SCHEME OF WORK

1. Program – B. Tech, semester-I, academic year 2015-16.
2. Course – Physical Chemistry 15BC 1105 (Chemical Engineering)
3. Category the course belongs to **Basic Science courses**
4. PO-Program outcome
   (The program outcomes are the skills and knowledge which the students have at the time of graduation)

1. Able to apply the knowledge of mathematics, science, engineering fundamentals to solve complex chemical engineering problems.

2. Attain the capability to identify, formulate and analyse problems related to chemical engineering and substantiate the conclusions

3. In a position to design solutions for chemical engineering problems and design system components and processes that meet the specified needs with appropriate consideration to public health and safety.

4. Able to perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.

5. Able to select and apply appropriate techniques from the available resources and modern chemical engineering and software tools, and will be able to predict and model complex engineering activities with an understanding of the practical limitations.

6. Able to carry out their professional practice in chemical engineering by appropriately considering and weighing the issues related to society and culture and the consequent responsibilities.

7. Able to understand the impact of the professional engineering solutions on environmental safety.

8. Transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.

9. Able to function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams.

10. Able to communicate fluently on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.

11. Able to apply knowledge of engineering and management principles while managing projects in multidisciplinary environments.

12. Engage in independent and life-long learning in their specialized areas of chemical engineering

5. CO-Course Outcome

CO No.	Course outcomes	Cognitive level
CO1	Understanding of principles and applications of distribution law.	Apply
CO2	Study of reaction rates and mechanisms.	Apply
CO3	Understanding of principle and different types of catalysis.	Apply
CO4	Application of laws and concepts of thermodynamics to chemical process.	Understand
CO5	Application of phase rule to different heterogeneous systems.	Understand

Course Outcome-PO matrix

Subject: Physical Chemistry

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		2					2			2
CO2	3	3		2					2			2
CO3	3	3		2					2			2
CO4	3	3		2					2			2
CO5	3	2		2					2			2

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), put -: No correlation

Course Outcome-Assessment

Week	**TOPIC / CONTENTS**	**Course Outcomes**	**Sample questions**	**TEACHING-LEARNING STRATEGY**	**Assessment Method & Schedule**
1	Distribution law – Modification , Solvent extraction	CO-1	Q) What is distribution law? Explain modified distribution law?	▫ Lecture / Discussion ▫ Problem solving	Assignment -I (Week - 4) Mid test-I (Week-9)
2	Applications of distribution	CO-1	Q) Explain the process	▫ Lecture /	Assignment

	law		of solvent extraction.	Discussion ▫ Problem solving	-I (Week - 4) Mid test-I (Week-9)
3	Partition chromatography, methods of determining order of reaction.	CO-1,2	Q) Give the any two methods of determining order of reaction.	▫ Lecture / Discussion Problem solving	Assignment -I (Week - 4) Mid test-I (Week-9)
4	Theories of reaction rates, problems	CO-2	Q) How does rate of reaction varies with temperature? Derive Arrhenius equation.	▫ Lecture / Discussion ▫ Problem solving	Assignment -I (Week - 4) Quiz-I (Week-7) Mid test-I (Week-9)
5	Complex reactions.	CO-2	Q) Derive the rate constant for consecutive reaction.	▫ Lecture / Discussion	Quiz-I (Week-7) Mid test-I (Week-9)
6	Fast reactions-stopped flow and relaxation techniques.	CO-2	Q) Explain the stopped flow technique for a fast reaction.	▫ Lecture / Discussion	Quiz-I (Week-7) Mid test-I (Week-9)
7	Catalysis-types of catalysis, characteristics of catalysis.	CO-3	Q) What are the characteristics of a catalyst?	▫ Lecture / Discussion	Mid test-I (Week-9)
8	Retardation, autocatalysis, mechanism of catalysis.	CO-3	Q) Explain the mechanism of acid – base catalysis.	▫ Lecture / Discussion	Mid-Test -I (Week-9)
9	**Mid-Test 1**				
10	Enzyme catalysis-mechanism and characteristics of enzyme catalysis.	CO-3	Q) What is enzyme catalysis? Give the mechanism of enzyme catalysis..	▫ Lecture / Discussion	Assignment -II (Week - 13)
11	Fundamentals of thermodynamics. Reversible and irreversible process, PV work and problems.	CO-4	Q) Derive an expression for PV work done.	▫ Lecture / Discussion Problem solving	Assignment -II (Week - 13) Mid-Test -II (Week-18)
12	Laws of Thermodynamics, work done in isothermal and adiabatic process.	CO-4	Q) Give the various forms of first law of thermodynamics. Give its mathematical form.	▫ Lecture / Discussion Problem solving	Assignment -II (Week - 13) Mid-Test -II

					(Week-18)
13	Concept of entropy,Carnot cycle-Gibbs Helmholtz equation	CO-4	Q) Derive an expression for efficiency of an engine by carnot cycle.	▫ Lecture / Discussion Problem solving	Assignment -II (Week - 13) Quiz-II (Week-16) Mid-Test -II (Week-18)
14	Clausius-Clapeyron equation, Vanthoffs isotherm and isochore	CO-4	Q) Derive Clausius_clapeyron equation.	▫ Lecture / Discussion ▫ Problem solving	Quiz-II (Week-16) Mid-Test -II (Week-18)
15	Definition and explanation of terms involved in phase rule, one component system.	CO-5	Q) Explain sulphur system with neat sketch.	▫ Lecture / Discussion	Quiz-II (Week-16) Mid-Test 2 (Week-18)
16	Two component system. Definition and classification of colloids, properties of colloids.	CO-5	Q) Give the classification of colloids.	▫ Lecture / Discussion	Quiz-II (Week-16) Mid-Test -II (Week-18)
17	Types of emulsions-preparation, gel-preparation, properties and application of colloids.	CO-5	Q) What are various applications of colloids?	▫ Lecture / Discussion	Mid-Test -II (Week-18)
18	**Mid-Test 2**				
19/20	**END EXAM**				