

**DEPARTMENT OF CHEMISTRY (UG & PG), JHARGRAM RAJ COLLEGE****LESSON PLAN (SESSION: 2022-2023)****TEACHER: DR. PRADIPTA GHOSH (PHYSICAL CHEMISTRY)****UG SEMESTER-I****PAPER: CC-2T (PHYSICAL CHEMISTRY-I), Kinetic Theory and Gaseous State (20 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
October 2022	Kinetic Theory of gases
November 2022	Maxwell's distribution of speed and energy
December 2022	Real gas and virial equation
January 2022	Class test

**PAPER: CC-2P (CHEMISTRY LAB-II)**

PERIOD	TOPIC(S) TO BE COVERED
November 2022	Experiment 1, Experiment 2
December 2022	Experiment 3, Experiment 4
January 2022	Experiment 5, Practice sessions

**UG SEMESTER-II****PAPER: GE-2P (PHYSICAL CHEMISTRY LAB-I)**

PERIOD	TOPIC(S) TO BE COVERED
March 2023	Experiments on surface tension measurement (two experiments)
April 2023	Experiments on viscosity coefficient measurement (two experiments)
May 2023	Practice sessions

**PAPER: DSC-1BT (CC-2) [FOR THE GENERAL COURSE]**

PERIOD	TOPIC(S) TO BE COVERED
October 2022	Chemical Energetics (08 lectures)
November 2022	Chemical equilibrium (04 lectures)
December 2022	Ionic equilibria (06 lectures)
January 2022	Class test

**PAPER: DSC-1BP (CC-2 LAB) [FOR THE GENERAL COURSE]**

PERIOD	TOPIC(S) TO BE COVERED
October 2022	Experiments based on thermochemistry (Part-A: three experiments)
November 2022	Experiments based on thermochemistry (Part-B: three experiments)
December 2022	Experiments based on ionic equilibria (two experiments)
January 2022	Practice sessions

**UG SEMESTER-III****PAPER: CC-5T (PHYSICAL CHEMISTRY-II), Transport properties (Part) (10 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
August 2022	Electrolytic Conductance and related topics including measurement.
September 2022	Transport number, measurement and related topics.
October 2022	Debye-Hückel-Onsager theory (qualitative ideas only)
November 2022	Class test

**PAPER: CC-5T (PHYSICAL CHEMISTRY-II), Applications of Thermodynamics – I (25 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
August 2022	Partial properties and Chemical potential
September 2022	Chemical Equilibrium; Nernst's distribution law
October 2022	Chemical potential and other properties of ideal substances.
November 2022	Class test

**PAPER: GE-2T (PHYSICAL CHEMISTRY-II) (08 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
September 2022	Chemical Equilibrium (thermodynamic approach)



**DEPARTMENT OF CHEMISTRY (UG & PG), JHARGRAM RAJ COLLEGE**  
**LESSON PLAN (SESSION: 2022-2023)**

PERIOD	TOPIC(S) TO BE COVERED
October 2022	Class test

**PAPER: GE-2P (PHYSICAL CHEMISTRY LAB-II) [jointly with Dr. Nabakumar Bera]**

PERIOD	TOPIC(S) TO BE COVERED
September 2022	Experiments on thermochemistry (Experiment 1, Experiment 2, Experiment 3)
October 2022	Experiments on ionic equilibria (Experiment 4, Experiment 5)
November 2022	Practice sessions

**PAPER: DSC-1CP (CC3 LAB) [FOR THE GENERAL COURSE]**

PERIOD	TOPIC(S) TO BE COVERED
September 2022	Experiments based on electrolytic conductance (four experiments)
October 2022	Experiments based on potentiometry (three experiments)
November 2022	Practice sessions

**UG SEMESTER-IV**

**PAPER: CC-8T (PHYSICAL CHEMISTRY-III), Applications of Thermodynamics – II (25 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
February 2023	Colligative properties: thermodynamic treatment, applications, abnormalities
March 2023	Phase rule: thermodynamic derivation, one- and multi-component systems
April 2023	First order phase transition and Clapeyron equation
May 2023	Binary solutions; Class tests

**PAPER: CC-8T (PHYSICAL CHEMISTRY-III), Electrical Properties of molecules (Part) (20 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
February 2023	Electromotive force: detailed treatment, applications of EMF measurements
March 2023	Concentration cells with and without transference; potentiometric titrations
April 2023	Class tests

**PAPER: CC-8T (PHYSICAL CHEMISTRY-III), Quantum Chemistry (Part) (05 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
May 2023	LCAO and HF-SCF: principles of chemical bonding (qualitative ideas)

**PAPER: CC-8P (PHYSICAL CHEMISTRY LAB-III)**

PERIOD	TOPIC(S) TO BE COVERED
February 2023	Experiment 1, Experiment 2
March 2023	Experiment 3, Experiment 4
April 2023	Experiment 5, Experiment 6
May 2023	Practice sessions

**PAPER: GE-4T (PHYSICAL CHEMISTRY-III) (60 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
February 2023	Solutions
March 2023	Phase equilibria; Class tests
April 2023	Conductance
May 2023	Electromotive force; Class tests

**PAPER: GE-4P (PHYSICAL CHEMISTRY LAB-III)**

PERIOD	TOPIC(S) TO BE COVERED
February 2023	Experiments based on Nernst's distribution law (two experiments)
March 2023	Experiments based on phase equilibria (two experiments)
April 2023	Experiments based on electrolytic conductance (two experiments)
May 2023	Experiments based on electromotive force (potentiometry) (two experiments)

