Name of Faculty: RAJENDER KUMAR
Discipline: **:** Civil Engg.
Semester: **: 1st**
Subject: **:** Applied Chemistry
Lesson Plan Duration: **15 Weeks**

Week	Lecture Day	Theory Topic (including assignment/ test)	Practical Day	Practical Topic
1st		**UNIT 1 Atomic Structure, Periodic Table and Chemical Bonding**. Bohr's model of atom (qualitative treatment only), dual character of matter: derivation of de- Broglie's equation.	1	To prepare standard solution of oxalic acid.
		Heisenberg's Principle of Uncertainty.		
		Modern concept of atomic structure: definition of orbitals, shapes of s, p and d-orbitals.		
2nd		Quantum numbers and their significance	2	To dilute the given KMnO4 solution.
		Electronic configuration: Aufbau and Pauli's exclusion principles and Hund's rule.		
		Electronic configuration of elements up to atomic number 30.		
3rd		Modern Periodic law and Periodic table.	3	Practical Checking and viva.
		Classification of elements into s, p, d and fblocks.		
		Classification of elements into s, p, d and fblocks.		
4th		Metals, non-metals and metalloids (periodicity in properties excluded).	4	To determine the amount of total dissolved solids(TDS) in ppm in a given sample of water gravimetrically.
		Chemical bonding: cause of bonding, ionic bond, covalent bond, and metallic bond (electron sea or gas model).		
		Physical properties of ionic, covalent and metallic substances.		
5th		**UNIT II** **Metals and Alloys** Metals: mechanical properties of metals such as conductivity, elasticity, strength and stiffness, luster, hardness.	5	To determine the pH of different solutions using a digital pH meter.
		Toughness, ductility, malleability, brittleness, and impact resistance and their uses.		
		Definition of a mineral, ore, gangue, flux and slag.		
6th		Metallurgy of iron from haematite using a blast furnace.	6	Practical Checking and viva.
		Commercial varieties of iron.		
		Alloys: definition, necessity of making alloys, composition, properties and uses of duralumin and steel.		
7th		Heat treatment of steel- normalizing, annealing, quenching, tempering.	7	To determine the viscosity of a lubricating oil using a Redwood viscometer.
		UNIT III Water, Solutions, Acids and Bases **Solutions:** Definition, expression of the concentration of a solution in percentage (w/w, w/v and v/v), normality, molarity and molality and ppm.		
		Simple problems on solution preparation.		
8th		Arrhenius concept of acids and bases, strong and weak acids and bases.	8	To find out the total alkalinity in parts per million (ppm) of a

		pH value of a solution and its significance, pH scale.		water sample with the help of a standard sulphuric acid solution.
		Simple numerical problems on pH of acids and bases.		
9th		Hard and soft water, causes of hardness of water, types of hardness – temporary and permanent hardness.	9	Practical Checking and viva.
		Expression of hardness of water, ppm unit of hardness; disadvantages of hard water.		
		Removal of hardness: removal of temporary hardness by boiling and Clark's method.		
10th		Removal of permanent hardness of water by Ion-Exchange method	10	To find out the strength in grams per litre of an unknown solution of sodium hydroxide using a standard (N/10) oxalic acid solution.
		Boiler problems caused by hard water: scale and sludge formation, priming and foaming, caustic embrittlement.		
		water sterilization by chlorine, UV radiation and RO.		
11 th		**UNIT IV Fuels and Lubricants** Fuels: definition and classification of higher and lower calorific values, units of calorific value, characteristics of an ideal fuel.	11	To prepare a sample of Phenol-formaldehyde resin (Bakelite)/Nylon-66 in the lab.
		Petroleum: composition and refining of petroleum.		
		Gaseous fuels: composition, properties and uses of CNG, PNG, LNG, LPG.		
12 th		Relative advantages of liquid and gaseous fuels over solid fuels. Scope of hydrogen as future fuel.	12	Practical Checking and viva.
		Lubricants- Functions and qualities of a good lubricant, classification of lubricants with examples.		
		Lubrication mechanism (brief idea only).		
13 th		Physical properties (brief idea only) of a lubricant: oiliness, viscosity, viscosity index, flash and fire point, ignition temperature,pour pint.	13	To determine the total hardness of given water sample by EDTA method.
		UNIT V Polymers and Electrochemistry Polymers and Plastics: definition of polymer, classification, addition and condensation polymerization.). 55.3 Introduction and application of nanotechnology:		
		Preparation properties and uses of polythene, PVC.		
14 th		Preparation properties and uses of . Nylon-66, Bakelite.	14	To determine the calorific value of a solid/liquid fuel using a Bomb calorimeter.
		Definition of plastic, thermoplastics and thermosetting polymers; natural rubber and neoprene, other synthetic rubbers (names only.		
		Corrosion: definition, dry and wet corrosion, factors affecting rate of corrosion.		
15 th		Methods of prevention of corrosion—hot dipping, metal cladding,	15	Practical Checking and viva.
		Methods of prevention of corrosion—cementation, quenching, cathodic protection methods.		
		Nano-materials and their classification, applications of nanotechnology in various engineering applications (brief).		