V.K.V GOVERNMENT DEGREE COLLEGE KOTHAPETA

(Accredited by NAAC "B"Grade)

(An ISO 9001:2015 Certified College by HYM International Certifications Pvt.Ltd.)

DEPARTMENT OF CHEMISTRY

POs, PSOs & COs

B.Sc Chemistry:

The Chemistry is one of the subjects in the science programs offered in the V.K.V Government Degree College. The combinations are M.P.C (Mathematics, Physics, Chemistry), B.Z.C (Botany, Zoology, Chemistry). The undergraduate course in Chemistry is intended to introduce the fundamental aspects of all chemistry students. Students learn about different sections of chemistry during three year degree course, which enables them to identify their area of chemical expertise and hence provides the basic foundation of their higher studies. They develop laboratory skills, critical thinking and reasoning to address different aspects of chemistry. One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded insyllabus citing related real field situations.

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B.Sc Chemistry

PROGRAMME OUTCOMES

1. **Theoretical Knowledge:** Upon completion of the B.Sc chemistry, this program coversdifferent fields of chemistry such as Organic, Physical, Inorganic areas. Chemistry majors are able to recognize and apply the principles of atomic and molecular structure to predict physical, chemical properties and chemical reactivity of compounds.

2. **Laboratory Skills:** Upon completion of a degree, chemistry majors are able to employ critical thinking and scientific inquiry in the performance, design, interpretation and documentation of laboratory experiments, at a level suitable to succeed at an entry-level position in chemicalindustry, pharmaceutical industry or a chemistry graduate program.

3. **Quantitative Skills:** Upon completion of a chemistry degree, chemistry background students are able tointerpret and analyze quantitative data of different chemical experiments.

4. **Instrumentation:** Upon completion of a B.Sc in Chemistry degree, students are able tounderstand theoretical concepts of instruments that are commonly used in most chemistry fields as well as interpret and use data generated in instrumental chemical analyses. They can operateinstruments used chemical analysis.

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PROGRAMME SPECIFIC OUTCOMES

- ✓ Creating attention in environmental problems.
- ✓ Increasing working knowledge of instruments.
- ✓ Obtaining the knowledge of pharmaceutical tables.
- ✓ Social awareness about the quality of water and food.
- ✓ Increasing the practical skill of the students,
- ✓ Creating Awareness about plastic garbage and recycle methods.

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COURSE OUTCOMES

Semester –I (Inorganic & Physical Chemistry)

This semester contains five units

Course outcomes:

At the end of the course, the student will be able to;

- Understand the basic concepts of p-block elements.
- Explain the difference between solid, liquid and gases in terms of intermolecular interactions.
- Apply the concepts of gas equations, pH and electrolytes while studying other chemistry courses.

Laboratory Course – I (Qualitative Mixture analysis)

Course outcomes:

At the end of the course, the student will be able to;

- Understand the basic concepts of qualitative analysis of inorganic mixture
- Use glassware, equipment and chemicals and follow experimental procedures in thelaboratory
- Apply the concepts of common ion effect, solubility product and concepts related toqualitative analysis

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Semester –II

Course name: Paper II (Organic & General Chemistry)

The Semester – II contains five units

Course outcomes:

At the end of the course, the student will be able to;

- Understand and explain the differential behavior of organic compounds based on fundamentalconcepts learnt.
- Formulate the mechanism of organic reactions by recalling and correlating the fundamentalproperties of the reactants involved.
- Learn and identify many organic reaction mechanism including Free Radical Substitution,Electrophonic Addition and Electrophonic Aromatic Substitution.
- Correlateanddescribethestereochemicalpropertiesoforganiccompoundsand reactions.

Laboratory Course – II (Volumetric Analysis Lab)

Course outcomes:

At the end of the course, the student will be able to;

- Use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
- Understand and explain the volumetric analysis based on fundamental concepts learnt inionic equilibria.
- Learn and identify the concepts of a standard solutions, primary and secondary standards.
- Facilitate the learner to make solutions of various molar concentrations.
- This may include: The concept of the mole; Converting moles to grams; Converting grams to moles; Defining concentration; Dilution of Solutions; Making different molar concentrations.

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Semester –III

Course name: Paper III (Organic & Spectroscopic Chemistry)

The Semester – III contains five units

Course outcomes:

At the end of the course, the student will be able to;
Understand preparation, properties and reactions of haloalkanes, haloarenes and oxygen containing functional groups.
Use the synthetic chemistry learnt in this course to do functional group transformations.
To propose plausible mechanisms for any relevant reaction

Laboratory Course – III (Organic Preparations & IR spectral analysis lab)

Course outcomes:

On the completion of the course,the student will be able to do the following**:**

- how to use glassware, equipment and chemicals and follow experimental procedures in thelaboratory
- how to calculate limiting reagent, theoretical yield, and percent yield
- how to engage in safe laboratory practices by handling laboratory glassware, equipment, andchemical reagents appropriately
- how to dispose of chemicals in a safe and responsible manner
  how to perform common laboratory techniques including reflux,

  distillation, recrystallization, vacuum filtration.

