



**Malaviya National Institute of Technology Jaipur**  
Department of Chemistry

**Course Details**  
Engineering Chemistry Lab | 26CYP101 | 0 0 2 0

**PREREQUISITE:**  
NIL

**COURSE OBJECTIVE(S):**

Enable students to learn quantitative analysis of chemical substances via various analytical methods including titration. Learn various instrumentation methods like conductometry, spectrometry, and potentiometry. Enable students to synthesis of various molecules and materials, and check purity of various chemicals experimentally.

**COURSE OUTCOMES:**

- CO1 : Perform quantitative chemical analysis using titration techniques.  
CO2 : Apply chromatographic, spectroscopic, and potentiometric techniques for chemical analysis.  
CO3 : Synthesize and analyse selected chemicals and advanced materials.  
CO4 : Conduct experiments safely and interpret and report experimental results.

**SYLLABUS:**

- EXPERIMENT I (2 Hours):** Conductometric titration of HCl vs. NaOH  
**EXPERIMENT II (2 Hours):** Determination of dissolved oxygen (DO) of a given water sample iodometrically.  
**EXPERIMENT III (2 Hours):** Determination of the percentage purity of bleaching powder iodometrically  
**EXPERIMENT IV (2 Hours):** Preparation of  $[\text{Ni}(\text{NH}_3)_6]\text{Cl}_2$  complex and estimation of nickel by complexometric titration  
**EXPERIMENT V (2 Hours):** Paper chromatography to separate plant based dye molecules from plant extracts and calculations of  $R_f$  values.  
**EXPERIMENT VI (2 Hours):** Paper/thin layer chromatography to separate various amino acids and calculations of  $R_f$  values  
**EXPERIMENT VII (2 Hours):** Study Crystal Field Theory to analyse colour of transition metal complexes using UV-Vis spectrophotometry  
**EXPERIMENT VIII (2 Hours):** Estimation of calcium in cement sample by complexometric titration  
**EXPERIMENT IX (2 Hours):** To conduct Potentiometric titrations using a pH meter  
**EXPERIMENT X (2 Hours):** Estimation of dissociation constant of a weak acid via conductometry  
**EXPERIMENT XI (2 Hours):** Spectrophotometric determination of the acid dissociation constant of an acid-base indicator  
**EXPERIMENT XII (2 Hours):** Synthesis of Zeolitic Imidazolate Framework-8 (ZIF-8) nanocrystals in aqueous system.  
**EXPERIMENT XIII (2 Hours):** Synthesis of biodiesel from vegetable oil

**EXPERIMENT XIV (2 Hours):** Synthesis of fluorescent carbon dots using polyethylene glycol 200 as the carbon source

**EXPERIMENT XV (2 Hours):** Synthesis of temperature dependent Reversible hydrogel

**EXPERIMENT XVI (2 Hours):** Determination of molecular weight of a polystyrene sample by viscometric method

**EXPERIMENT XVII (2 Hours):** Synthesis of nanoparticles and Nanorod-comparison and surface analysis

**EXPERIMENT XVIII (2 Hours):** Estimation of the strength of an unknown ferrous ion by redox titration with  $\text{KMnO}_4$

**EXPERIMENT XIX (2 Hours):** Estimation of the strength of a sodium carbonate and sodium hydroxide in the given mixed alkali solution

**EXPERIMENT XX (2 Hours):** Estimation of the strength of an unknown  $\text{K}_2\text{Cr}_2\text{O}_7$  solution using an internal/external indicator

### EVALUATION

Final grades will be weighted average of performance in

|                       |     |
|-----------------------|-----|
| Continuous Assessment | 50% |
| Midterm Exam          | 20% |
| Endterm Exam          | 30% |

depending on the institute's academic policy.

### Textbook(s):

### Reference book(s):

1. Laboratory Manual on engineering chemistry by S.K. Bhasin & Sudha Rani, Dhanpat Rai Publishing Company, New Delhi.
2. A text book of Practical chemistry by K. D. Gupta & K.K. Saxena University Press, Jaipur.

### Online/E-Resources:

