

Sri Venkateswara University, Tirupati

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

COURSE STRUCTURE (for Semesters IV)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
	IV	8	Organic Chemistry-III (Nitrogen Containing Organic Compounds & Biomolecules)	3	3
			Organic Chemistry-III Practical	2	1
		9	Physical Chemistry – III (Ionic equilibrium and Thermodynamics)	3	3
			Qualitative Analysis of Inorganic Mixture	2	1
		10	Applied and Physical Chemistry	3	3
			Applied and Physical Chemistry Practical	2	1


(BOS chairman)
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SEMESTER-IV

COURSE 10: APPLIED AND PHYSICAL CHEMISTRY

Theory

Credits: 3

3 hrs/week

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I. LEARNING OBJECTIVES:

1. Understand polymer classification, methods of polymerization, and applications of commercial polymers.
2. Describe the fundamentals, properties, synthesis, and applications of nanomaterials.
3. Classify drugs, understand their development process, and identify their forms.
4. Apply rate laws to chemical reactions and determine kinetic parameters.
5. Analyze enzyme kinetics using rate theories and the Michaelis-Menten equation.

II. COURSE OUTCOMES:

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

1. Explain polymer classification and applications of commercial polymers.
2. Describe types, synthesis methods, and applications of nanomaterials.
3. Explain basic pharmaceutical concepts, including drug development and dosage forms.
4. Apply kinetic laws to analyze reaction rates and derive rate equations.
5. Evaluate the role of activation energy and enzyme catalysis in chemical reactions.

III. SYLLABUS:

UNIT-1: POLYMERS

(9 h)

Definition, Classification of polymers, Methods of polymerization- addition, condensation, co-polymerization. Structure and applications of some important polymers: Polythene, PVC, Nylon, Polyesters, Bakelite, Natural rubber. Biodegradable and non-biodegradable polymers-examples.

UNIT-2: NANOMATERIALS

(9 h)

Definition and classification of nanomaterials, Magnetic and mechanical properties of nanomaterials, Types of nanomaterials (metal-based, carbon-based, and polymer-based), Synthesis of nanomaterials by Top-down approach and Bottom-up approach, Applications of nanomaterials in medicine and environment.

UNIT-3: DRUGS

(9 h)

Definition of Drug and Medicine, Drug discovery-preclinical and clinical trials, Classification of drugs based on therapeutic use. Classification of dosage forms-solid, liquid, gaseous and

semisolid dosage forms, Generic and brand names of any four drugs, Introduction to Computer Aided Drug Design (CADD).

UNIT - 4: CHEMICAL KINETICS-I

(9 h)

The concept of reaction rates. Factors affecting reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (similar reactants). Half-life of a reaction- half life of first order reaction- (with derivation). General methods for the determination of the order of a reaction- Ostwald's isolation method, half life method, integration method.

UNIT-5: CHEMICAL KINETICS-II

(9 h)

Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Enzyme catalysis- Specificity, factors affecting enzyme catalysis, Inhibitors; Lock & key model. Michaels- Menten equation- with derivation.

IV. REFERENCES:

1. F.W. Billmeyer, Text Book of Polymer Science, Wiley Inter Science, 2007.
2. B.R. Puri, L.R. Sharma, M.S. Pathania, Principles of Physical Chemistry, Vishal Publishing, 2020.
3. Charles P. Poole Jr, Frank J. Owens, Introduction to nanotechnology, Wiley India, 2003.
4. K.K. Choudhary, Nanoscience and Nanotechnology, Narosa Publishing, 2016.
5. G. Patrick, Introduction to Medicinal Chemistry, Oxford University Press, 2017.
6. H. Singh, V.K. Kapoor, Medicinal & Pharmaceutical Chemistry, Vallabh Prakashan, 1996.
7. P.W. Atkins, J.de. Paula, Atkin's Physical Chemistry, Oxford University Press, 2014.
8. Gurudeep Raj, Advanced physical chemistry, Krishna Prakashan Media, 2016.

V. PROPOSED ACTIVITIES:

1. Industrial Visit: Visit to a plastic or rubber manufacturing plant
2. Seminar or case study on nanomedicine or nanofiltration
3. Solve numerical problems on half-life, Arrhenius equation, rate laws.

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-IV

COURSE 10: APPLIED AND PHYSICAL CHEMISTRY PRACTICAL

Practical

Credits: 1

2 hrs/week

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I. LEARNING OBJECTIVES:

1. To develop practical skills in measuring the rate of chemical reactions and understanding factors affecting reaction rates.
2. To introduce students to basic nanomaterial synthesis with a focus on zinc oxide nanoparticles.
3. To develop an understanding of pharmaceutical terminology and differentiate between generic and brand names of common drugs.

II. COURSE OUTCOMES:

1. Evaluate the influence of concentration on the rate of a chemical reaction experimentally.
2. Analyze temperature dependence on reaction rate and interpret kinetic data.
3. Compare the strengths of different acids based on kinetic measurements in ester hydrolysis.
4. Synthesize zinc oxide nanoparticles and understand their significance in modern chemistry and nanotechnology.
5. Identify and categorize commonly used drugs by comparing their generic and brand names.

III. SYLLABUS:

1. Determination of the rate constant of acid hydrolysis of an ester.
2. Study the effect of concentration on the rate of reaction between sodium thiosulphate and hydrochloric acid.
3. Study the effect of temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid.
4. Comparison of the strengths of HCl and H₂SO₄ by studying the kinetics of hydrolysis of methyl acetate.
5. Preparation of Zinc oxide nano particles.
6. Prepare a chart of 10 commonly used drugs with their generic and brand names and therapeutic classification.

IV. REFERENCES:

1. B.R. Puri, L.R. Sharma, M.S. Pathania, Principles of Physical Chemistry, Vishal Publishing, 2020.
2. P.W. Atkins, J.de. Paula, Atkin's Physical Chemistry, Oxford University Press, 2014.
3. K.K. Choudhary, Nanoscience and Nanotechnology, Narosa Publishing, 2016..
4. Tripathi, K. D. Essentials of Medical Pharmacology (9th ed.). Jaypee Brothers Medical Publishers, 2021.

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-IV**

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