

**UTKAL GOURAV MADHUSUDAN INSTITUTE OF TECHNOLOGY, RAYAGADA****Academic Lesson Plan for 2<sup>nd</sup> Semester – 2025 (Summer)**

Name of the teaching faculty: Miss Dasmanti Sabar,

Guest Faculty (Chemistry)

Discipline : Common (Civil / Electrical / E&amp;TC / Mechanical Engg.)

Dept. : Department of Mathematics &amp; Science

Semester : 2<sup>nd</sup>

Subject : Theory 5 : Applied Chemistry

No of Periods per Week: 4,

Total Periods: 60,

End semester Exam : 70 Marks,

Class Test(I.A.): 30 Marks,

Total Marks: 100 Marks

Week	Period	Unit / Chapter	Topics to be covered
1 <sup>st</sup>	1 <sup>st</sup>	Unit-1 Atomic structure, chemical bonding and solutions	Introduction of atomic structure (Rutherford model of an atom), Bohr's theory.
	2 <sup>nd</sup>	Unit-1 Atomic structure, chemical bonding and solutions	Hydrogen spectrum explanation based on Bohr's model of an atom. Heigenberg's Uncertainty principle.
	3 <sup>rd</sup>	Unit-1 Atomic structure, chemical bonding and solutions	Orbital concept and shapes of s,p, d and f Orbitals . Quantum numbers,
	4 <sup>th</sup>	Unit-1 Atomic structure, chemical bonding and solutions	Pauli's Exclusion Principle ,Hund's rule of multiplicity, Aufbau rule,electronic configuration.

2nd	1 <sup>st</sup>	Unit-1 Atomic structure, chemical bonding and solutions	Introduction of chemical bonding, concepts and types. Concepts of ionic bond.
	2 <sup>nd</sup>	Unit-1 Atomic structure, chemical bonding and solutions	Covalent bond (H <sub>2</sub> ,F <sub>2</sub> ,HF hybridisation in BeCl <sub>2</sub> ,BF <sub>3</sub> ,CH <sub>4</sub> ,NH <sub>3</sub> ,H <sub>2</sub> O).Coordinate bond
	3 <sup>rd</sup>	Unit-1 Atomic structure, chemical bonding and solutions	Hydrogen bonding, metallic bonding, and introduction of ideal solute, solvent, and solution.
	4 <sup>th</sup>	Unit-2 Atomic structure, chemical bonding and solutions	Problems based on solutions-Molarity and parts per million(ppm)
	1 <sup>st</sup>	Unit-2 Water	An introduction of representation of water distribution on earth. Classification of soft water and hard water.
	2 <sup>nd</sup>	Unit-2 Water	Salts causing water hardness, Unit of hardness. Causes of hard water(cause of poor lathering of soap in hard water)
	3 <sup>rd</sup>	Unit-2 Water	Problems caused by the use of hard water in boiler .Quatitative

			Determination of water hardness by EDTA method
	4 <sup>th</sup>	Unit-2 Water	An introduction of Water softening techniques ,soda lime process, zeolite process.ion exchange process for water softening
4 <sup>th</sup>	1 <sup>st</sup>	Unit-2 Water	An introduction of Municipal water treatment (screening, sedimentation)
	2 <sup>nd</sup>	Unit-2 Water	Coagulation, Filtration and disinfection/sterilization.
	3 <sup>rd</sup>	Unit-2 Water	An introduction of Indian standard specification of drinking water and water for human consumption.
	4 <sup>th</sup>	Unit-3 Engineering materials	Introduction to natural occurrence of metals. minerals and ores .
5 <sup>th</sup>	1 <sup>st</sup>	Unit-3 Engineering materials	General principle of metallurgy Extraction of iron from haematite ore,
	2 <sup>nd</sup>	Unit-3 Engineering materials	Extraction of aluminium from bauxite & alloys .
	3 <sup>rd</sup>	Unit-3 Engineering materials	And based applications(Portland cement, glasses, refractory .
	4 <sup>th</sup>	Unit-3 Engineering materials	composite materials And introduction of polymer: preparation of thermoplastics and thermosetting plastics).
6 <sup>th</sup>	1 <sup>st</sup>	Unit-3 Engineering materials	Introduction of rubber and properties, vulcanization of rubber
	2 <sup>nd</sup>	Unit-4 Chemistry of fuels and Lubricants.	An introduction of Fuel & combustion classification of fuel.
	3 <sup>rd</sup>	Unit-4	Calorific value (HCV & LCV),

