



GOVERNMENT POLYTECHNIC, KENDRAPARA, DEPARTMENT OF HUMANITIES AND SCIENCE

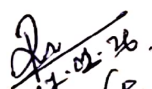
Discipline:	Semester: 2ND COMMON	Name of the Teaching Faculty: Kshyana Prava Sahoo (GF in Chemistry) Rabinarayan Panda (GF in Chemistry)	
Subject: Applied Chemistry (Th-5)	No. of days/per week class allotted: 04	Semester From date: 09.01.2026 to Date: 08.05.2026 No. of Weeks: 15	
PRE-REQUISITES	Basic knowledge of Science and Mathematics.		
COURSE OUTCOMES	CO1	Solve various engineering problems applying the basic knowledge of atomic, molecular, electronic modifications and Chemical bonding by analyzing the technology based on them.	
	CO2	Identify the problems associated with raw water used in drinking & boilers and sewage water and solve the problems by using different water treatment methods.	
	CO3	Analyze the properties engineering materials and substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.	
	CO4	Use relevant fuel and lubricants for domestic and industrial applications	
	CO5	To impart knowledge on the essential aspects of electrochemical cells, emf, applications of emf measurements and understand the Principles of corrosion and corrosion control.	
Week	Class Day	Theory/Practical Topics	DELIVERY METHOD
1ST	1ST	Unit 1: Atomic Structure, Chemical Bonding and Solutions , (Rutherford model of atom, Bohr's theory (expression of energy and radius to be omitted))	CHALK & TALK
	2ND	Hydrogen spectrum explanation based on Bohr's model of atom	CHALK & TALK
	3RD	Heisenberg uncertainty principle, Quantum numbers – orbital concept.	CHALK & TALK
	4TH	Shapes of s,p,d & f orbitals, Pauli's exclusion principle.	CHALK & TALK
2ND	1ST	Hund's rule of maximum multiplicity Aufbau rule, electronic configuration.	CHALK & TALK
	2ND	Concept of chemical bonding – cause of chemical bonding, types of bonds: ionic bonding (NaCl example)	CHALK & TALK
	3RD	Covalent bond (H ₂ , F ₂ , HF hybridization in BeCl ₂ , BF ₃ , CH ₄ , NH ₃ , H ₂ O),	CHALK & TALK
	4TH	Co-ordination bond in NH ₄ ⁺ , and anomalous properties of NH ₃ , H ₂ O due to hydrogen bonding, and metallic bonding.	CHALK & TALK
3RD	1ST	Solution – idea of solute, solvent and solution, methods to express the concentration of solution molarity (M = mole per liter), ppm, mass percentage, volume percentage and mole fraction.	CHALK & TALK
	2ND	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 simple numerical on water hardness.	CHALK & TALK
	3RD	Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge	CHALK & TALK