**PAPER: DSC-1DT (CC-4) [FOR THE GENERAL COURSE]**

PERIOD	TOPIC(S) TO BE COVERED
February 2023	Kinetic theory of gases



**DEPARTMENT OF CHEMISTRY (UG & PG), JHARGRAM RAJ COLLEGE**  
**LESSON PLAN (SESSION: 2022-2023)**

PERIOD	TOPIC(S) TO BE COVERED
March 2023	Liquids
April 2023	Solids
May 2023	Chemical kinetics

**PAPER: DSC-1DP (CC-4 LAB) [FOR THE GENERAL COURSE]**

PERIOD	TOPIC(S) TO BE COVERED
February 2023	Experiments based on surface chemistry (two experiments); practice sessions
March 2023	Experiments based on viscosity (two experiments); practice sessions
April 2023	Experiments based on chemical kinetics (four experiments); practice sessions

**UG SEMESTER-V**

**PAPER: DSE-1T (ADVANCED PHYSICAL CHEMISTRY): CRYSTAL STRUCTURE (10 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
July 2022	Bravais Lattice and Laws of Crystallography
August 2022	Crystal planes
September 2022	Determination of crystal structure
October 2022	Class tests

**PAPER: DSE-1T (ADVANCED PHYSICAL CHEMISTRY): SPECIAL SELECTED TOPICS (05 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
July 2022	Polymers: classification, reaction mechanisms, properties, molecular weights

**PAPER: DSE-1P (ADVANCED PHYSICAL CHEMISTRY LAB): Computer programs based on numerical methods for**

PERIOD	TOPIC(S) TO BE COVERED
July 2022	Programming 1: Roots of equations; practice sessions
August 2022	Programming 2: Numerical differentiation; practice sessions
September 2022	Programming 3: Numerical integration; practice sessions
October 2022	Programming 4: Matrix operations; practice sessions
November 2022	Programming 5: Simple exercises using molecular visualization software

**UG SEMESTER-VI**

**PAPER: CC-14T (PHYSICAL CHEMISTRY-V): SURFACE PHENOMENON (10 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
January 2023	Surface tension and energy
February 2023	Adsorption
March 2023	Colloids; class tests

**PAPER: CC-14P (PHYSICAL CHEMISTRY LAB-V): SURFACE PHENOMENON (10 Lectures)**

PERIOD	TOPIC(S) TO BE COVERED
January 2023	Experiment 1, Experiment 2, practice sessions
February 2023	Experiment 3, Experiment 4, practice sessions
March 2023	Experiment 5, Experiment 6, practice sessions

**PAPER: DSE-4T (POLYMER CHEMISTRY):**

PERIOD	TOPIC(S) TO BE COVERED
January 2023	Introduction and history of polymeric materials (02 lectures)
February 2023	Kinetics of polymerization; crystallization and crystallinity (04 lectures)
March 2023	Determination of molecular weight of polymers; polymer solution (04 lectures)
April 2023	Glass transition temperature, numerical problems (02 lectures)



**DEPARTMENT OF CHEMISTRY (UG & PG), JHARGRAM RAJ COLLEGE**  
**LESSON PLAN (SESSION: 2022-2023)**  
**PG SEMESTER-I**

**PAPER: CEM 101 (PHYSICAL CHEMISTRY):**

PERIOD	TOPIC(S) TO BE COVERED
October 2022	Unit-2: Thermodynamics
November 2022	Unit-4: Rotational Spectroscopy
December 2022	Unit-5: Vibrational Spectroscopy

**PG SEMESTER-II**

**PAPER: CEM 201 (PHYSICAL CHEMISTRY):**

PERIOD	TOPIC(S) TO BE COVERED
February 2023	Unit-3: Electronic Spectroscopy
March 2023	Unit-4: Raman Scattering

**PG SEMESTER-III**

**PAPER: CEM 302 (PHYSICAL CHEMISTRY SPECIALIZATION):**

PERIOD	TOPIC(S) TO BE COVERED
September 2022	Unit-2: Perturbation theory
October 2022	Unit-3: Semi-classical treatment of radiation-matter interaction
November 2022	Unit-4: Semiempirical methods of Quantum Chemistry

**PAPER: CEM 303 (PHYSICAL CHEMISTRY SPECIALIZATION):**

PERIOD	TOPIC(S) TO BE COVERED
September 2022	Unit-1: Solid state chemistry- I
October 2022	Unit-2: Solid state chemistry- II

**PAPER: CEM 395 (PHYSICAL CHEMISTRY SPECIALIZATION):**

PERIOD	TOPIC(S) TO BE COVERED
September 2022 – December 2022 (16 weeks)	Review work in an area of contemporary interest; research work to be performed; seminar Lecture has to be delivered on the total work carried out.

**PG SEMESTER-IV**

**PAPER: CEM 402 (PHYSICAL CHEMISTRY SPECIALIZATION):**

PERIOD	TOPIC(S) TO BE COVERED
February 2023	Unit-1: Quantum mechanics of many-electron systems-I
March 2023	Unit-3: Applications of perturbation theory
April 2023	Unit-4: Computational Chemistry-I

**PAPER: CEM 403 (PHYSICAL CHEMISTRY SPECIALIZATION):**

PERIOD	TOPIC(S) TO BE COVERED
February 2023	Unit-5: Advanced electrochemistry
March 2023	

**PAPER: CEM 495 (PHYSICAL CHEMISTRY SPECIALIZATION):**

PERIOD	TOPIC(S) TO BE COVERED
February 2023 – May 2023 (16 weeks)	Review work in an area of contemporary interest; research work to be performed; seminar Lecture has to be delivered on the total work carried out.