Credit**
19PCECE01	**CEC-I: Scientific Writing (Research Review and Presentation)**	**1 hrs / wk**	**2 Credits Evaluation at the End of SEM-2**

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	Search & retrieve authenticated scientific reference materials.	K1, K2
CO_2	Investigate literature search using NLIST, NPTEL, Science Direct and various E-resources.	K2, K3
CO_3	Understand variance between various Full paper, article, patent, communication and review article.	K2, K3
CO_4	Understand the IPR policy, patent filling, significance and Intellectual patent applications.	K1, K2
CO_5	Know that how to write research/review article.	K2, K3,K4

Course Content **Hours**

Module-I : Articles Review & Scientific writing 08 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-II : Patent 04 hrs

- Introduction to IPR (Intellectual property rights), Patent searching, downloading, reading and filling.
- Difference between patent and provisional patent.
- Significance of Patent.

Suggested laboratory experiments:

- Computer based presentation

Pedagogic tools:

- Computer, Power point presentation

Text books

- Not applicable

Reference Books:

- Not applicable

Laboratory Manual/ Book

- Not applicable

Suggested reading / E-resources

- E-journals/ E-book

Suggested MOOCs

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Methods of assessing the Course Outcomes The COs of the course will be assessed through
• Assignment-II
• Presentation
• CBT

19PCECE02	**CEC-II: STC/ Online Courses / Professional Certification Courses**	**2 hrs./wk**	**2 Credit Evaluation at the End of SEM-IV**

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

19PCECE02	**STC Advance Instrumentation Techniques IR, HPLC, GCMS, MPAES, AAS**	**2 Credits Evaluation at the End of SEM-IV**

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 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 and Absorbance Spectroscopy 6 hrs

- Introduction, explanation and working phenomena of each part of MPAES and 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 and 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

- E-Journals, Book
- Chromatography animation Video

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

Evaluation Norms & Guidelines for the courses unique to the Department

M.Sc. Chemistry Program

SEMESTER I & II

19PCECE01	CEC-I: Scientific Writing	Evaluated at the End of SEM-II	Credit: 2

Continues Internal Assessment Pattern:

Components	Detail	Marks
Assignment- 1	Drawing of Reaction Scheme and Mechanism	20
Assignment-2	Information retrieval: (e-books, research articles& reviews) using NLIST & Science Direct	20
Seminar	Review of Literature Presentation	20
Computer Based Test	Computer Based Test	40
	Total	**100**

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

Range of Marks	Remarks
91-100	Excellent
76-90	Very good
60-75	Good
40-59	Fair
Below 40	Not completed

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.

19PCECE02	STC Advance Instrumentation Techniques IR, HPLC, GCMS, MPAES, AAS	2 Credits Evaluation at the End of SEM-IV

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

MOOC's/ Competitive Exams/ Professional Certification Courses
On submission of **MOOC's/ Competitive Exams/ Professional Certification Courses** passing certificate students will earn 2 credits.

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

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.