| | | | |
|---|---|---|---|
| Course Title: | Applied Chemistry | Semester | I/II |
| Course Code: | 1BCHES/C/M/E 102/202 | CIE Marks | 50 |
| Course Type (Theory/Practical/Integrated) | Integrated | SEE Marks | 50 |
| | | Total Marks | 100 |
| Teaching Hours/Week (L:T:P:S) | 3:0:2:0 | Exam Hours | 03 |
| Total Hours of Pedagogy | 64 hours | Credits | 04 |

## Course Learning Objectives:

This course will enable the students to

- Understand the chemical properties of materials and their relevance in Engineering applications.
- Integrate sustainability to minimize waste and energy in material selection, design, and manufacturing.
- To equip students with a strong foundation in analytical reasoning skills to address and solve societal challenges.

## Course Outcomes:

On completion of this course, students will be able to,

- Interpret the principles of chemistry related to engineering and technology
- Apply the knowledge of chemistry in solving engineering problems related to energy, materials, corrosion, analytical techniques and environmental contexts.
- Analyze the appropriate chemical techniques suitable for engineering applications to reach the substantiated conclusions.
- Apply the techniques of quantitative chemical analysis for engineering problems through experimental skills.

**CIE for the practical component of the Integrated Course**

- On completion of each laboratory experiment, students will be assessed, and marks will be awarded on the same day. Ten marks are allocated for performing the experiment and preparing the laboratory record, while the remaining ten marks will be assigned based on a test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 10 marks.
- The laboratory test (duration 02/03 hours) will be conducted at the end of the 14th /15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 10 marks. Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 20 marks.

## General Instructions

- Before entering the lab the student should carry the following things.

1. Identity card issued by the college.
2. Lab Apron
3. Lab observation book
4. Lab Manual
5. Lab Record
6. Scientific calculator

- Students have to attend all the labs regularly in time. If there is any genuine reason for absent then, with the permission of Lab in charge & HOD they have to complete the corresponding experiment within next lab.
- Students should come prepared for the lab by reading the procedure of the respective experiment thoroughly and reading the viva questions and answers for the corresponding experiment.
- While leaving the experimental table, switch off the devices.
- Before finishing the experiment, show and get signature from the lab in-charge.
- Don't use pencils for entering readings in the tabular column. Use only pen to write the readings and don't overwrite the readings.
- Plan the experimental work so that it is finished within the stipulated time.
- On the same day of performing an experiment, the concerned teacher-in-charge must sign the calculations and for that experiment, the internal assessment marks should be obtained. Failing this, one will get zero marks for that experiment.
- Lab record must be completed, before coming to the next Lab session. Record writing also carries marks.
- The lab internal assessment marks will be given by considering the following things, Average marks obtained for each experiment, lab internal marks (conducted at the end of the semester) and based on the attendance percentage.
- The minimum marks to be obtained in the lab internal assessment is 08.
- If any student fails to get minimum marks, that student is marked as NSSR (Not Satisfied Sessional Requirement) and will be detained in the lab.
- The detained student has to take the lab exam once again in the next semester and he has to attend the lab regularly and get internal marks.

## Chemistry lab safety measures

- Shoes must be worn in the laboratory.
- Do not chew gum, eat, or drink in the laboratory. Never taste any chemicals. Keep your hands away from your face when working with chemicals.
- Notify your teacher immediately if any chemicals, especially concentrated acids or bases, are spilled.
- Do not handle dangerous equipment or chemicals unless instructed by your teacher.
- Wash your hands with soap and water at the end of each laboratory exercise.

## LAB ASSESSMENT RUBRICS FOR CIE-2025 SCHEME

**1. Maximum CIE: 20 Marks**
**a. Continuous Evaluation of Experiments: 10 Marks**
**b. Internal Test: 10 Marks**

### a) Continuous Evaluation of Experiments: 10 Marks

| Particulars | | Sub division | Marks allotted | Marks obtained |
|---|---|---|---|---|
| **a** | **Conduction of experiment (3M)** | Tabulation of readings | 02 | |
| | | Accurate reading(as per primary std) | 01 | |
| **b** | **Observation (2M)** | Method of Analysis | 01 | |
| | | Appropriate Formula & Tabular Column | 01 | |
| **c** | **Calculation & Result (2M)** | Formula, Substitution & Result | 02 | |
| **d** | **Record (3M)** | Writing of aim & theory | 01 | |
| | | Writing of Procedure | 01 | |
| | | Graph/ Calculation | 01 | |
| **Total** | | | **10** | |

### b. Rubrics for Test Evaluation: The laboratory test shall be conducted for 50 marks and Scaled down to 10 marks.

| Descriptions | Marks allotted |
|---|---|
| **Procedure write-up** | 10 |
| **Conduction of experiment** | 20 |
| **Calculation, Graph works & Result** | 10 |
| **Viva-voce** | 10 |
| **Total** | 50 |

**Total Marks (a + b) = 20 Marks**

## DEPARTMENT OF CHEMISTRY

## List of Lab Experiments

| Exp. No. | NAME OF THE EXPERIMENT |
|---|---|
| 1 | Estimation of total hardness of given water sample by EDTA method |
| 2 | Determination of chemical oxygen demand (COD) of industrial effluents |
| 3 | Estimation of percentage of CaO in cement by complexometric method |
| 4 | Estimation of iron in TMT bar by diphenyl amine /External indicator method |
| 5 | Determination of total alkalinity of given water sample |
| 6 | Estimation of acid mixture using conductometric sensor |
| 7 | Estimation of iron in rust sample using potentiometric sensor |
| 8 | Determination of pKa value of vinegar solution using pH sensor |
| 9 | Estimation of Copper present in electroplating effluent by optical sensor |
| 10 | Determination of viscosity coefficient of green fuel using Ostwald's viscometer |