

Proceeding Meeting of Board of studies (Chemistry)

आज दिनांक 21.12.2024 को दिन शनिवार पूर्वाह्न 11.30 बजे एक रसायन विज्ञान विषय पाठ्यक्रम समिति की बैठक, रसायन विज्ञान के अन्तर्गत वोकेशनल कोर्स Systematic Chemistry Laboratory Techniques (SCLT) में तृतीय एवं चतुर्थ सेमेस्टर के पाठ्यक्रम (03 Credit/Sem.) तैयार किये जाने हेतु सम्पन्न हुई। जिसमें समिति के निम्नलिखित सदस्य उपस्थित रहें—

1. प्रो० मुकेश बाबू संयोजक
2. प्रो० डी०के० सिन्हा सदस्य

व्यावसायिक कार्यक्रमों के पाठ्यक्रम, शीर्षक-चयन, Systematic Chemistry Laboratory Techniques (SCLT) पर विस्तार से चर्चा की गई तथा वोकेशनल कोर्स Systematic Chemistry Laboratory Techniques (SCLT) में तृतीय एवं चतुर्थ सेमेस्टर के पाठ्यक्रम (03 Credit/Sem.) अंतिम रूप से तैयार कर उसे अनुमोदन हेतु पारित कर दिया गया।



(प्रो० डी०के० सिन्हा)

सदस्य

के०जी०के० कॉलेज, मुरादाबाद



(प्रो० मुकेश बाबू)

संयोजक

हिन्दू कॉलेज, मुरादाबाद

Vocational Programme in Chemistry Discipline

Title:- Systematic Chemistry Laboratory Techniques (SCLT)

Faculty: Science

The present vocational programme is proposed for those students who are aiming their career as laboratory technicians/assisting staff in chemistry laboratory, distilleries, pharma sector and other small-scale industries. There are so many scopes for employability after this programme as lab staff/assistant in school or college laboratories. The course will also give strong technical hands to the students in the direction of skill development and for their own startups as medium or small scale industries. At present, the university does not have any programme for learner students to impart the knowledge for chemistry laboratory techniques through the regular curriculum. This vocational programme has been designed to produce the fully trained laboratory supporting staff in appropriate procedures for organizing and maintaining school/college (degree, agricultural, engineering, pharmacy etc.) chemistry laboratories and various other related industrial sectors.

• **OBJECTIVES**

The course covers the broad objectives as to:

1. Introduce the learners about the basic facilities available in school, college and industrial level chemistry laboratories;
2. Impart knowledge of the basics and structure of organization and management of laboratories;
3. Train the learners in the operation and maintenance of chemicals & common apparatus used in laboratories;
4. Familiarize them to develop skills in common laboratory techniques;
5. Train them in the procedures of procurement and storage of laboratory equipment, apparatus, glass wares and chemicals;
6. Enable them to follow appropriate disposal procedures and safety measures required for chemistry laboratories;
7. Produce well trained Staff /Technicians /Assistants to work in chemistry labs, especially at the Schools, Colleges, Pharma industries or other small scale industries more efficiently and productively.

M. S. G. S.

D. S. S.

• **SALIENT FEATURES OF THE PROGRAMME**

The syllabus of programme is specially designed to produce well trained laboratory staff. The programme has very selective approach to achieve the theoretical as well practical knowledge. The curriculum designed as learners will be able to have:

- Knowledge of basic concepts of chemistry and analytical techniques.
- Learning of stock and standard solution preparation.
- Learning mole concepts, titrimetry, basic idea of normality, molarity and molality.
- Understanding the working of basic chemical equipment like pH meter, spectrophotometer, melting and boiling point apparatus.
- Knowledge of simple and advanced chromatographic techniques like HPLC and GC.
- Understanding the method and importance of calibration of analytical instruments.
- Training of preparation of chromatographic chambers and columns.
- Understanding the importance of extraction techniques and sample preparation.
- Practically separate and identify organic compounds.

COURSE STRUCTURE:

Programme : Vocational	Credits: 3
Total marks: 100	Min. Passing Marks: 35%
Discipline: Chemistry	Course Code: SCLT
Eligibility: Passed B.Sc. 1 st and 2 nd semester.	
Duration of programme: Two semesters	
Total lectures per week (L-P-T) = 1-2-1	
Examination pattern – as per university ordinance	

L- Lectures (1 credit), P- Practical (1 credit), T- Tutorials (1 credit)
*may vary as per university ordinance/guidelines come in force.