		Chemistry of fuels and Lubricants	calculation of HCV and LCV using Dulong's formula.
	4 <sup>th</sup>	Unit-4 Chemistry of fuels and Lubricants	Analysis of coal –Proximate Analysis of coal (solid fuel)
7 <sup>th</sup>	1 <sup>st</sup>	Unit-4 Chemistry of fuels and Lubricants	Fuel rating of petrol & diesel (octane & cetane numbers)
	2 <sup>nd</sup>	Unit-4 Chemistry of fuels and Lubricants	Chemical composition , calorific values and application of fuel
	3 <sup>rd</sup>	Unit-4 Chemistry of fuels and Lubricants	An introduction of Lubrication and function of lubricant.
	4 <sup>th</sup>	Unit-4 Chemistry of fuels and Lubricants	Characteristics properties of good Lubricant and introduction of classification of lubricant
8 <sup>th</sup>	1 <sup>st</sup>	Unit-4 Chemistry of fuels and Lubricants	Liquid lubricants , classification and properties, semi-solids lubricants, classification & properties.
	2 <sup>nd</sup>	Unit-4 Chemistry of fuels and Lubricants	Solids lubricants, classification & properties and emulsion.
	3 <sup>rd</sup>	Unit-4 Chemistry of fuels and Lubricants	Mechanism of lubrication and physical properties of lubricant, viscosity .
	4 <sup>th</sup>	Unit-4 Chemistry of fuels and Lubricants	Viscosity index , oiliness.
9 <sup>th</sup>	1 <sup>st</sup>	Unit-4 Chemistry of fuels and Lubricants	flash point and fire point and cloud point and pour point
	2 <sup>nd</sup>	Unit-4 Chemistry of fuels and Lubricants.	Chemical properties of lubricants and coke number or carbon residue.
	3 <sup>rd</sup>	Unit-4 Chemistry of fuels and Lubricants	Total acid number(TAN)

	4 <sup>th</sup>	Unit-4 Chemistry of fuels and Lubricants	saponification value(SV) or saponification number(SN)
10th	1 <sup>st</sup>	Unit-5 Electrochemistry	An introduction of electronic concept of oxidation -reduction .
	2 <sup>nd</sup>	Unit-5 Electrochemistry	Introduction of Electrolytes and non electrolytes.
	3 <sup>rd</sup>	Unit-5 Electrochemistry	Faradays laws of electrolysis
	4 <sup>th</sup>	Unit-5 Electrochemistry	industrial application of electrolysis- electroplating.
11th	1 <sup>st</sup>	Unit-5 Electrochemistry	Electroplating, electrolytic refining.
	2 <sup>nd</sup>	Unit-5 Electrochemistry	Application of redox reactions in electrochemical cells – primary cells –dry cells
	3 <sup>rd</sup>	Unit-5 Electrochemistry	Secondary cell (a)lead acid storage cell (b) fuel cell
	4 <sup>th</sup>	Unit-5 Electrochemistry	(c)Solar cells and introduction of corrosion Dry or chemical corrosion.
12th	1 <sup>st</sup>	Unit-5 Electrochemistry	Wet or electrochemical corrosion.
	2 <sup>nd</sup>	Unit-5 Electrochemistry	introduction of corrosion preventive measures.
	3 <sup>rd</sup>	Unit-5 Electrochemistry	purification ,alloying
	4 <sup>th</sup>	Unit-5 Electrochemistry	Heat treatment and its properties.

13th	1 <sup>st</sup>	Unit-5 Electrochemistry	Introduction of external preventive measures.
	2 <sup>nd</sup>	Unit-5 Electrochemistry	Cathodic protection
	3 <sup>rd</sup>	Unit-5 Electrochemistry	Anodic protection
	4 <sup>th</sup>	Unit-5 Electrochemistry	Organic inhibitors
14th	1 <sup>st</sup>	Unit-5 Electrochemistry	Difference between internal corrosion and external preventive measures
	2 <sup>nd</sup>	Unit-5 Electrochemistry	Question based on Electrochemistry
	3 <sup>rd</sup>	Unit-5 Electrochemistry	Summary
	4 <sup>th</sup>		Unit-1-solved problems and revision.
15th	1 <sup>st</sup>		Unit-2-solved problems and revision
	2 <sup>nd</sup>		Unit-3-solved problems and revision
	3 <sup>rd</sup>		Unit-4-solved problems and revision
	4 <sup>th</sup>		Unit-5-solved problems and revision.

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