

**DEPARTMENT OF CHEMISTRY (UG & PG), JHARGRAM RAJ COLLEGE****LESSON PLAN (SESSION: 2020-2021)****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 2020	Kinetic Theory of gases
November 2020	Maxwell's distribution of speed and energy
December 2020	Real gas and virial equation
January 2020	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
November 2020	Experiment 1, Experiment 2
December 2020	Experiment 3, Experiment 4
January 2020	Experiment 5, Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
March 2021	Experiments on surface tension measurement (two experiments)
April 2021	Experiments on viscosity coefficient measurement (two experiments)
May 2021	Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
October 2020	Chemical Energetics (08 lectures)
November 2020	Chemical equilibrium (04 lectures)
December 2020	Ionic equilibria (06 lectures)
January 2020	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
October 2020	Experiments based on thermochemistry (Part-A: three experiments)
November 2020	Experiments based on thermochemistry (Part-B: three experiments)
December 2020	Experiments based on ionic equilibria (two experiments)
January 2020	Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
August 2020	Electrolytic Conductance and related topics including measurement.
September 2020	Transport number, measurement and related topics.
October 2020	Debye-Hückel-Onsager theory (qualitative ideas only)
November 2020	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
August 2020	Partial properties and Chemical potential
September 2020	Chemical Equilibrium; Nernst's distribution law
October 2020	Chemical potential and other properties of ideal substances.
November 2020	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
September 2020	Chemical Equilibrium (thermodynamic approach)



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PERIOD	TOPIC(S) TO BE COVERED
October 2020	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
September 2020	Experiments on thermochemistry (Experiment 1, Experiment 2, Experiment 3)
October 2020	Experiments on ionic equilibria (Experiment 4, Experiment 5)
November 2020	Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
September 2020	Experiments based on electrolytic conductance (four experiments)
October 2020	Experiments based on potentiometry (three experiments)
November 2020	Practice sessions

**UG SEMESTER-IV**

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

PERIOD	TOPIC(S) TO BE COVERED
February 2021	Colligative properties: thermodynamic treatment, applications, abnormalities
March 2021	Phase rule: thermodynamic derivation, one- and multi-component systems
April 2021	First order phase transition and Clapeyron equation
May 2021	Binary solutions; Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
February 2021	Electromotive force: detailed treatment, applications of EMF measurements
March 2021	Concentration cells with and without transference; potentiometric titrations
April 2021	Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
May 2021	LCAO and HF-SCF: principles of chemical bonding (qualitative ideas)

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

PERIOD	TOPIC(S) TO BE COVERED
February 2021	Experiment 1, Experiment 2
March 2021	Experiment 3, Experiment 4
April 2021	Experiment 5, Experiment 6
May 2021	Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
February 2021	Solutions
March 2021	Phase equilibria; Class tests
April 2021	Conductance
May 2021	Electromotive force; Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
February 2021	Experiments based on Nernst's distribution law (two experiments)
March 2021	Experiments based on phase equilibria (two experiments)
April 2021	Experiments based on electrolytic conductance (two experiments)
May 2021	Experiments based on electromotive force (potentiometry) (two experiments)

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

PERIOD	TOPIC(S) TO BE COVERED
February 2021	Kinetic theory of gases



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PERIOD	TOPIC(S) TO BE COVERED
March 2021	Liquids
April 2021	Solids
May 2021	Chemical kinetics

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

PERIOD	TOPIC(S) TO BE COVERED
February 2021	Experiments based on surface chemistry (two experiments); practice sessions
March 2021	Experiments based on viscosity (two experiments); practice sessions
April 2021	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 2020	Bravais Lattice and Laws of Crystallography
August 2020	Crystal planes
September 2020	Determination of crystal structure
October 2020	Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
July 2020	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 2020	Programming 1: Roots of equations; practice sessions
August 2020	Programming 2: Numerical differentiation; practice sessions
September 2020	Programming 3: Numerical integration; practice sessions
October 2020	Programming 4: Matrix operations; practice sessions
November 2020	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 2021	Surface tension and energy
February 2021	Adsorption
March 2021	Colloids; class tests

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

PERIOD	TOPIC(S) TO BE COVERED
January 2021	Experiment 1, Experiment 2, practice sessions
February 2021	Experiment 3, Experiment 4, practice sessions
March 2021	Experiment 5, Experiment 6, practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
January 2021	Introduction and history of polymeric materials (02 lectures)
February 2021	Kinetics of polymerization; crystallization and crystallinity (04 lectures)
March 2021	Determination of molecular weight of polymers; polymer solution (04 lectures)
April 2021	Glass transition temperature, numerical problems (02 lectures)



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**LESSON PLAN (SESSION: 2020-2021)**  
**PG SEMESTER-I**

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

PERIOD	TOPIC(S) TO BE COVERED
October 2020	Unit-2: Thermodynamics
November 2020	Unit-4: Rotational Spectroscopy
December 2020	Unit-5: Vibrational Spectroscopy

**PG SEMESTER-II**

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

PERIOD	TOPIC(S) TO BE COVERED
February 2021	Unit-3: Electronic Spectroscopy
March 2021	Unit-4: Raman Scattering

**PG SEMESTER-III**

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

PERIOD	TOPIC(S) TO BE COVERED
September 2020	Unit-2: Perturbation theory
October 2020	Unit-3: Semi-classical treatment of radiation-matter interaction
November 2020	Unit-4: Semiempirical methods of Quantum Chemistry

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

PERIOD	TOPIC(S) TO BE COVERED
September 2020	Unit-1: Solid state chemistry- I
October 2020	Unit-2: Solid state chemistry- II

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

PERIOD	TOPIC(S) TO BE COVERED
September 2020 – December 2020 (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 2021	Unit-1: Quantum mechanics of many-electron systems-I
March 2021	Unit-3: Applications of perturbation theory
April 2021	Unit-4: Computational Chemistry-I

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

PERIOD	TOPIC(S) TO BE COVERED
February 2021	Unit-5: Advanced electrochemistry
March 2021	

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

PERIOD	TOPIC(S) TO BE COVERED
February 2021 – May 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.