- how to create and carry out work up and separation procedures
  how to critically evaluate data collected to determine the identity, purity, and

  percent yieldof products and to summarize findings in writing in a clear and concise

  manner

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Semester –IV (4)

Course name: Paper IV (Inorganic, Organic & Physical Chemistry)

The Semester – IV contains five units

Course outcomes:

At the end of the course, the student will be able to;

- To learn about the laws of absorption of light energy by molecules and subsequentphotochemical reactions.
- To understand the concept of quantum efficiency and mechanisms of photochemical reactions.

Laboratory Course – IV (4) (Organic Qualitative analysis lab)

Course outcomes:

At the end of the course, the student will be able to;

- Use glassware, equipment and chemicals and follow experimental procedures in thelaboratory
- Determine melting and boiling points of organic compounds
- Understand Application of concepts of different organic reactions studied in theory part oforganic chemistry

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Semester –IV (5)

Course name: Paper IV (Inorganic & Physical Chemistry)

Course outcomes:

At the end of the course, the student will be able to;

- Understand concepts of boundary conditions and quantization, probability distribution, mostprobable values, uncertainty and expectation values
- Application Of Quantization To Spectroscopy.
- Various types of spectra and their use in structure determination.

Laboratory Course – IV (5)

(Conductometric and Potentiometric Titrimetric lab)

Course outcomes:

At the end of the course, the student will be able to;

- Use glassware, equipment and chemicals and follow experimental procedures in thelaboratory
- Apply concepts of electrochemistry in experiments
- Be familiar with electroanalytical methods and techniques in analytical chemistry which study an analyte by measuring the potential (volts) and/or current(amperes) in an electrochemical cell containing the analyte.

Semester –V

Course outcomes:

Laboratory Course - V

This laboratory course contains the following Organic Qualitative Analysis experiments

Analysis of an organic compound through systematic qualitative procedure for functional groupidentification including the determination of melting point and boiling point with suitable.

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Semester –V

Course name: SKILL ENHANCEMENT COURSE ELECTIVE

Paper -6B (Analytical Methods in Chemistry-1)

Learning Outcomes:

Students after successful completion of the course will be able to:

1. Identify the importance of solvent extraction and ion exchange method.
2. Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis.
3. Demonstrate the usage of common laboratory apparatus used in quantitative analysis.
4. Understand the theories of different types of titrations.
5. Gain knowledge on different types of errors and their minimization methods.

Lab Course name: SKILL ENHANCEMENT COURSE ELECTIVE

Paper -6B (Analytical Methods in Chemistry Lab-1)

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Estimate Iron(II) using standard Potassium dichromate solution
2. Learn the procedure for the estimation of total hardness of water
3. Demonstrate the determination of chloride using Mohr's method
4. Acquire skills in the operation and calibration of pH meter
5. Perform the strong acid vs strong base titration using pH meter

Course name: SKILL ENHANCEMENT COURSE ELECTIVE

Paper -7B (Analytical Methods in Chemistry-2)

Learning Outcomes:

Students after successful completion of the course will be able to:

1. Identify the importance of chromatography in the separation and identification ofcompounds in a mixture
2. Acquire a critical knowledge on various chromatographic techniques.
3. Demonstrate skills related to analysis of water using different techniques.
4. Understand the principles of spectro chemistry in the determination of metal ions.
5. Comprehend the applications of atomic spectroscopy.

Lab Course name: SKILL ENHANCEMENT COURSE ELECTIVE

Paper -7B (Analytical Methods in Chemistry Lab-2)

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Perform the separation of a given dye mixture using TLC
2. Learn the preparation of TLC plates
3. Demonstrate the separation of mixture of amino acids using paper chromatography
4. Acquire skills in using column chromatography for the separation of dye mixture

Co-Curricular Activities:

a) Mandatory:*(Lab/field training of students by teacher (lab:10+field:05):*

1. **For Teacher**: Training of students by the teacher in laboratory and field for not lessthan15 hours on the field techniques/skills of determination of hardness of water, using the calorimeter and or Spectrophotometer, preparation of TLC plate, identification of spots in TLC and Paper chromatographic techniques, loading of column, selection of solvent system, separation of amino acids and dyes mixture using chromatographic techniques.

2. **For Student**: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the chromatographic techniques used for the separation of compounds. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3. Max marks for Fieldwork/project work Report: 05.

4. Suggested Format for Fieldwork/project work**:** *Title page, student details,index page, details of place visited, observations, findings, and acknowledgements.*

5. Unit tests (IE).

b) **Suggested Co-Curricular Activities**

1. Training of students by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics).
3. Visits to facilities, firms, research organizations etc.
4. Invited lectures and presentations on related topics by field/industrial experts.