 

SYLLABUS

SEMESTER -3

Unit	Topic/s
I (Theory)	Analytical chemistry concepts (05 Hours) Quantitative and qualitative analysis, Introduction to titrimetry, titration and their types (acid base, redox, precipitation and complexometric) vs <i>Iodometric</i> vs <i>iodometric titration</i> , types of indicators (internal, external and self-indicators). Equivalence or <i>and</i> end point.
	Basic chemistry concepts (05 Hours) Mole Concept, molecular weight, formula weight, and equivalent weight. Concentration units: Molarity, Formality, Normality, Molality, Mole fraction, Percent by weight, Percent by volume, Parts per thousand, Parts per million, Parts per billion, pH, pOH, milli equivalents, Milli moles.
	Analytical Instrumentation (05 Hours) pH meter, refractometer, melting and boiling point apparatus, density meter, titrator and spectrophotometer.
II (Practical)	<ol style="list-style-type: none"> Determining strength of solution using titration. Melting point determination of organic compounds. Boiling point determination of organic compounds Determination of acetic acid in commercial vinegar using NaOH.
III (Tutorials)	Activity 1: Preparation of stock and standard solutions. Activity 2: Storage of volatile and non-volatile standard solutions. Activity 3: Maintaining and register of stock solution. Activity 4: Preparation of buffer solution.

Mushy *Chase*

SEMESTER 4

Unit	Topic/s
I (Theory)	Introduction to chromatography (05 Hrs.) Terms used in chromatography (analyte, eluent, eluate, stationary phase, mobile phase, column and detector), paper chromatography, Thin Layer Chromatography (TLC), Gas chromatography, Liquid chromatography, and Ion exchange chromatography.
	Advanced Chromatographic techniques (05 Hours) High Performance Liquid Chromatography (HPLC) with brief discussion about its detectors (R.I., ECD, FLD and DAD or PDA), Gas Chromatography (GC) with brief discussion about its detectors (ECD, FID and NPD)
	Calibration and separation techniques (05 Hours) Calibration concept and its types, calibration of fractional weights, burette, pipette, thermometer, and pH meter. Brief discussion of separation techniques (LLE SPE, SPME and LLME). <i>Ansaf</i> <i>Ansaf</i> <i>Ansaf</i>
II (Practical)	1. Paper chromatographic separation of a mixture containing 2/3 amino acids. 2. TLC separation of a mixture containing 2/3 amino acids 3. Calibration of burette and pipette. <i>Ansaf</i> 4. Separation of organic compounds (proteins or aromatic hydrocarbons) by 3 column chromatography. <i>Ansaf</i>
III (Tutorials)	<i>Activity 1:</i> Preparation of chromatographic chamber <i>Activity 2:</i> Preparation of TLC plate using silica gel or alumina. <i>Activity 3:</i> Separation of analytes using liquid-liquid extraction (LLE). <i>Activity 4:</i> Preparation of glass column for normal phase and reverse phase chromatography.

Ansaf

Ansaf

Bibliography:

1. Vogels Qualitative Inorganic Analysis, A. I. Vogel, *Prentice Hall*.
2. Vogels textbook of chemical quantitative analysis, *Longman Scientific*
3. The golden book of chemistry experiments, R. Brent, *Golden press, NY*
4. Comprehensive Practical Organic Chemistry, V. K. Ahluwalia, & R. Aggarwal, *Universities Press*.
5. Lab Manual of Organic Chemistry, R. K. Bansal, *New Age Pub.*
6. Senior Practical Physical Chemistry, B. D. Khosla, R. Chand & Co
7. Chemistry Practical, O. P. Pandey, D.N. Bajpai, S. Giri, *S. Chand*
8. Advanced practical chemistry, J. Singh et al. *Pragati Prakashan*
9. Computer fundamental, B Ram, *New Age Pub.*
10. <https://www.youtube.com/watch?v=dLUdhFlxZfo>
11. <https://chemicalsafety.com/chemical-inventory-management-software/>
12. <https://www.youtube.com/watch?v=D7mlaR8Arc>

Mukul
(Prof. Mukul Baner)

D.K. Sinha
(Prof. D.K. Sinha)