DEPARTMENT OF CHEMISTRY (UG & PG), JHARGRAM RAJ COLLEGE
LESSON PLAN (SESSION: 2023-2024)
TEACHER: DR. PRADIPTA GHOSH (PHYSICAL CHEMISTRY)

UG SEMESTER-I

PAPER: CEMMI-01T (MINOR, UNDER CCFUP PROGRAM] PART-B: PHYSICAL CHEMISTRY

PERIOD	TOPIC(S) TO BE COVERED
October 2023	Kinetic Theory of Gases and Real gases (Part-A)
November 2023	Kinetic Theory of Gases and Real gases (Part-B)
December 2023	Solution of numerical problems and exercises
January 2023	Class test

PAPER: CEMMI-01T (MINOR, UNDER CCFUP PROGRAM] PART-B: PHYSICAL CHEMISTRY

PERIOD	TOPIC(S) TO BE COVERED
November 2023	Surface tension related experiments (two experiments)
December 2023	Viscosity coefficient related experiments (two experiments)
January 2023	Practice sessions

UG SEMESTER-II

PAPER: GE-2P (PHYSICAL CHEMISTRY LAB-I)

PERIOD	TOPIC(S) TO BE COVERED
March 2024	Experiments on surface tension measurement (two experiments)
April 2024	Experiments on viscosity coefficient measurement (two experiments)
May 2024	Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
October 2023	Chemical Energetics (08 lectures)
November 2023	Chemical equilibrium (04 lectures)
December 2023	Ionic equilibria (06 lectures)
January 2023	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
October 2023	Experiments based on thermochemistry (Part-A: three experiments)
November 2023	Experiments based on thermochemistry (Part-B: three experiments)
December 2023	Experiments based on ionic equilibria (two experiments)
January 2023	Practice sessions

UG SEMESTER-III

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

PERIOD	TOPIC(S) TO BE COVERED
August 2023	Electrolytic Conductance and related topics including measurement.
September 2023	Transport number, measurement and related topics.
October 2023	Debye-Hückel-Onsager theory (qualitative ideas only)
November 2023	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
August 2023	Partial properties and Chemical potential
September 2023	Chemical Equilibrium; Nernst's distribution law
October 2023	Chemical potential and other properties of ideal substances.
November 2023	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
September 2023	Chemical Equilibrium (thermodynamic approach)

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PERIOD	TOPIC(S) TO BE COVERED
October 2023	Class test

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

PERIOD	TOPIC(S) TO BE COVERED
September 2023	Experiments on thermochemistry (Experiment 1, Experiment 2, Experiment 3)
October 2023	Experiments on ionic equilibria (Experiment 4, Experiment 5)
November 2023	Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
September 2023	Experiments based on electrolytic conductance (four experiments)
October 2023	Experiments based on potentiometry (three experiments)
November 2023	Practice sessions

UG SEMESTER-IV

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

PERIOD	TOPIC(S) TO BE COVERED
February 2024	Colligative properties: thermodynamic treatment, applications, abnormalities
March 2024	Phase rule: thermodynamic derivation, one- and multi-component systems
April 2024	First order phase transition and Clapeyron equation
May 2024	Binary solutions; Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
February 2024	Electromotive force: detailed treatment, applications of EMF measurements
March 2024	Concentration cells with and without transference; potentiometric titrations
April 2024	Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
May 2024	LCAO and HF-SCF: principles of chemical bonding (qualitative ideas)

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

PERIOD	TOPIC(S) TO BE COVERED
February 2024	Experiment 1, Experiment 2
March 2024	Experiment 3, Experiment 4
April 2024	Experiment 5, Experiment 6
May 2024	Practice sessions

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

PERIOD	TOPIC(S) TO BE COVERED
February 2024	Solutions
March 2024	Phase equilibria; Class tests
April 2024	Conductance
May 2024	Electromotive force; Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
February 2024	Experiments based on Nernst's distribution law (two experiments)
March 2024	Experiments based on phase equilibria (two experiments)
April 2024	Experiments based on electrolytic conductance (two experiments)
May 2024	Experiments based on electromotive force (potentiometry) (two experiments)