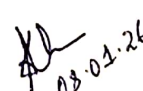
	4TH	Quantitative measurement of water hardness by ETDA method	CHALK & TALK
4TH	1ST	Total dissolved solids (TDS) alkalinity estimation.	CHALK & TALK
	2ND	Water softening techniques – soda lime process, zeolite process.	CHALK & TALK
	3RD	Ion exchange process of Water Softening.	CHALK & TALK
	4TH	Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization.	CHALK & TALK
5TH	1ST	Water for human consumption for drinking and cooking purposes from any water sources and enlist Indian standard specification of drinking water (collect data and understand standards).	CHALK & TALK
	2ND	Unit 3: Engineering Materials. Natural occurrence of metals – minerals, ores of iron, aluminium and copper, gangue (matrix), flux, slag,	CHALK & TALK
	3RD	Metallurgy-Brief account of general principles of metallurgy.	CHALK & TALK
	4TH	Extraction of - iron from haematite ore using blast furnace	CHALK & TALK
6TH	1ST	Aluminium from bauxite along with reactions.	CHALK & TALK
	2ND	Alloys – definition, purposes of alloying	CHALK & TALK
	3RD	ferrous alloys and non ferrous with suitable examples, properties and applications.	CHALK & TALK
	4TH	General chemical composition, composition based applications (elementary idea only details omitted):	CHALK & TALK
7TH	1ST	Port land cement and hardening, Glasses Refractory and Composite materials.	CHALK & TALK
	2ND	Polymers-monomer, homo and co polymers, degree of polymerization	CHALK & TALK
	3RD	Reactions involved in preparation and their application of thermoplastics and thermosetting plastics (using PVC, PS, PTFE)	CHALK & TALK
	4TH	Preparation of nylon-6, nylon-6,6 and Bakelite),rubber and vulcanization of rubber	CHALK & TALK
8TH	1ST	Unit 4: Chemistry of Fuels and Lubricants, Definition of fuel and combustion of fuel, classification of fuels	CHALK & TALK
	2ND	calorific values (HCV and LCV),	CHALK & TALK
	3RD	Calculation of HCV and LCV using Dulong's formula.	CHALK & TALK
	4TH	Proximate analysis of coal solid fuel	CHALK & TALK
9TH	1ST	Petrol and diesel -fuel rating (octane and cetane numbers),	CHALK & TALK
	2ND	Chemical composition, calorific values	CHALK & TALK
	3RD	Applications of LPG, CNG, water gas, coal gas, producer gas and biogas.	CHALK & TALK
	4TH	Lubrication-function and characteristic properties of good lubricant.	CHALK & TALK
10TH	1ST	classification with examples, lubrication mechanism – hydrodynamic and boundary lubrication	CHALK & TALK
	2ND	Physical properties (viscosity and viscosity index, oiliness)	CHALK & TALK
	3RD	flash and fire point, cloud and pour point only)	CHALK & TALK
	4TH	chemical properties (coke number, total acid number saponification value) of lubricants.	CHALK & TALK
11TH	1ST	Unit 5: Electro Chemistry, (Electronic concept of oxidation, reduction and redox reactions. Definition of terms: electrolytes, non-electrolytes with suitable examples)	CHALK & TALK
	2ND	Faradays laws of electrolysis and simple numerical problems	CHALK & TALK
	3RD	Industrial Application of Electrolysis-Electrometallurgy	CHALK & TALK


	4TH	Electroplating, Electrolytic refining.	CHALK & TALK
12TH	1ST	Application of redox reactions in electrochemical cells- Primary cells-dry cell.	CHALK & TALK
	2ND	Secondary cell-commercially used lead storage battery.	CHALK & TALK
	3RD	fuel and Solar cells. Introduction to Corrosion of metals.	CHALK & TALK
	4TH	definition, types of corrosion (chemical and electrochemical)	CHALK & TALK
13TH	1ST	H ₂ liberation and O ₂ absorption mechanism of electrochemical corrosion	CHALK & TALK
	2ND	factors affecting rate of corrosion	CHALK & TALK
	3RD	Internal corrosion preventive measures-Purification, alloying and heat treatment	CHALK & TALK
	4TH	External corrosion preventive measures: a) metal (anodic, cathodic) coatings, organic inhibitors.	CHALK & TALK
14TH	1ST	Revision & Answer Writing	CHALK & TALK
	2ND	Revision & Answer Writing	CHALK & TALK
	3RD	Revision & Answer Writing	CHALK & TALK
	4TH	Revision & Answer Writing	CHALK & TALK
15TH	1ST	Revision & Answer Writing	CHALK & TALK
	2ND	Revision & Answer Writing	CHALK & TALK
	3RD	Revision & Answer Writing	CHALK & TALK
	4TH	Revision & Answer Writing	CHALK & TALK

LEARNING RESOURCES:

1. Applied Chemistry by Dr. Anju Rawlley Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Text Book of Chemistry for Class XI& XII(Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18
3. Dara, S.S. & Dr.S.S.Umare, Engineering Chemistry, S.Chand. Publication, New Delhi, New Del- hi, 2015.


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