



**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 for Generic Elective Courses for PG Program

Offered to Other Department, Semester-III

Effective From 2018-19 & Onwards

Semester - III		
Course Code	Course Title	Course Credit and hrs
19PCEGE01	Molecular Spectroscopy	2 Credits - 2 hrs / wk

Course Description:

This course focuses on several topics in Molecular Spectroscopy and will contain: principles, theory, instrumentation and Identification of molecules and materials with advanced spectroscopy and spectrometry such as UV-Vis spectroscopy, FT-IR spectroscopy, Mass Spectrometry, NMR spectroscopy.

Course Purpose:

- To understand and describe Fundamental of Molecular Spectroscopy.
- To have a basic understanding of the theoretical background of the measurement principles typically used in spectroscopy and spectrometry.
- To discuss instrumentation of UV-Vis, FT-IR, NMR Spectroscopy and Mass Spectrometry.

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 principle, fundamental theory of various Spectroscopy techniques.	K1, K2
CO ₂	Discuss Instrumentation of UV-Vis, FT-IR, NMR Spectroscopy and Mass Spectrometry.	K2
CO ₃	Characterize and Interpret spectroscopic data to perform qualitative analysis of unknown compounds.	K3
CO ₄	Elucidate structures of the unknown compounds by amalgamation of various spectroscopic techniques	K3, K4
CO ₅	Differentiate various applications of Characterization techniques to medicinal and pharmaceutical field.	K3

Course Content	Hours
Module-I : Introduction to Spectroscopic Techniques:	06 hrs
<ul style="list-style-type: none"> ➤ Types of Analytical techniques ➤ Introduction of Instrumental methods and its classification ➤ Overview of spectroscopic methods based on wave length regions of Electromagnetic radiation ➤ Properties of Electromagnetic radiation 	
Module-II : UV Spectroscopy:	05 hrs
<ul style="list-style-type: none"> ➤ Introduction to UV and Visible ➤ Principle & Theory of UV spectrometry ➤ Instrumentation ➤ Interpretation of UV spectra ➤ Applications UV spectroscopy. 	
Module-III : Infrared Spectroscopy:	05 hrs
<ul style="list-style-type: none"> ➤ Introduction to IR ➤ Principle & Theory of Infrared absorption spectroscopy ➤ Infrared sources ➤ Sample handling techniques ➤ Instrumentation ➤ Applications and limitations of IR spectroscopy. 	
Module-IV : Mass Spectrometry:	06 hrs
<ul style="list-style-type: none"> ➤ Introduction ➤ Principle ➤ Theory and components of mass spectrometers ➤ Different ionization and detection techniques ➤ Types of ions produced in mass spectrometer ➤ Applications of Mass spectrometry. 	
Module-V : Nuclear Magnetic Resonance Spectroscopy:	08 hrs
<ul style="list-style-type: none"> ➤ Introduction ➤ NMR active nuclei and Basic Theory ➤ NMR Spectrometer, internal Standard & solvent ➤ Signals, Equivalent and Non equivalent Protons ➤ Shielding, Deshielding and Chemical shift ➤ Factors affecting on chemical shift ➤ Spin-spin coupling (multiplicity) and coupling constant (J) ➤ Applications of Nuclear magnetic resonance spectroscopy 	

Suggested laboratory experiments:

- **Note:** NA

Pedagogic tools:

- Chalk and Board, Power point presentation, models
- LCD and Videos.
- Live Demonstration of Instruments

Text book:

1. Analytical Chemistry by Christian Gary D.(**ISBN-9780471214724**)
2. Fundamentals of Analytical Chemistry by Skoog Douglas A.(**ISBN - 9781285640686**)
3. Stahl, E. (1969, Second edition) Thin-Layer Chromatography: A Laboratory Handbook. New Berlin: Springer. (**ISBN: 978-3-642-88488-7**).
4. Separation techniques by Satyender Ahuja.

Reference Books:

1. Instrumental Methods of chemical analysis by B.K. Sharma.(**ISBN - 9788182830196**)
2. Pharmaceutical analysis (Vol.II) Dr. A. V. Kasturie, Dr. S.G. Wadodkar.(**ISBN-13: 978-8185790084**)
3. Instrumental Methods of chemical analysis Gurdeep R. Chatwal.(**ISBN-13: 978-9351420880**)
4. H.A. strobe chemical instrumental A schematic Approach 2nd Edition, Addison Wesley, Reading mass.

Laboratory Manual/ Book

- Not applicable.

Suggested reading / E-resources

- <http://www.nptel.ac.in/courses/104103069/#>
- <http://ocw.mit.edu/courses/chemistry/>

Guidelines and Evaluation Norms for Generic Elective Course- PG Programme
Generic Elective Courses:

Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective.

A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

Generic Elective Course:

- a) Generic Elective Course – courses of 2 credits, 100% CIA courses.
- b) Choice from among the **List-GE**

S.N.	Component	Content	Duration if any	Marks	Sub Total
1.	Test-I	1 st &2 nd unit	1hrs.	20 (set for 20marks Objective)	90 Marks
	Test-II	All 5 units	3 hrs.	70 (set for 70marks) Question Paper Pattern enclosed in Annexure-I	
2.	Assignment-I			5 (Set for 20 Marks)	10 Marks
	Assignment-II			5(Set for 20 Marks)	
Total					100 Marks

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Question Paper Pattern - Test-II - Generic Elective Courses-PG Program

Effective from A.Y. 2018-19& Onwards

Duration of Examination: **3 Hrs.**

Max. Marks: **70**

Part A (45 Questions X 1 Mark = 45 Marks)

Answer **ALL** questions

1.



45.

Part B (5 Questions X 5 Marks = 25 Marks)

Answer **ALL** questions

46a.

OR

46b.



50a.

OR

50b.