Lesson Plan

Name : Ms. Ankita

Discipline : Civil Engg.

Year : 1st semester

Session : 2023-2024

Subject : Applied Chemistry

Code : 220014

**Teaching Load : 3 Lectures and 1per week**

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| **Week** | **Theory** | | **Practical** |
| **Lecture** | **Topic** | **Topic** |
| **1st** | **1st** | Bohr’s model of atom (qualitative treatment only), dual character of matter | 1. To prepare standard solution of oxalic acid |
| **2nd** | Derivation of de-Broglie’s equation |
| **3rd** | Heisenberg’s Principle of Uncertainty |
| **2nd** | **1st** | Modern concept of atomic structure: definition of orbitals, shapes of s, p and d-orbitals | 2. To dilute the given KMnO4 solution |
| **2nd** | Quantum numbers and their significance.  Electronic configuration |
| **3rd** | Aufbau and Pauli’s exclusion principles and Hund’  rule, |
| **3rd** | **1st** | Electronic configuration of elements up to atomic number 30. | 3. To find out the strength in grams per litre of an unknown solution of sodium hydroxide using a standard (N/10) oxalic acid solution. |
| **2nd** | Modern Periodic law and Periodic table, |
| **3rd** | Classification of elements into s, p, d and f-  blocks |
| **4th** | **1st** | Metals, non-metals and metalloids (periodicity in properties excluded). | 4. To find out the total alkalinity in parts per million (ppm) of a water sample with the help of a standard sulphuric acid solution. |
| **2nd** | Chemical bonding: cause of bonding |
| **3rd** | Ionic bond, covalent bond, and metallic bond (electron sea or gas model), |

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| **5th** | **1st** | | Physical properties of ionic, covalent and metallic substances | 5. To determine the total hardness of given water sample by EDTA method |
| **2nd** | | **Assignment 1** |
| **3rd** | | Revision of unit 1/ Problem solving |
| **6th** | **1st SESSIONAL TEST (UNIT 1 )** | | |  |
| **7th** | **1st** | Metals: mechanical properties of metals such as conductivity, elasticity, strength and stiffness, luster, hardness, toughness, ductility, malleability, brittleness, and impact resistance and their uses. | | 6. To determine the amount of total dissolved solids(TDS) in ppm in a given sample of water gravimetrically |
| **2nd** | Definition of a mineral, ore, gangue, flux and slag. Metallurgy of iron from haematite using a blast  furnace. Commercial varieties of iron | |
| **3rd** | Alloys: definition, necessity of making alloys, composition, properties and uses of duralumin and steel. Heat treatment of steel- normalizing,  annealing, quenching, tempering. | |
| **8th** | **1st** | 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. | | 7. To determine the pH of different solutions using a digital pH meter |
| **2nd** | Arrhenius concept of acids and bases, strong and weak acids and bases, pH value of a solution and its significance, pH scale. Simple numerical problems on pH of acids and bases. | |
| **3rd** | Hard and soft water, causes of hardness of water, types of hardness – temporary and permanent hardness, expression of hardness of  water, ppm unit of hardness | |
| **9th** | **1st** | Disadvantages of hard water; removal of hardness: removal of temporary hardness by boiling and Clark’s method; removal of permanent hardness of water by Ion-Exchange  method | | 8. To determine the calorific value of a solid/liquid fuel using a Bomb calorimeter. |
| **2nd** | Boiler problems caused by hard water: scale and sludge formation, priming and foaming, caustic embrittlement; water sterilization by chlorine, UV  radiation and RO. | |
| **3rd** | Revision / Problem solving/Assignment 2 | |
| **10th** | **2ND SESSIONAL TEST ( UNIT 2.5 – 2.9 & UNIT 3)** | | |  |

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| **11th** | **1st** | Fuels: definition and classification of higher and lower calorific values, units of calorific value, characteristics of an ideal fuel. Petroleum:  composition and refining of petroleum; | 9. To determine the viscosity of a lubricating oil using a Redwood viscometer |
| **2nd** | Gaseous fuels: composition, properties and uses of CNG, PNG, LNG, LPG; relative advantages of liquid and gaseous fuels over solid fuels. Scope of hydrogen as future fuel. |
| **3rd** | Lubricants- Functions and qualities of a good lubricant, classification of lubricants with examples; lubrication mechanism (brief idea only); physical properties (brief idea only) of a lubricant: oiliness, viscosity, viscosity index, flash and fire point, ignition temperature, pour  point. |
| **12th** | **1st** | Polymers and Plastics: definition of polymer, classification, addition and condensation polymerization; preparation properties and uses  of polythene, PVC, Nylon-66, Bakelite; | 10. To prepare a sample of Phenol-formaldehyde resin (Bakelite)/Nylon-66 in the lab. |
| **2nd** | Definition of plastic, thermoplastics and thermosetting polymers; natural rubber and  neoprene, other synthetic rubbers (names only). |
| **3rd** | Corrosion: definition, dry and wet corrosion, factor affecting rate of corrosion, methods of prevention of corrosion—hot dipping, metal cladding, cementation, quenching, cathodic protection  methods |
| **13th** | **1st** | Introduction and application of nanotechnology: nano-materials and their classification, applications of nanotechnology in various  engineering applications (brief). | Revision |
| **2nd** | Revision/Class Test |
| **3rd** | Assignment 3 |
| **14th** |  | **3rd SESSIONAL TEST ( UNIT 4 & UNIT 5)** |  |
| **15th** | **1st** | **Oral test** | Revision & Checking of practical note books |
| **2nd** | **Written test** |
| **3rd** | **Revision** |
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