

**DEPARTMENT OF CHEMISTRY (UG & PG), JHARGRAM RAJ COLLEGE****LESSON PLAN (SESSION: 2021-2022)****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 2021	Kinetic Theory of gases
November 2021	Maxwell's distribution of speed and energy
December 2021	Real gas and virial equation
January 2021	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
November 2021	Experiment 1, Experiment 2
December 2021	Experiment 3, Experiment 4
January 2021	Experiment 5, Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
March 2022	Experiments on surface tension measurement (two experiments)
April 2022	Experiments on viscosity coefficient measurement (two experiments)
May 2022	Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
October 2021	Chemical Energetics (08 lectures)
November 2021	Chemical equilibrium (04 lectures)
December 2021	Ionic equilibria (06 lectures)
January 2021	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
October 2021	Experiments based on thermochemistry (Part-A: three experiments)
November 2021	Experiments based on thermochemistry (Part-B: three experiments)
December 2021	Experiments based on ionic equilibria (two experiments)
January 2021	Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
August 2021	Electrolytic Conductance and related topics including measurement.
September 2021	Transport number, measurement and related topics.
October 2021	Debye-Hückel-Onsager theory (qualitative ideas only)
November 2021	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
August 2021	Partial properties and Chemical potential
September 2021	Chemical Equilibrium; Nernst's distribution law
October 2021	Chemical potential and other properties of ideal substances.
November 2021	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
September 2021	Chemical Equilibrium (thermodynamic approach)



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PERIOD	TOPIC(S) TO BE COVERED
October 2021	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
September 2021	Experiments on thermochemistry (Experiment 1, Experiment 2, Experiment 3)
October 2021	Experiments on ionic equilibria (Experiment 4, Experiment 5)
November 2021	Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
September 2021	Experiments based on electrolytic conductance (four experiments)
October 2021	Experiments based on potentiometry (three experiments)
November 2021	Practice sessions

UG SEMESTER-IV

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

PERIOD	TOPIC(S) TO BE COVERED
February 2022	Colligative properties: thermodynamic treatment, applications, abnormalities
March 2022	Phase rule: thermodynamic derivation, one- and multi-component systems
April 2022	First order phase transition and Clapeyron equation
May 2022	Binary solutions; Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
February 2022	Electromotive force: detailed treatment, applications of EMF measurements
March 2022	Concentration cells with and without transference; potentiometric titrations
April 2022	Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
May 2022	LCAO and HF-SCF: principles of chemical bonding (qualitative ideas)

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

PERIOD	TOPIC(S) TO BE COVERED
February 2022	Experiment 1, Experiment 2
March 2022	Experiment 3, Experiment 4
April 2022	Experiment 5, Experiment 6
May 2022	Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
February 2022	Solutions
March 2022	Phase equilibria; Class tests
April 2022	Conductance
May 2022	Electromotive force; Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
February 2022	Experiments based on Nernst's distribution law (two experiments)
March 2022	Experiments based on phase equilibria (two experiments)
April 2022	Experiments based on electrolytic conductance (two experiments)
May 2022	Experiments based on electromotive force (potentiometry) (two experiments)

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

PERIOD	TOPIC(S) TO BE COVERED
February 2022	Kinetic theory of gases



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PERIOD	TOPIC(S) TO BE COVERED
March 2022	Liquids
April 2022	Solids
May 2022	Chemical kinetics

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

PERIOD	TOPIC(S) TO BE COVERED
February 2022	Experiments based on surface chemistry (two experiments); practice sessions
March 2022	Experiments based on viscosity (two experiments); practice sessions
April 2022	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 2021	Bravais Lattice and Laws of Crystallography
August 2021	Crystal planes
September 2021	Determination of crystal structure
October 2021	Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
July 2021	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 2021	Programming 1: Roots of equations; practice sessions
August 2021	Programming 2: Numerical differentiation; practice sessions
September 2021	Programming 3: Numerical integration; practice sessions
October 2021	Programming 4: Matrix operations; practice sessions
November 2021	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 2022	Surface tension and energy
February 2022	Adsorption
March 2022	Colloids; class tests

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

PERIOD	TOPIC(S) TO BE COVERED
January 2022	Experiment 1, Experiment 2, practice sessions
February 2022	Experiment 3, Experiment 4, practice sessions
March 2022	Experiment 5, Experiment 6, practice sessions

PAPER: DSE-4T (POLYMER CHEMISTRY):

PERIOD	TOPIC(S) TO BE COVERED
January 2022	Introduction and history of polymeric materials (02 lectures)
February 2022	Kinetics of polymerization; crystallization and crystallinity (04 lectures)
March 2022	Determination of molecular weight of polymers; polymer solution (04 lectures)
April 2022	Glass transition temperature, numerical problems (02 lectures)



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PG SEMESTER-I

PAPER: CEM 101 (PHYSICAL CHEMISTRY):

PERIOD	TOPIC(S) TO BE COVERED
October 2021	Unit-2: Thermodynamics
November 2021	Unit-4: Rotational Spectroscopy
December 2021	Unit-5: Vibrational Spectroscopy

PG SEMESTER-II

PAPER: CEM 201 (PHYSICAL CHEMISTRY):

PERIOD	TOPIC(S) TO BE COVERED
February 2022	Unit-3: Electronic Spectroscopy
March 2022	Unit-4: Raman Scattering

PG SEMESTER-III

PAPER: CEM 302 (PHYSICAL CHEMISTRY SPECIALIZATION):

PERIOD	TOPIC(S) TO BE COVERED
September 2021	Unit-2: Perturbation theory
October 2021	Unit-3: Semi-classical treatment of radiation-matter interaction
November 2021	Unit-4: Semiempirical methods of Quantum Chemistry

PAPER: CEM 303 (PHYSICAL CHEMISTRY SPECIALIZATION):

PERIOD	TOPIC(S) TO BE COVERED
September 2021	Unit-1: Solid state chemistry- I
October 2021	Unit-2: Solid state chemistry- II

PAPER: CEM 395 (PHYSICAL CHEMISTRY SPECIALIZATION):

PERIOD	TOPIC(S) TO BE COVERED
September 2021 – December 2021 (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 2022	Unit-1: Quantum mechanics of many-electron systems-I
March 2022	Unit-3: Applications of perturbation theory
April 2022	Unit-4: Computational Chemistry-I

PAPER: CEM 403 (PHYSICAL CHEMISTRY SPECIALIZATION):

PERIOD	TOPIC(S) TO BE COVERED
February 2022	Unit-5: Advanced electrochemistry
March 2022	

PAPER: CEM 495 (PHYSICAL CHEMISTRY SPECIALIZATION):

PERIOD	TOPIC(S) TO BE COVERED
February 2022 – May 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.