

Sri Venkateswara University, Tirupati

**Syllabus for Chemistry (Major) in consonance with Curriculum frame work
(W.E.F. AY-2026-27)**

COURSE STRUCTURE (for Semesters III)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
II	III	5	Organic Chemistry – II (Halogenated Hydrocarbons and Oxygen Containing Functional Groups)	3	3
			Organic Qualitative Analysis	2	1
		6	Physical Chemistry – II (Solutions and Electrochemistry)	3	3
			Physical Chemistry – II Practical	2	1
		7	Coordination Chemistry	3	3
			Preparation of Coordination Compounds	2	1


(BOS Chairman)
Dr. V. PRABHAKAR RAO
M.Sc., M.Phil, Ph.D.
LECTURER IN CHEMISTRY
Dr. YSR GOVT. DEGREE COLLEGE
VEDURUKUPPAM - 517 560
CHITTOOR (DIST), A.P.

SEMESTER-III

COURSE 6: PHYSICAL CHEMISTRY-II

Theory

Credits: 3

3 hrs/week

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I. LEARNING OBJECTIVES:

1. Understand the principles governing the behaviour of solutions.
2. Apply colligative properties to determine molecular weights and solution behaviours.
3. Describe and differentiate between thermal and photochemical reactions, Fluorescence, Phosphorescence, with mechanistic insights.
4. Explain and apply concepts of ionic conductance and perform conductometric titrations.
5. Analyze electrochemical cells, EMF, electrode potentials, and perform potentiometric titrations.

II. COURSE OUTCOMES:

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

1. Understand Azeotropes, Raoult's law and Nernst distribution law.
2. Calculate colligative properties and molecular masses of solutes using various experimental methods.
3. Explain laws of photochemistry and mechanisms of photochemical reactions with qualitative concepts of fluorescence and phosphorescence.
4. Evaluate conductance behavior of electrolytes and perform conductometric titrations.
5. Illustrate working principles of electrochemical cells and perform potentiometric titrations.

III. SYLLABUS:

UNIT-1: SOLUTIONS

(9 h)

Classification - miscible, partially miscible and Immiscible, Raoult's Law, Azeotropes, HCl-H₂O system and ethanol-water system, Partially miscible liquids: phenol- water system, Critical solution temperature (CST), Effect of impurity on consolute temperature, Nernst distribution law, Calculation of the partition coefficient, Applications of Nernst distribution law.

UNIT- 2: COLLIGATIVE PROPERTIES

(9 h)

Definition, Relative lowering of vapour Pressure, Elevation in boiling point, Depression in freezing point and Osmotic pressure. Determination of molecular mass of non-volatile solute by Ostwald-Walker method, and Berkeley-Hartley method.

UNIT - 3: PHOTOCHEMISTRY

(9 h)

Definition, Difference between thermal and photochemical processes, Laws of photochemistry: Grothus- Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum Yield- reasons for low and high quantum yields with examples, Photochemical reaction mechanism: Hydrogen-Chlorine and Hydrogen-Bromine reaction. Qualitative description of Fluorescence, Phosphorescence, Jablonski diagram, Chemiluminescence, and Photosensitization.

UNIT- 4: ELECTROCHEMISTRY- I

(9h)

Strong and weak electrolytes, Conductance, Specific conductance, Equivalent conductance and Molar conductance - effect of dilution. Cell constant. Kohlrausch's law and its applications. Application of conductivity measurements-conductometric titrations. Transport number and determination of transport number by Hittorf's method. Debye-Huckel - Onsager's equation for strong electrolytes (derivation not required).

UNIT- 5: ELECTROCHEMISTRY-II

(9 h)

Electrochemical Cells, Types of electrodes with examples: Metal- metal ion, Gas electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt - salt anion. Single electrode potential, Standard electrode potential, Determination of EMF of a cell, Nernst equation, Potentiometric titrations.

IV. REFERENCES:

1. P.W. Atkins, J.de. Paula, Atkin's Physical Chemistry Ed., 10th Edition, Oxford University Press, 2014.
2. G.W. Castellan, Physical Chemistry, 4th Edition, Narosa., 2004.
3. K.L. Kapoor, A Textbook of Physical Chemistry, 3rd Edition, McGraw-Hill Education, 2015.
4. B.R. Puri, L.R. Sharma, M.S. Pathania, *Principles of Physical Chemistry*, Vishal Publishing, 2020.
5. P. Bahadur, **Concepts of Physical Chemistry**, G.R. Bathla Publications, 2018.

V. PROPOSED ACTIVITIES:

1. Experiment: Plot miscibility curves and CST.
2. Comparative worksheet: Thermal and photochemical reactions, Fluorescence and Phosphorescence.
3. Group Work: Determination of EMF and Conductivity.

VI. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

1. Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning.
2. Class Tests, Worksheets, Quizzes, Industrial/Field visits, Student seminars, Poster and PPT presentations, Peer learning, Project-based learning, Assignments, Debates, Group Discussions: Enhances critical thinking skills.
3. Semester End Examination (SEE): Critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

SEMESTER-III

COURSE 6: PHYSICAL CHEMISTRY-II PRACTICAL

Practical

Credits: 1

2 hrs/week

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I. LEARNING OBJECTIVES:

1. Determine critical solution temperature (CST) and study the effect of electrolytes.
2. Use conductometry to determine the concentrations of strong and weak acids.
3. Apply potentiometric methods for accurate titration of acid-base systems.
4. Develop precision, accuracy, and skill in handling electrochemical instruments.

II. COURSE OUTCOMES:

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

1. Determine the CST of a partially miscible liquid system and interpret the effect of impurities.
2. Conduct and interpret conductometric and potentiometric titrations of strong and weak acids with a strong base.
3. Use and calibrate electrochemical instruments accurately in titrations.

III. SYLLABUS:

1. Determination of Critical Solution Temperature (CST) for Phenol-water system.
2. Study the effect of electrolyte on Critical Solution Temperature.
3. Conductometric titration- Determination of the concentration of HCl solution using standard NaOH solution.
4. Conductometric titration - Determination of the concentration of CH₃COOH solution using standard NaOH solution.
5. Potentiometric titration - Determination of the concentration of HCl using standard NaOH solution.

IV. REFERENCES:

1. B.D. Khosla, V.C. Garg, A. Gulati, Senior Practical Physical Chemistry, R. Chand & Co, New Delhi, 2015.
2. K.L. Kapoor, A Textbook of Physical Chemistry, McGraw-Hill Education, 2019.
3. C.W. Garland, J.W. Nibler, D.P. Shoemaker, Experiments in Physical Chemistry, 8th Edition, McGraw-Hill, New York, 2003.

V. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

1. Internal Practical Assessment
2. Lab Record Evaluation
3. Final Practical Examination
4. Oral/Viva Voce

4- Year UG Honours, Major
Syllabus
(2026-27)
Semester-III

Model Question Paper

Time : 3hrs

Marks:75

Part-A

Answer any Five Questions. Each Question carries 3 Marks.

5x3=15

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Answer the following questions. Each question carries 12 Marks

5x12=60

11. a) Unit-I
(Or)
b) Unit-I

12. a) Unit-II
(Or)
b) Unit-II

13. a) Unit-III
(Or)
b) Unit-III

14. a) Unit-IV
(Or)
b) Unit-IV

15. a) Unit-V
(Or)
b) Unit-V