

ACADEMIC LESSON PLAN FOR APPLIED CHEMISTRY (SUMMER-2026)		
Discipline: Civil, Mechanical, Etc & Electrical Engineering	Semester: 2nd	Name of the Teaching Faculty: Salini Bose
Subject: Applied Chemistry	No of Days /per week class allotted: 4	Semester from date: 09/01/2026 to 08/05/2026 No of weeks: 15
Week	Class Day	Theory Topics
1st	1st	Unit 1: Atomic Structure, Chemical Bonding and Solutions: Rutherford model of atom
	2nd	Bohr's theory
	3rd	hydrogen spectrum explanation based on Bohr's model of atom,
	4th	Heisenberg uncertainty principle & Quantum numbers
2nd	1st	Quantum numbers – orbital concept. Shapes of s, p and d orbitals,
	2nd	Pauli's exclusion principle, Hund's rule of maximum multiplicity
	3rd	Aufbau rule, electronic configuration.
	4th	Concept of chemical bonding – cause of chemical bonding, types of bonds: ionic bonding (NaCl example)
3rd	1st	covalent bond (H ₂ , F ₂ , HF)
	2nd	Hybridization in BeCl ₂ , BF ₃ .
	3rd	Hybridization in CH ₄ , NH ₃ , H ₂ O.
	4th	Coordination bond in NH ₄ ⁺ , and anomalous properties of NH ₃ due to hydrogen bonding .
4th	1st	Anomalous properties of H ₂ O due to hydrogen bonding and metallic bonding.
	2nd	Solution – idea of solute, solvent and solution, methods to express the concentration of solution -molarity (M = mole per liter), ppm,
	3rd	Methods to express the concentration of solution- mass percentage, volume percentage and mole fraction.
	4th	Unit 2: Water: Graphical presentation of water distribution on Earth (pie or bar diagram). Classification of soft and hard water based on soap test, salts causing water hardness, unit of hardness and
5th	1st	Simple numerical on water hardness & Cause of poor lathering of soap in hard water.
	2nd	Problems caused by the use of hard water in boiler (scale and sludge)
	3rd	Problems caused by the use of hard water in boiler (foaming and priming, corrosion)
	4th	Quantitative measurement of water hardness by EDTA method,
6th	1st	Total dissolved solids (TDS) alkalinity estimation.
	2nd	Water softening techniques – soda lime process,
	3rd	Water softening techniques- zeolite process
	4th	Water softening techniques- ion exchange process.
7th	1st	Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization.
	2nd	Water for human consumption for drinking and cooking purposes from any water sources and Indian standard specification of drinking water
	3rd	Unit 3: Engineering Materials: Natural occurrence of metals – minerals, ores of iron, aluminium and copper, gangue (matrix), flux, slag.
	4th	metallurgy – brief account of general principles of metallurgy.
8th	1st	Extraction of - iron from haematite ore using blast furnace,
	2nd	Extraction of - Aluminium from bauxite along with reactions.

	3rd	Alloys – definition, purposes of alloying, ferrous alloys and non ferrous with suitable examples, properties and applications.
	4th	General chemical composition, composition based applications, Portland cement and hardening,
9th	1st	Glasses Refractory and Composite materials.
	2nd	Polymers – monomer, homo and co polymers, degree of polymerization, simple reactions involved in preparation and application of thermoplastics and thermosetting plastics
	3rd	Preparation and application of PVC & PS.
	4th	Preparation and application of PTFE & nylon – 6.
10th	1st	Preparation and application of nylon-6,6 and Bakelite.
	2nd	Rubber and vulcanization of rubber.
	3rd	Unit 4: Chemistry of Fuels and Lubricants: Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV),
	4th	calculation of HCV and LCV using Dulong's formula.
11th	1st	Proximate analysis of coal solid fuel
	2nd	petrol and diesel - fuel rating (octane and cetane numbers),
	3rd	Chemical composition, calorific values and applications of LPG, CNG, water gas
	4th	Chemical composition, calorific values and applications of coal gas, producer gas and biogas.
12th	1st	Lubrication – function and characteristic properties of good lubricant, classification with examples,
	2nd	lubrication mechanism – hydrodynamic and boundary lubrication,
	3rd	physical properties (viscosity and viscosity index, oiliness, flash and fire point, cloud and pour point)
	4th	chemical properties (coke number, total acid number saponification value) of lubricants.
13th	1st	Unit 5: Electro Chemistry : Electronic concept of oxidation, reduction and redox reactions.
	2nd	Definition of terms: electrolytes, non-electrolytes with suitable examples,
	3rd	Faradays laws of electrolysis and simple numerical problems.
	4th	Industrial Application of Electrolysis – • Electrometallurgy • Electroplating
14th	1st	Electrolytic refining.
	2nd	Application of redox reactions in electrochemical cells – • Primary cells – dry cell,
	3rd	Secondary cell - commercially used lead storage battery,
	4th	fuel and Solar cells.
15th	1st	Introduction to Corrosion of metals – definition, types of corrosion (chemical and electrochemical),
	2nd	H ₂ liberation and O ₂ absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion.
	3rd	Internal corrosion preventive measures – Purification, alloying and heat treatment and
	4th	External corrosion preventive measures: a) metal (anodic, cathodic) coatings, b) organic inhibitors.