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

PERIOD	TOPIC(S) TO BE COVERED
February 2024	Kinetic theory of gases

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PERIOD	TOPIC(S) TO BE COVERED
March 2024	Liquids
April 2024	Solids
May 2024	Chemical kinetics

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

PERIOD	TOPIC(S) TO BE COVERED
February 2024	Experiments based on surface chemistry (two experiments); practice sessions
March 2024	Experiments based on viscosity (two experiments); practice sessions
April 2024	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 2023	Bravais Lattice and Laws of Crystallography
August 2023	Crystal planes
September 2023	Determination of crystal structure
October 2023	Class tests

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

PERIOD	TOPIC(S) TO BE COVERED
July 2023	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 2023	Programming 1: Roots of equations; practice sessions
August 2023	Programming 2: Numerical differentiation; practice sessions
September 2023	Programming 3: Numerical integration; practice sessions
October 2023	Programming 4: Matrix operations; practice sessions
November 2023	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 2024	Surface tension and energy
February 2024	Adsorption
March 2024	Colloids; class tests

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

PERIOD	TOPIC(S) TO BE COVERED
January 2024	Experiment 1, Experiment 2, practice sessions
February 2024	Experiment 3, Experiment 4, practice sessions
March 2024	Experiment 5, Experiment 6, practice sessions

PAPER: DSE-4T (POLYMER CHEMISTRY):

PERIOD	TOPIC(S) TO BE COVERED
January 2024	Introduction and history of polymeric materials (02 lectures)
February 2024	Kinetics of polymerization; crystallization and crystallinity (04 lectures)
March 2024	Determination of molecular weight of polymers; polymer solution (04 lectures)
April 2024	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 2023	Unit-2: Thermodynamics
November 2023	Unit-4: Rotational Spectroscopy
December 2023	Unit-5: Vibrational Spectroscopy

PG SEMESTER-II

PAPER: CEM 201 (PHYSICAL CHEMISTRY):

PERIOD	TOPIC(S) TO BE COVERED
February 2024	Unit-3: Electronic Spectroscopy
March 2024	Unit-4: Raman Scattering

PG SEMESTER-III

PAPER: CEM 302 (PHYSICAL CHEMISTRY SPECIALIZATION):

PERIOD	TOPIC(S) TO BE COVERED
September 2023	Unit-2: Perturbation theory
October 2023	Unit-3: Semi-classical treatment of radiation-matter interaction
November 2023	Unit-4: Semiempirical methods of Quantum Chemistry

PAPER: CEM 303 (PHYSICAL CHEMISTRY SPECIALIZATION):

PERIOD	TOPIC(S) TO BE COVERED
September 2023	Unit-1: Solid state chemistry- I
October 2023	Unit-2: Solid state chemistry- II

PAPER: CEM 395 (PHYSICAL CHEMISTRY SPECIALIZATION):

PERIOD	TOPIC(S) TO BE COVERED
September 2023 – December 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.

PG SEMESTER-IV

PAPER: CEM 402 (PHYSICAL CHEMISTRY SPECIALIZATION):

PERIOD	TOPIC(S) TO BE COVERED
February 2024	Unit-1: Quantum mechanics of many-electron systems-I
March 2024	Unit-3: Applications of perturbation theory
April 2024	Unit-4: Computational Chemistry-I

PAPER: CEM 403 (PHYSICAL CHEMISTRY SPECIALIZATION):

PERIOD	TOPIC(S) TO BE COVERED
February 2024	Unit-5: Advanced electrochemistry
March 2024	

PAPER: CEM 495 (PHYSICAL CHEMISTRY SPECIALIZATION):

PERIOD	TOPIC(S) TO BE COVERED
February 2024 – May 2024 (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.